Data Collection and QI Measurement

Measuring and reporting key data during the QI implementation process informs leaders and teams about progress and guides strategies for change tactics and further implementation revisions.[39, 43] This section outlines process and outcome measures that are specific to eliminating elective deliveries <39 weeks gestation. In addition, national quality measures that tend to dictate data reporting to outside entities are highlighted.[8] The following data collection and measurement section helps support hospitals in meeting and tracking these national objectives.

DATA COLLECTION

As previously outlined in the MAP-IT section, one critical step of successful implementation is defining a data collection plan and refining the data collection process through trial and feedback.
A common mistake is that leaders spend a great deal of time and energy collecting too much data, only to find that they have not collected data on the most critical elements. Thus, data collection should be tailored and minimized to analyze the most important issues surrounding the elimination of non-medically indicated (elective) deliveries. Consider selecting 2-3 quality measures that will inform and support driving change. Selecting too many measures at one time can be overwhelming and frustrating. Identify measures that fit the capacity of the team and add new measures as the initial quality measures are achieved.

Data Collection Planning

- Identify data to be collected, how it will be captured, by whom, and how often.
- Select 2-3 quality measures that can be tracked over time. Examples of types of quality measures and measurement specifications are described in this section and can be collected using the sample Data Collection Form also contained in this section.
- Calculate measures approximately every month based on the customized measurement specifications.
- Collect at least 2-3 months of pre-implementation baseline data. This can be done retrospectively by chart review or prospectively, as other parts of the project are being established, e.g., mobilizing the leaders who will support implementation efforts.
- Develop trend charts to display and communicate results with team members on a regular basis.

Typically, facilities collect data to understand both process and outcome measures. QI results are not immediately apparent when patient outcomes are used as a measure, because outcomes are usually slower to change than processes. Therefore, the first months of QI projects typically focus on process measures.

Baseline Data

Before the project begins, baseline data should be collected. These baseline data help assess the situation and identify areas for improvement. For example, clinicians may not know their volume of elective deliveries prior to 39 weeks because clinicians may not be recording indications for induction and cesarean sections. Similarly, clinicians may not be recording how gestational age is confirmed. Thus, another potential benefit of baseline data collection may be an improvement in the accuracy and completeness of the documentation of the indications of induction or cesarean section and gestational age.

Data Collection

Completion of the sample QI Data Collection Form contained in this section can be utilized to assess implementation progress and to calculate chosen measures. Almost all data fields on the sample QI Data Collection Form can be populated using data collected on the Sample Scheduling Form. Delivery outcomes data can usually be obtained from the L&D logbook.

Trend Charts

Data can be an important tool to inform and to motivate hospital staff. Trend charts are developed to highlight desired QI data measures and are utilized to communicate the amount of progress that has or has not been made toward achieving the end goal.

SELECTING QUALITY MEASURES

The types of measures selected by hospital leaders are based on the project characteristics and national requirements. Examples of quality measures include: 1) Process, 2) Structure, 3) Outcome, and 4) Balancing measures. Table 9 provides definitions of process, outcome and national quality measures for a QI project to eliminate non-medically indicated (elective) deliveries prior to 39 weeks. Examples of these types of measures and types of collection tools are also described.

Table 9: Examples of Quality Measures

Measure Type Definitions	Measure Examples	Collection Tools
Process Measures: • Are key steps in the workflow that collectively impact outcomes. • Are critical elements of all effective QI implementation plans because they provide immediate feedback on progress being made toward long-term goals. • Rarely provide information about patient outcomes. • May not be easy to identify process measures that are the most critical to success.	• Is the indication for the induction charted? • Does the charted indication meet the scheduling criteria? • Is gestational age charted? • Is it ≥39 weeks? • How many mothers had elective deliveries prior to 39 weeks? • What proportion of 37-39-week births had an elective induction or cesarean section?	• It is important to structure the scheduling form in a manner that makes data points easy to identify and collect. • Process flow charts help a team outline all of the processes that affect outcomes.
Outcome Measures: • Identify good and bad consequences for the patient (unintended consequences are equally important). • Are the ultimate measure of the success of all QI projects. However, true adverse outcomes are often rare or difficult to collect; therefore, time intervals between rare events are another way to measure outcomes. • Often require a separate data collection approach than that used for collecting process measures.	• Number of elective <39-week births admitted to the NICU. • Frequency of RDS or other neonatal morbidity. • Measurements of the number of shoulder dystocias (balancing measure).	• Outcome measures require some data choices and a very large sample size. Thus, they are typically done in large multi-center trials that provide data for use by smaller centers. • Most centers want to identify one or two outcome measures to keep staff focused on the goal. For example, Intermountain Healthcare collected data on the number of infants electively delivered prior to 39 weeks and NICU admissions.
National Quality Measures: • Serve as benchmarks and may be required for outside regulatory agencies like TJC. • May or may not be directly part of the QI data process.	• TJC and the LeapFrog Group both have quality measures for elective deliveries < 39 weeks.	• These organizations provide detailed data collection specifications described later in this section.

QI Data Collection Form for Singleton Scheduled Inductions and Cesarean Sections

Admit Date	Name	OB Initials	Scheduled Induction or Cesarean Section	Bishop Score	Dates (Circle if < 39 week)			OB/Medical Condition		Sched CS	Outcomes (Data collected from Delivery and NICU logbooks)	
					GA (week & day)	Dates confirmed by sono < 20 wk	Mature fetal lung test	Abruption/Previa Choriomanionitis Fetal Demise Gestational HTN Chronic HTN GDM Diabetes (Type I or II) PROM >41 wks Prior fetal demise	Oligo/Polyhydram IUGR Non-reassuring Fetal Status Isoimmunization Heart Dx Liver Dx Renal Dx Coagulation Dx Pulmonary Dx HIV	Prior CS Prior Classical CS Prior Myomec Breech/Trans. Patient Choice **Elective Ind** Choice/Social Macrosomia Distance Other:_____	Delivery: Spon Vag=SV OPVag=OV Cesarean=CS	NICU Admit
1/1/10	Smith, J	EM	Ind	8	39 + 1	X		PROM			OV	No
1/5/10	Jones, M	JG	CS		36 + 1	X	X	Previa			CS	Yes
1/6/10	Lee, M	CO	CS		38 + 5	X				Macrosomia	OV	No
1/6/10	Carpenter, A	JG	Ind	8	40 + 4	X				Choice	SV	No

Comments:
1. The last two columns are outcome measures that help reinforce the change process.
2. The lung maturity testing column is included as an option to document lung maturity for scheduled deliveries with a medical/OB indication, e.g. placenta previa. Lung maturity testing as a column on this log is not meant to imply that elective induction at <39 weeks is acceptable if there is a mature lung test (this is contrary to ACOG guidelines)
3. This data collection tool is for women with one fetus since the national guidelines for <39 weeks are specified for singletons only; multiples have different gestational age guidelines. A hospital may choose to collect data on multiples if they want to track this population.

Form options:
1. NICU length of stay may be tracked instead of or in addition to NICU admission.
2. Bishop Score and Fetal Lung Maturity Test do not relate to the recommended QI measures but may be of interest to QI project leaders. These columns can be removed or revised based on local hospital guidelines.
3. Data collection may be limited to women who give birth >=37 weeks 0 days gestation or extended to include all women who give birth.

MEASURE SPECIFICATIONS AND GUIDELINES

Outlined below are the specific quality measures that can be used to assess critical elements of the non-medically indicated (elective) deliveries <39 weeks. The numerators and denominators that are used to compute the measures are defined. In addition, there is information about how to obtain the necessary data to support the calculation of the following quality measures.

- Measures 1 and 2 are among the first measurements performed to identify how well clinicians document and collect data on women with the most accurate measurement of gestational age and indications for scheduled deliveries.
- Measures 3 and 4 are done to analyze the *specific issue*: how many inductions between 37 0/7 days to 38 6/7 weeks are non-medically indicated (elective) and how many cesarean births are non-medically indicated (elective)?
- Measure 5 summarizes the whole project: how many inductions or cesarean births between 37 0/7 days to 38 6/7 weeks are non-medically indicated (elective)?
- Measure 6 is essentially identical to TJC measure. It calculates of ALL low-risk women (without a medical condition) between 37 0/7 days to 38 6/7 weeks, how many have inductions or cesarean births that are non-medically indicated (elective)?
- Measure 7 tracks an important outcome of the project – reduction in the number of infants admitted to the neonatal intensive care unit (NICU).

RECOMMENDED PROCESS MEASURES

Measurement 1: Percent of women with scheduled induction/cesarean section and gestational age confirmed by sonogram

Purpose: Identify how well clinicians document gestational age using the most accurate measurement technique.

Numerator: Number of women from the denominator with "Gestational Age Confirmed by Sonogram" checked on Data Collection Form

Denominator: Total number of women with scheduled induction/cesarean section (at all gestational ages)

Target: 100% of women with scheduled induction/cesarean section will have gestational age confirmed by sonogram recorded on the Data Collection Form. (Once the target of 100% is routinely reached, this measure is no longer needed.)

Measurement 2: Percent of women with scheduled induction/cesarean section and a medical or obstetric indication charted

Purpose: Identify how well clinicians document indications for scheduled deliveries.

Numerator: Number of women from the denominator with a medical or obstetric indication recorded on the Data Collection Form (in either "Indication" column)

Denominator: Total number of women with scheduled induction/cesarean section (at all gestational ages)

Target: 100% of women with scheduled induction/cesarean section will have a medical or obstetric indication recorded on the Data Collection Form. (Once the target of 100% is routinely reached, this measure is no longer needed.)

Measurement 3: Percent of inductions between 37 0/7 and 38 6/7weeks that are non-medically indicated (ELECTIVE).

Purpose: Identify how many inductions in the Early Term time period are non-medically indicated (elective).

Numerator: Number of women from the denominator with an indication in the "Elective" column on the Data Collection Form; ***excludes*** active labor or pre-labor rupture of membranes

Denominator: Total number of women with singleton births and a scheduled induction between 37 0/7 and 38 6/7 weeks

Target: 0% of women with singleton births will have scheduled non-medically indicated (ELECTIVE) delivery between the gestational period of 37 0/7 and 38 6/7weeks.

Measurement 4: Percent of scheduled cesarean sections between 37 0/7 and 38 6/7 weeks that are non-medically indicated (ELECTIVE.)

Purpose: Identify how many scheduled cesarean sections occur in the Early Term time period that are non-medically indicated (elective).

Numerator: Number of women from the denominator with an indication in the "Elective" column on the Data Collection Form; ***excludes*** active labor or pre-labor rupture of membranes

Denominator: Total number of women with singleton births and a scheduled cesarean section between 37 0/7 and 38 6/7 weeks

Target: 0% of women with singleton births will have scheduled non-medically indicated (ELECTIVE) cesarean section between 37 0/7 and 38 6/7 weeks.

Measurement 5: Percent of inductions AND scheduled cesarean sections between 37 0/7 and 38 6/7 weeks that are non-medically indicated (ELECTIVE.) (Measures 3 and 4 combined)

Purpose: Summarizes the whole project – Identifies how many scheduled inductions AND scheduled cesarean section occur in the Early Term time period that are non-medically indicated (elective).

Numerator: Number of women from the denominator with an indication in the "Elective" column on the Data Collection Form; ***excludes*** active labor or pre-labor rupture of membranes (Add numerators from Measures 3 and 4)

Denominator: Total number of women with singleton births and a scheduled induction or cesarean section between 37 0/7 and 38 6/7 weeks (Add denominators from Measures 3 and 4)

Target: 0% of women with singleton births will have scheduled non-medically indicated (ELECTIVE) induction or cesarean section between 37 0/7 and 38 6/7 weeks.

OPTIONAL PROCESS MEASURE

Measurement 6: Percent of low-risk women between 37 0/7 to 38 6/7 weeks that have either a scheduled induction or cesarean that is non-medically indicated (ELECTIVE)
Note: Optional and requires additional data beyond the data collection form to create the denominator and is essentially identical to the Joint Commission measure PC-01.

Purpose: Changes the denominator from Measure 5 and asks of ALL low-risk women (without a medical condition) in Early Term time period, how many have inductions or cesarean births that are elective?

Numerator: Number of women from the denominator with scheduled induction or cesarean section and an indication in the "Elective" column on the Data Collection Form; ***excludes*** active labor or pre-labor rupture of membranes (note: this is the same numerator as Measure 5)

Denominator: Total number of ALL low-risk women (singleton deliveries between 37 0/7 and 38 6/7 weeks) without a known medical indication. This is obtained from another source other than the data collection from most hospitals would use labor log system (paper or electronic)

Target: 0% of low-risk women will have a scheduled non-medically indicated (ELECTIVE) induction or cesarean section prior to 39.0 weeks.

RECOMMENDED OUTCOME MEASURE

Measurement 7: Number of infants admitted to the NICU or transferred to another hospital for care after a scheduled elective induction/ cesarean section between 37 0/7 and 38 6/7 weeks.

Purpose: Tracks reduction in the number of infants admitted to the NICU or transferred to another hospital.

Numerator: Number of infants from women in the denominator admitted to the NICU (or transferred to another hospital)

Denominator: Total number of women with singleton births and a scheduled induction or cesarean section between 37 0/7 and 38 6/7 weeks (same denominator as Measure 5)

Target: 0% of infants will be admitted to the NICU.

Measurement 7 – Alternate:

An alternative or additional measure that more accurately tracks outcomes and costs is the measurement of NICU length of stay (NICU-LOS) for newborns born between 37 0/7 days to 38 6/7 weeks. However, the NICU-LOS measure is more difficult to collect.

OVERVIEW OF NATIONAL QUALITY MEASURES

Outlined below are national quality measures recommended by the Joint Commission and Leapfrog to reduce elective deliveries prior to 39 weeks. This toolkit has been designed to support hospital leaders' efforts to achieve their quality improvement goals and meet national guidelines. At present benchmarks do not exist but will be set by these national organizations once data have been collected and analyzed.

THE JOINT COMMISION

National Quality Core Measures: Perinatal Care Measure Set—
PC-01 Elective Delivery (April 2010 specifications)
http://manual.jointcommission.org/releases/archive/TJC2010A1/MIF0166.html

Description: Of all 37-39 week singleton births without a medical or obstetric medical condition, how many mothers are having electively scheduled deliveries (induction or cesarean section)?

Type of measure: Process

Numerator: Number of women (delivering singleton newborns between ≥37 and <39 weeks gestation without a medical/obstetric indication (Table 10), and not in active labor or with spontaneous rupture of membranes) with a cesarean section or an induction of labor

Denominator: Total number of women delivering singleton newborns between ≥37 and <39 weeks of gestation without a medical/obstetric indication (Table 10), and not in active labor or with spontaneous rupture of membranes

Sampling: Yes, per protocol. (Entire population is also accepted.)

Comment: This measure is likely to be the most widely accepted national measure definition but requires data collection based on chart review. Data collection can be facilitated with well-designed logbooks described earlier. The Joint Commission quality measure is newly developed, so additional tweaking is most likely to occur over the next few years. For example, it is likely that new exclusions may be added after hospital leaders have more experience with data collection.

THE LEAPFROG GROUP

Normal Deliveries-1: Elective Delivery Prior to 39 Completed Weeks Gestation (April 2009 specifications)[50]

Description: Of all births >37 weeks without a medical or obstetric condition, how many women with singleton births at 37-39 weeks are having electively scheduled deliveries (induction or cesarean section)?

Type of measure: Process

Numerator: Number of women with singleton births (≥37 gestation during the reporting period with excluded populations (medical or obstetric conditions, Table 10) with a cesarean section or an induction of labor and <39 weeks gestation

Denominator: Total number of women with singleton births ≥37 weeks gestation during the reporting period with excluded populations (medical or obstetric conditions, Table 10)

Sampling: No

Comment: The Leapfrog measure specifications may be superseded by those outlined by TJC.

Table 10: Comparison of National Specifications for Medical Conditions that May Justify a Scheduled Delivery Prior to 39 weeks Gestation		
ACOG[11]: "Examples of Conditions That May be Indications for Induction of Labor"[)]	**NQF[8] and LeapFrog[50]: "Specifications for Early Medically-Indicated Delivery" (with ICD9 codes)**	**TJC[19]:"Conditions Justifying Delivery <39 weeks" (PC-01 version 04/10) (with ICD9 codes)**
Abruption	Placental abruption, placenta previa, unspecified antenatal hemorrhage (641.x)	<same as NQF>
Chorioamnionitis	*No ICD9 included*	*No ICD9 included*
Fetal demise	Fetal demise (656.41, V27.1)	<same as NQF> plus pregnancy with diagnosis of stillbirth (V23.5)
Gestational hypertension, preeclampsia, eclampsia, chronic hypertension	Any hypertensive disorder (642.x)	<same as NQF>
Pre-labor rupture of membranes (PROM)	Ruptured membranes (658.11)	<same as NQF> plus delayed delivery after rupture of membranes (658.21)
Post-term pregnancy	Post-dates (645.x)	<same as NQF>
Diabetes mellitus	Preexisting diabetes mellitus (648.0), gestational diabetes (648.8)	<same as NQF>
Renal disease	Renal disease (646.2)	<same>
Chronic pulmonary disease	*No ICD9 included*	*No ICD9 included*
Antiphospholipid syndrome	Maternal coagulation defects in pregnancy, (649.31)	<same as History>
Other maternal diseases	Liver diseases (646.71), congenital cardiovascular disorders (648.5), other cardiovascular diseases (648.6)	<same as NQF>
Not included	*Not included*	Asymptomatic HIV infection (V08), HIV disease (042)
Fetal compromise	*Not included*	Fetal distress (656.31), abnormal fetal heart rate (659.71)
Severe fetal growth restriction	Intrauterine growth restriction (IUGR) (656.51)	<same as NQF>
Isoimmunization	Isoimmunization related to Rh (656.11) or related to other types (656.21)	<same as NQF> plus fetal-maternal hemorrhage (656.01)
Oligohydramnios	Oligohydramnios (658.01)	<same as NQF>
Not included	Polyhydramnios (658.11)	<same as NQF>
Not included	Multiple gestation (651.x)	<same as NQF>
Not included	Malpresentations (breech, face, brow, transverse, unstable lie or high head at term (652.x)	*Not included, except for unstable lie (652.01)*
Not included	*Not included*	Fetal central nervous system malformation or chromosomal abnormality, suspected damage to the fetus from viral or other diseases in the mother, drugs, radiation (655.01, 655.11, 655.31, 655.41, 655.51, 655.61)

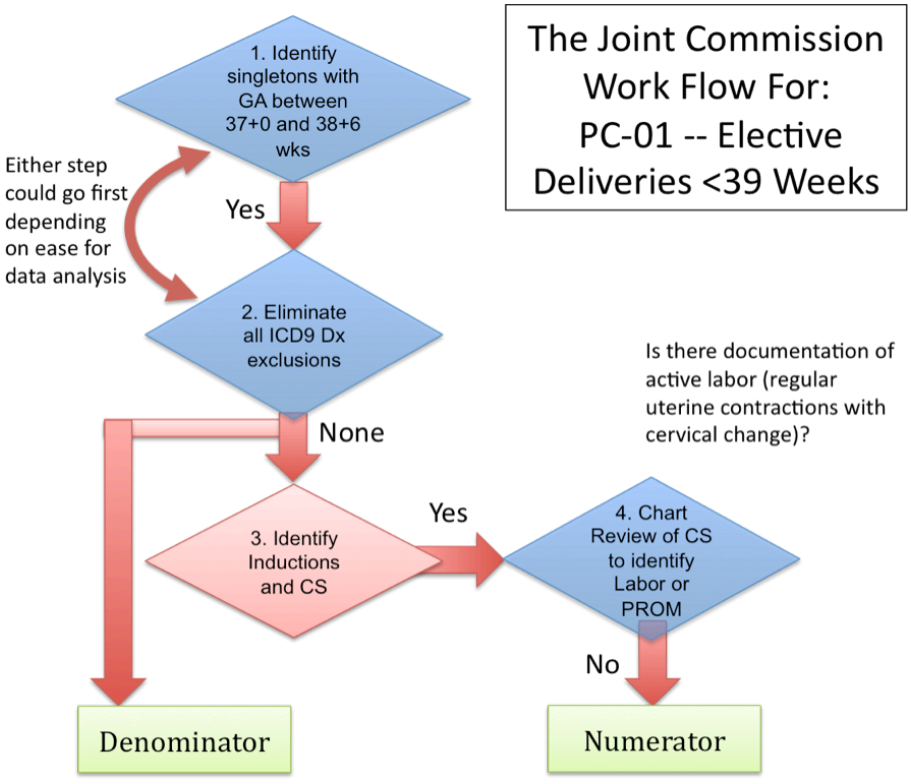
Data Collection for Quality Measurement

Data collection to track the number of non-medically indicated (elective) deliveries performed before 39 weeks gestation at individual hospitals include some data elements that are available in administrative data sets and other data elements that are not. The data elements that are available in Patient Discharge Diagnosis (PDD) datasets include ICD9 diagnosis and procedure codes. Limitations of PDD datasets include the lack of any codes for gestational age; poor coding for induction of labor (often confused with labor augmentation); and the absence of a code for labor (which is a critical required element for assessment of whether the cesarean section was elective (scheduled or indicated.) Although there is an ICD9 diagnosis code for rupture of membranes there is no evidence that this code is consistently used when a repeat cesarean section is performed or when labor is induced at term.[51-53] The lack of consistent coding of the presence of rupture of membranes will affect the ability of administrative data to accurately capture the number of women who had an elective delivery prior to 39 weeks.

The data elements that are available on the birth certificate include gestational age, birth method and a limited number of diagnoses. However, there is some concern as to the accuracy of the gestational age that is recorded. For example, hospitals vary as to how they identify the final or best gestational age that gets recorded on the birth certificate. Furthermore, maternal diagnoses are variably recorded on the birth certificate.[51, 52] Birth certificate data typically is not helpful to hospital leaders but are useful for state public health surveillance programs since these data provide the ability to perform some population tracking such as following the portion and trends of all births occurring between 37 to 39 weeks of gestation.

In recognition of the limitations of administrative data sets, The Joint Commission Perinatal Core Measure PC-01 has outlined data collection steps that require primary chart review for at least some of the data elements. [19] (Refer to Figure 16)

Figure 16. The Joint Commission Work Flow For: PC-01 – Elective Deliveries <39 Weeks



To circumvent the limitations in administrative datasets, hospital leaders have begun to utilize standardized data collection forms that prompt them to capture the key data that are required by the Joint Commission. An example is the "QI Data Collection form for Singleton Scheduled Inductions and Cesarean Sections." This sample form is meant to be used in conjunction with the sample scheduling form. When both forms are used together they help the front-line leaders streamline data collection and minimize the need for data collection from chart review.

The Joint Commission allows hospital leaders to monitor compliance with PC-01 "Elective Deliveries <39 Weeks" by sampling approximately 200 cases per year.[19] However, for the purposes of supporting the goals of a QI project (Rapid Change Cycles using either MAP-IT or PDSA), it is preferable to collect data on all cases during the baseline and active implementation phases of the project. More comprehensive data collection provides leaders with the necessary information to identify practice patterns, obtain trend data, and have more accurate statistics. Once the QI project goals have been achieved, the frequency of monitoring can be reduced to maintenance monitoring based on the needs of the local leader. The tools developed and included in this toolkit are meant to facilitate the hospital leader's data collection efforts and decisions and should be tailored to the individual population needs. Table 11 summarizes four commonly available data collection sources of key data elements for measuring non-medically indicated deliveries prior to 39 weeks.

Table 11:
Data Element Sources with Combined Rankings of Availability and Reliability[50-52]

Data Element	Medical Record (chart)	Labor Logbook or Unit-level Electronic Data (e.g. Fetal monitor systems)	Patient Discharge Diagnosis record (e.g. UB-92)	Birth Certificate
Singleton	Good	Good	Good	Good
Mother's age	Good	Good	Good	Good
Gestational age	Good	Good	Not available	Fair
Maternal diagnoses	Good	Fair-Good	Fair-Good	Fair-Poor
Cesarean section	Good	Good	Good	Good
Induction	Good	Good	Fair (often confused with augmentation)	Fair (often confused with augmentation)
Labor present prior to CS or induction	Good	Fair	Not available	Not available
Rupture of membranes present prior to CS or induction	Good	Good	Sometimes available	Not available

Good = estimated >95% present and accurate
Fair = estimated 50-70% present and accurate
Fair-Poor = estimated 20-70% present and accurate