

Using a State Birth Registry as a Quality Improvement Tool

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Abstract

Background Birth registry data are universally collected, generating large administrative datasets. However, these data are typically not used for quality improvement (QI) initiatives in perinatal medicine because the quality and timeliness of the information is uncertain.

Objective We sought to identify and address causes of inaccuracy in recording birth registry information so that birth registry data could support statewide obstetrical quality initiatives in Ohio.

Study Design The Ohio Perinatal Quality Collaborative and the Ohio Department of Health Vital Statistics used QI techniques in 15 medium-sized maternity hospitals to identify and remove systemic sources of inaccuracy in birth registry data. The primary outcome was the rate of scheduled deliveries without medical indication between 37^{0/7} and 38^{6/7} weeks at participating hospitals from birth registry data.

Results Inaccurate birth registry data most commonly resulted from limited communication between clinical and medical record staff. The rate of scheduled births between 37^{0/7} and 38^{6/7} weeks' gestation without a documented medical indication as recorded in the birth registry declined by 35%.

Conclusion A QI initiative aimed at increasing the accuracy of birth registry information demonstrated the utility of these data for surveillance of perinatal outcomes and has led to ongoing efforts to support birth registrars in submitting accurate data.

Keywords

- ▶ birth registry data
- ▶ quality improvement
- ▶ perinatal outcomes
- ▶ population health

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Administrative or population health datasets are often used for research related to maternal and infant health. These descriptive reports are retrospective yet powerful because of their large sample size and immediate relation to a population for which the authors often have responsibility. As Lain et al have noted, uncertainties about the accuracy and timeliness of information recorded in such data limits its use for policy decisions, quality improvement (QI) efforts, and research.¹

In 2007, a consortium of Ohio perinatal clinicians, hospitals, and policy makers established the Ohio Perinatal Quality Collaborative (OPQC, www.opqc.net). The initial OPQC obstetrical project to reduce inappropriate scheduled births before 39^{0/7} weeks of gestation, conducted between 2008 and 2010 in Ohio's 20 largest birth hospitals, was associated with a significant reduction in elective near-term births.² The project used hand collected data from scheduled birth forms submitted monthly by each site. Seeking external validation of the effects of the QI project, we compared project data to birth registry data recorded over the same time.³ The degree of concordance varied substantially across sites, with high concordance reported from sites with frequent communication between clinicians and birth registrars. Birth registrars at all sites expressed great interest in pursuing steps to improve the quality and timeliness of data collection. When OPQC was asked to disseminate this project to the remaining 95 Ohio maternity hospitals, we realized that although resources for hand collected data were not available, the birth registry was in place in every maternity hospital, accompanied by a work force of registrars who were eager to provide accurate and timely information. However, we also recognized that using the birth registry as the sole

source of data for this statewide effort would also require a parallel QI effort focused on birth registry accuracy. We therefore chose to pilot a dual effort to improve the birth registry data, alongside an effort to improve clinical care in a small number of representative community hospitals. In this article, we describe our efforts to improve the accuracy of birth certificate data and reduce the rates of scheduled deliveries before 39 weeks to less than 5% of births as measured by birth certificate data, in a small group of community-based maternity hospitals in Ohio.

Materials and Methods

Participants

In this study, 15 hospitals were selected for the pilot project to provide a group with a representative range of characteristics, including number of births, percentage of births covered by Medicaid, baseline percentage of scheduled births between 37^{0/7} and 38^{6/7} weeks without medical indication, and geographic diversity (► **Table 1**). Recruitment letters, signed by the clinical obstetric leader of OPQC and the director of the Ohio Department of Health (ODH), were sent to the chief executive officers of each hospital, inviting participation in the initiative. Staff from ODH Vital Statistics called each hospital to invite the hospital to participate in the pilot project. Sites were asked to establish a QI team that included both clinical and data staff, for example, at least one physician, one nurse, and one birth data manager.

Improvement Goal

Key driver diagrams are typically used in the design of a QI project to provide a framework of the aim, outline key factors

Table 1 Characteristics of the 15 hospitals participating in the pilot project, based on data in the 2010 Ohio IPHIS birth registry

Hospital	No. of births in 2010	Percentage of 2010 births to mothers on Medicaid (%)	Percentage of 2010 scheduled births 37–38 weeks' gestation without medical indication (%)
1	4,166	27.3	5.0
2	3,052	5.0	7.8
3	2,434	16.5	13.2
4	1,915	40.2	11.2
5	1,652	44.2	18.6
6	1,440	42.4	6.9
7	1,412	41.6	21.0
8	1,111	64.8	11.1
9	1,052	69.3	14.3
10	1,051	45.4	25.4
11	1,004	55.9	14.1
12	988	77.4	3.9
13	981	47.0	37.1
14	583	72.2	17.1
15	493	79.9	30.2

necessary for improvement, identify potential change strategies, and focus QI teams on the most important factors likely to affect outcomes. We developed two key driver diagrams for this project focused on: (1) reducing scheduled deliveries prior to 39 weeks without medical indication (►Fig. 1) and (2) improving the accuracy of the birth registry (►Fig. 2). As outlined on the key driver diagrams, the aims were (1) to reduce the rate of scheduled births to women at 37^{0/7} to 38^{6/7} weeks' gestation that lacked documentation of an appropriate medical or obstetric indication to less than 5% and (2) to improve birth registry accuracy so that selected key variables are transmitted accurately in 95% of records, both within 9 months in participating hospitals.

Interventions

We used an adapted learning collaborative model⁴⁻⁷ accompanied by site visits to each hospital. A face-to-face learning session was held in March 2012, in which teams from each of the 15 sites met with content and improvement experts. OPQC QI consultants and staff from the ODH Office of Vital Statistics visited each pilot hospital between April and June 2012. During these site visits, clinical and data abstraction staff completed process flow maps for scheduled induction of labor and cesarean birth, and for birth data extraction. They discussed barriers and opportunities for scheduling deliveries and improving birth certificate accuracy. Vital Statistics staff took notes and kept a spreadsheet of pertinent information. Each site compared medical record data for key

data fields from three to five preselected patients to the corresponding data in the ODH Integrated Perinatal Health Information System (IPHIS), which automates the collection of pregnancy and newborn data. Policies based on national guidelines for scheduled inductions before 39 weeks were also reviewed.^{8,9} Participants were asked to create locally appropriate strategies, for example, use of a scheduled birth form documenting gestational age and indication for scheduled birth, and use QI methods,² for example, plan-do-study-act cycles, to address any gaps in adhering to the guidelines and to improve the accuracy of the site's birth data. We shared educational materials provided by the Ohio chapters of the ACOG and the March of Dimes for pregnant women, their families, and health professionals about not scheduling early elective deliveries because infants are not fully developed until 39 weeks. We also discussed opportunities for testing new strategies. Site visits typically lasted 4 hours.

Based on observations occurring at site visits, OPQC and ODH Vital Statistics personnel identified a need to provide additional training for hospital staff regarding recognition, definition, and abstraction of key birth registry variables. OPQC clinical leaders and ODH Vital Statistics staff identified a list of data elements deemed essential for QI such as best obstetrical estimate of gestational age and medical indication for scheduled birth (see ►Table 1). Thirteen key variables were selected from more than 360 data elements in the IPHIS. A brief guide to the chart location and keywords

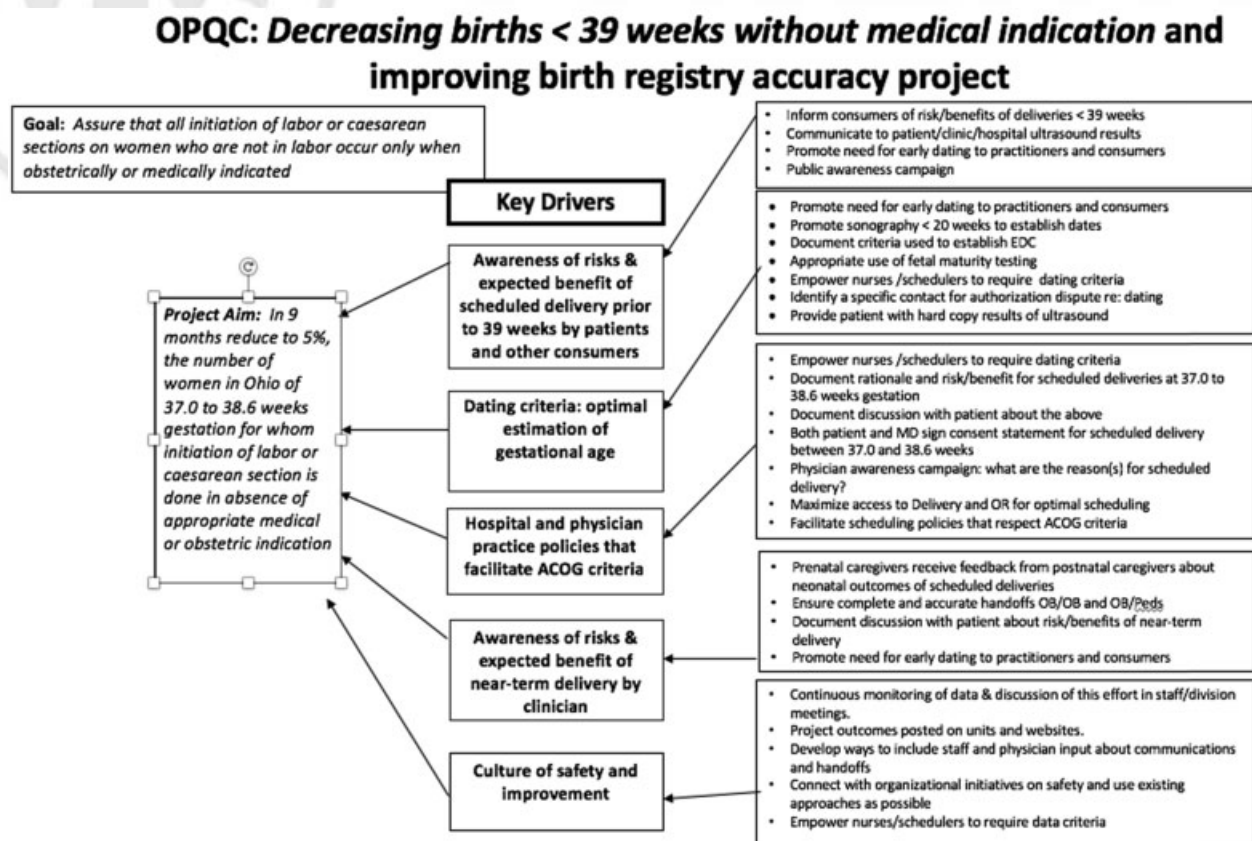


Fig. 1 Key driver diagram: 39-week scheduled delivery project.

OPQC: Decreasing births < 39 weeks gestation without medical indication and improving birth registry accuracy project

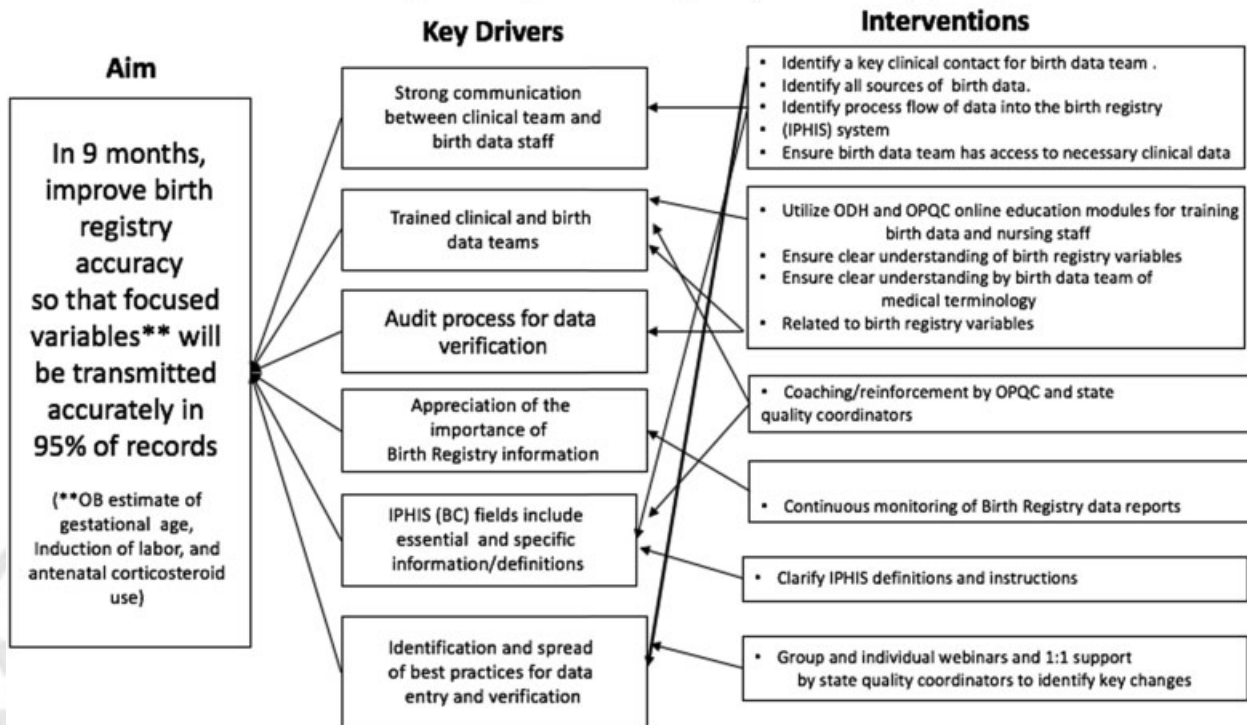


Fig. 2 Key driver diagram: improving birth certificate accuracy.

associated with each variable, its definition and importance, and helpful tips to further aid the data registrars was created.¹⁰ This document focused project efforts and was emphasized during subsequent monthly team and individual site calls. In addition, the ODH manual on completing the birth data was also reviewed and clarifying revisions made.^{11,12}

Between May and December 2012, teams conducted plan–do–study–act cycles to test improvement changes¹³ and participated in monthly calls to report challenges encountered and strategies tested. Each site was provided with quarterly summaries of its own individual and aggregate collaborative birth registry data in control chart format that displayed rates of scheduled deliveries without an indication over the preceding 60 months. Webinars addressed clinical practice issues related to scheduled deliveries and successful strategies to improve birth registry data quality. Two experienced perinatal nurses trained in QI contacted each team at least twice monthly to assess progress and provide QI coaching support.

Outcomes and Data Collection

The primary clinical outcome was the aggregate rate of scheduled births between 37^{0/7} and 38^{6/7} weeks that lacked a documented medical indication in the 15 pilot hospitals. Changes in the primary outcome measure were hypothesized to reflect improvements in clinical efforts to reduce scheduled deliveries without an indication and in birth

registry accuracy. We also sought to identify key factors associated with successful site participation.

Rates of scheduled deliveries without a medical indication were tracked using IPHIS birth registry data entered by each participating hospital. The IPHIS data elements document inductions of labor but do not track scheduled cesarean births. The scheduled inductions metric, in place since 2006, was helpful to generate a baseline rate, to track changes over time, and to reflect the indications used to support decisions to schedule a birth.

Barriers to accurate data entry were identified in ODH Vital Statistics field notes from site visits and from monthly narrative reports submitted by each team.

Analysis

We used statistical process control methodology^{14,15} to detect change in outcomes in birth certificate data. The period January 2010 through February 2012 was used as a preintervention reference baseline to calculate a centerline (mean) and control limits. Once baseline data are displayed, data values are added monthly and monitored for evidence of significant change using standard statistical rules. These rules predict that, if the system of care does not change significantly, subsequent data values added after establishing a baseline will vary randomly around the centerline and within the control limits. In contrast, significant changes in the system of care will produce nonrandom patterns characterized by the standard statistical rules.^{14,15}

The birth registry data show a stable baseline from January 2010 through August 2011, when a mean of 13.64% births in the pilot hospitals were induced without a documented medical indication during this interval. Between August 2011 and February 2012, a mean of 9.26% of births in the pilot hospitals were induced without medical indication. This difference was sufficient to indicate/suggest a significant change associated with an external cause. The explanation for this decrease is uncertain but may have been influenced by concurrent state and national efforts to reduce early elective delivery.

Human Subjects Protection

OPQC received approval from the ODH Institutional Review Board (#2010-42, original date of review November 23, 2010, and renewal February 3, 2012), including permission to obtain Vital Statistics files monthly to perform analyses at the hospital, regional, and state level. Encrypted data are transferred electronically to OPQC via a secure, password-protected, World Wide Web-based extranet. The Health Insurance Portability and Accountability Act–specified, limited dataset procedures are used for all OPQC improvement projects.

Results

In this study, 15 of the 16 hospitals invited to participate agreed to participate; the hospital that declined was undergoing significant reorganization. Twelve of the 15 were Level II hospitals with mean number of deliveries of 1,200/year (range: 450–4,000). About 38% of the women who gave birth at these 15 hospitals were insured by Medicaid (see ►Table 1). All hospitals (15/15) had a departmental policy limiting scheduled deliveries before 39 weeks' gestation to those with medical indication, but only six had a policy that required documentation of the reason for scheduling an induction, and/or halting inductions until a sufficient medical indication was documented. At the time of the ODH + OPQC staff site visit, 13 of the 15 hospitals used audits of medical records to assess compliance with the Joint Commission < 39-week criteria; only one used audits to compare medical records and IPHIS data.

There was robust participation by the 15 teams in OPQC activities: 100% teams completed the site visit, 93% (14/15) teams attended the learning session, 73% (11/15) participated in at least 6 of the monthly webinars, and 73% (11/15) teams completed 5 monthly progress reports. Of note, eight teams attended all the webinars and nine completed all progress reports.

The site visits and monthly reports identified several key barriers to accurate birth data entry. Every hospital identified data entry errors during the medical record–IPHIS review at the site visit; no site recorded complete agreement between the medical record and the corresponding IPHIS entry. Sites that relied on nonmaternity unit staff (e.g., Medical Records personnel) for data entry had more errors in data accuracy than maternity unit staff. Birth data registrars and clinical teams often had no regular interactions. In

some sites, the data abstractors had never met the maternity clinical team members. Data abstractors often used definitions of requested variables that demonstrated a lack of clear understanding of birth registry definitions. For example, the source of “obstetrical estimate of gestation” was often inconsistently and incorrectly recorded in IPHIS: the gestational age was rounded up, for example, from 38^{4/7} to 39 weeks, or the newborn physical examination was entered as the gestational age. Breastfeeding was frequently captured as “intent to breastfeed,” instead of the intended inquiry about whether the infant was being breastfed at discharge. We learned that the importance of birth certificate data in decision making and allocation of funding by state and federal agencies is not widely appreciated by hospital maternity staff. We identified significant variation among birth data abstractors in interpretation of medical technology and in the ODH Vital Statistics dictionary used to explain IPHIS birth data variables.

Beginning in March 2012, the implementation of efforts to improve the accuracy of the IPHIS data entry was accompanied by a significant decline in the mean aggregate percentage of scheduled inductions in the pilot hospitals recorded in the birth registry (►Fig. 3). The rate of scheduled births between 37^{0/7} and 38^{6/7} weeks' gestation without a documented medical indication declined from 9.26% in participating pilot hospitals to 6.07%, a decrease of 35% (►Fig. 3). The decline was large enough and persisted long enough to indicate that a significant change or “special cause” occurred in this group of sites, according to statistical process control rules.^{14,15} Improvement among sites was not uniform. In ►Fig. 4, we show a graph from an individual site that recorded significant decline in scheduled births that lacked a medical indication during participation in the pilot project, from a rate of 33% without medical indication at 37 and 38 weeks' gestation to 9%. This site had engaged leadership from both hospital administration and obstetrical clinical leaders and demonstrated close communication between birth data and clinical staff.

Comment

We tested use of birth registry data as the single measurement tool in a dual QI project, and sought to identify key steps to improve the accuracy of birth registry data. Not surprisingly, regular communication and collaboration between the clinical obstetric staff (medical and nursing) and the birth data abstractors were identified as essential to assure the accuracy of information reported. The list of key variables focused the learning by the abstractors and became a valuable reference guide for their work. Selecting a subset of key variables helped teams to begin work with a limited, feasible target. Importantly, the collaborative improvement approach allowed us to build a community of clinical teams and birth registrars who were intent on sharing challenges and strategies. The work of clarifying the variable definitions led to many important changes in the reference materials available to all hospitals in the state that have subsequently been useful to the National Vital Statistics Registry at CDC

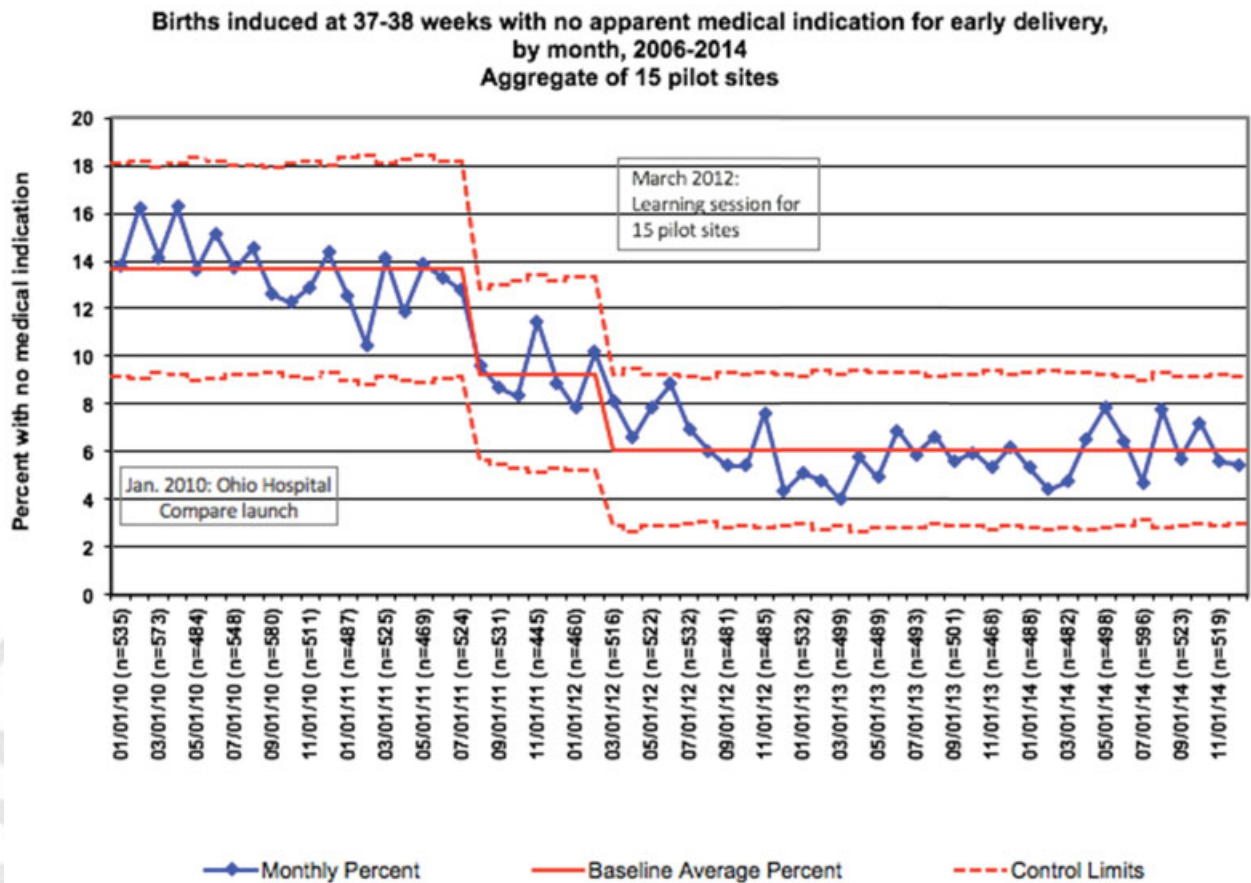


Fig. 3 Ohio Birth Registry data showing percentage of scheduled deliveries without medical indication at 37 and 38 weeks' gestation in 15 pilot sites, by January 2010 to December 2014. Ohio Department of Health Birth Registry Vital Statistics data documenting percentage of scheduled deliveries without medical indication at 37 and 38 weeks' gestation for 15 pilot sites, by January 2010 to December 2014. The solid red line is the centerline or the mean; the dashed red lines are the upper and lower control limits and represent three standard errors above and below the mean. The initial centerline, between January 2010 and July 2011, indicates that 13.64% of scheduled deliveries occurring at the pilot sites between 37 and 38 weeks' gestation were documented as without medical indication. Between August 2011 and February 2012, a mean of 9.26% of births in the pilot hospitals were induced without medical indication. During the project, the rate of scheduled births between 37^{0/7} and 38^{6/7} weeks' gestation without a documented medical indication declined from 9.26% in participating pilot hospitals to 6.07%, a decrease of 35%. This decrease has been sustained.

(William Callaghan, MD, MPH, Centers for Disease Control and Prevention, personal communication). In recognition of the need for ongoing training, OPQC and ODH have developed a set of online modules to introduce birth registry staff to the importance and meaning of birth data variables and to facilitate data abstraction and entry into the IPHIS registry.¹⁶ In addition, monthly webinar "office hours" and annual regional meetings have provided ongoing continuing education to birth registrars to support accurate data submission.

Based on this experience and subsequent participation by almost all Ohio maternity hospitals, OPQC has become increasingly confident in using birth registry data to track population-level improvement in elective early delivery and other projects. Birth registry data are particularly useful for QI projects because (1) it is available in all maternity hospitals, (2) hospitals already collect a standard set of data elements for this purpose, and (3) it allows a true population focus because birth registry data include all births, thus avoiding the potential for bias induced by sampling. This

pilot project confirmed that accurately recorded public health surveillance data can inform and accelerate improvement initiatives.

The rate of scheduled deliveries without medical indication demonstrated a decline before the beginning of the intervention, perhaps due to a secular trend coincident with the initial OPQC project² and with national efforts at reducing scheduled deliveries prior to 39 weeks' gestation without medical indication.^{8,9} However, over the duration of the OPQC QI project in these 15 pilot sites, the rate of scheduled deliveries that lacked an indication documented in the birth registry continued to decline.

This study has several limitations. Although we discovered substantial lack of agreement between medical records and the IPHIS registry during the site visits, we do not have sufficient quantitative data to determine the degree of improvement in accuracy of birth data that occurred during this pilot project. The document we developed and asked teams to complete during the project

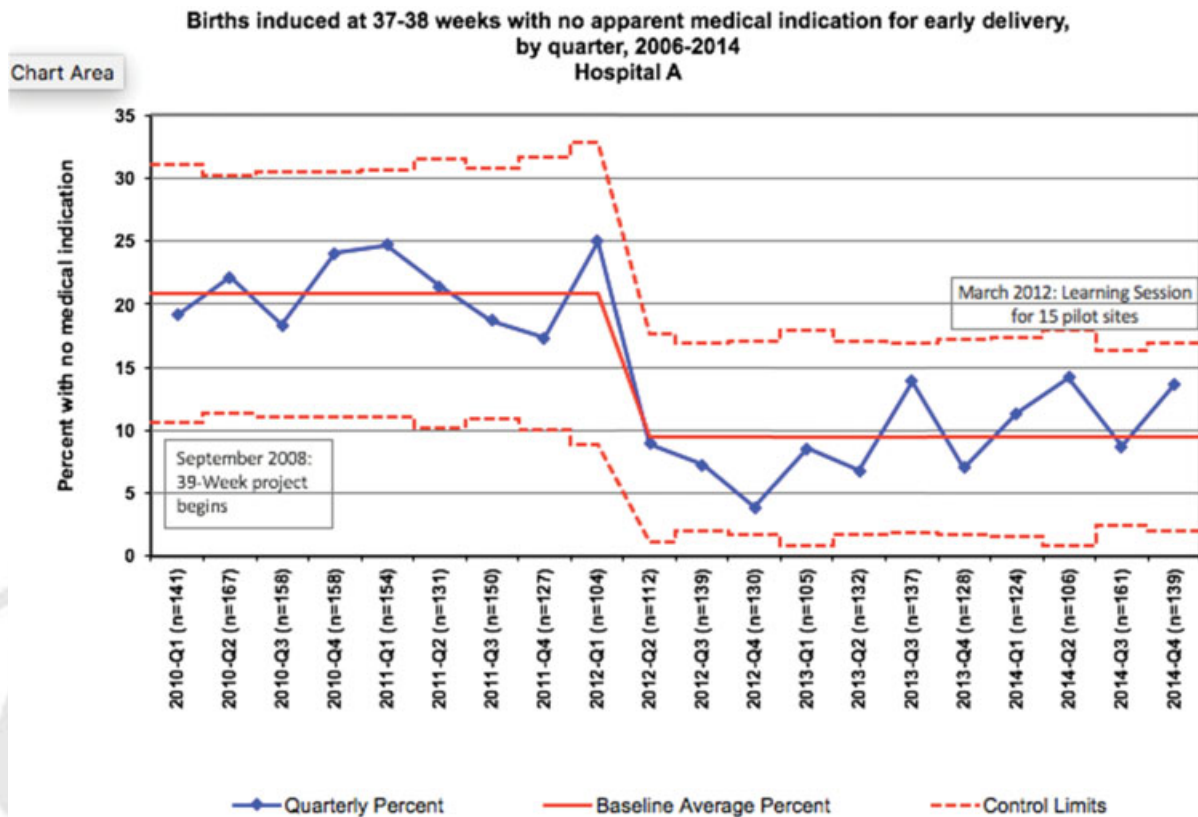


Fig. 4 Improvement for one of the maternity hospital sites participating in pilot project. Ohio Department of Health Birth Registry Vital Statistics data documenting percentage scheduled deliveries without medical indication at 37 and 38 weeks' gestation for one hospital site participating in the pilot project, by January 2010 to December 2014. The solid red line is the centerline or the mean; the dashed red lines are the upper and lower control limits and represent three standard errors above and below the mean. During the project, beginning in the second quarter of 2012, this site's rate decreased from 33 to 9% scheduled deliveries without medication indication at 37 and 38 weeks' gestation.

was not always fully understood or utilized. The proportion of the documented decline in inappropriate scheduled births that can be attributed to improvements in the accuracy of birth registry data versus improvements in clinical processes related to limiting scheduled deliveries without an indication is uncertain.

Teams reported numerous changes made to data collection and entry into IPHIS and credited participation in this project. We can infer from qualitative reports that the accuracy of collection and reporting has improved because of teams' participation in this project. Despite efforts to improve rates of scheduled deliveries < 39 weeks gestation without medical indication (as measured by birth registry data), rates varied across sites and approached but did not meet the target goal of < 5% during this pilot project.

In this article, we describe OPQC's successful efforts with teams from small- and moderate-sized maternity hospitals to apply strategies developed in larger centers to a variety of community settings. This project identified key issues needed to improve birth data accuracy and demonstrated that the Ohio birth registry can be used as a QI measure. We believe that these lessons may be generalizable to other states. This pilot project provided preliminary evidence of efficacy, including the key elements of a "change package" that have allowed application of this initiative to the remaining 72 maternity hospitals in Ohio, and has led to

ongoing efforts to support birth registrars in submitting accurate data.

Study Location

This study was conducted at the following locations in Ohio: Ashtabula County Medical Center; Bethesda North Hospital; Blanchard Valley Hospital; Fairfield Medical Center; Genesis Hospital; Good Samaritan, Premier Health; Kettering Medical Center; Mercy Medical Center, Canton; Mercy Regional Medical Center, Lorain; ProMedica Bay Park Hospital; Southern Ohio Medical Center; Southview Medical Center; St. Rita's Medical Center; The Christ Hospital; and TriPoint Medical Center – Lake Health.

Note

Results from this study were presented at the Academy for Healthcare Improvement Annual Meeting, Arlington, VA, April 26, 2013.

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Conflict of Interest

None.

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