

Kansas

Data Quality Assurance Survey Kansas Birth Registration



Research Summary

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October 2002

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Table of Contents

Introduction.....	1
Methods and Materials	3
Findings and Discussion.....	7
Conclusions	20
Recommendations	25
Tables & Attachments	27
Table A. Birth Certificate - Medical Record Match Counts and Rates by Hospital by Data Element	
Table B. Telephone Survey Questionnaire Results	
Attachment 1 Study Elements --Vital Statistics Data Quality Study	
Attachment 2 KDHE Hospital Worksheet for Birth Registration Part 1	
Attachment 3 KDHE Hospital Worksheet for Birth Registration Part 2	
Attachment 4 Sample KDHE Certificate of Live Birth	
Attachment 5 Birth Clerk Telephone Survey Questionnaire	
Attachment 6 Newborn Maturity Rating & Classification Form, Mead Johnson	
References	44

Introduction

Kansas state law charges the Kansas Department of Health and Environment's (KDHE) Center for Health and Environmental Statistics (CHES) with maintaining a civil registration system of vital events occurring in Kansas. The CHES' Office of Vital Statistics (OVS) receives and files records of births, deaths, marriages, and marriage dissolutions. When an individual needs proof of a vital event for identification, proof of age, legal issues, or property rights, the office makes the records available in the form of certified copies. A secondary benefit of this vital record process is the accumulation of health information. Because of the depth and breadth of information compiled, Vital Statistics data is often referred to as the "Gold Standard" of public health data. The CHES Office of Health Care Information (OHCI) summarizes the data into a multitude of reports.

State-based Vital Statistics systems capture over 99 percent of all vital events occurring. Through cooperative agreements with other states, CHES obtains data on events occurring to Kansas residents in other states. This enables CHES to complete a health snapshot of resident births and deaths.

As with many data collection systems, data quality is a long-standing concern. Because some programs use vital event data for benefit determinations, the timeliness of record collection is a concern. The vital records collection process involves numerous steps to assure the completeness and accuracy of the information collected. The OVS staff follows procedures to identify errors and incomplete information from all providers. OVS staff also track how timely facilities are in reporting birth certificate information. Birth event data are predominantly received from hospitals, the place of occurrence for most births. The data reporting process is susceptible to error for a number of reasons, including: high turnover rate of skilled birth clerks, workload of hospital staff, and incomplete or unavailable medical records. Prior OVS staffing levels precluded routine data quality evaluations.

To achieve more rapid and accurate reporting, CHES, like many states, implemented an Electronic Birth Registration (EBR) process. While EBR reduces data entry errors, it cannot address all inconsistencies and missing data.

Two previous KDHE studies provide insight. Conducted in the 1990s, both compared birth certificate data to hospital records. Matching information in corresponding data fields served as a proxy indicator of data entry accuracy. Dr. Elizabeth W. Saadi and Cynthia Keeling conducted a 1992 study of 97 births at an urban hospital. Dr. Cleda Meyer, Baker University; Dr. Elizabeth W. Saadi; Cynthia Keeling; and Greg Crawford, assisted by 14 Baker University nursing students, reviewed 124 birth records at two urban hospitals in 1998.

Although limited in sample size and scope, the studies identified reporting areas in need of improvement. Results from these studies indicated high levels of comparability between the medical record and the birth certificate for data elements commonly required for billing and medical procedures information. Other data, such as prenatal care and birth weight, were incomplete or in

disagreement. In some cases the medical records were incomplete or clerks did not pursue the required information.

Proposed national changes to the standard birth and death certificates mean CHES will need to collect additional vital events data. The changes, combined with the need to upgrade the Vital Statistics data system, brought about the effort to reassess birth certificate data quality and reporting timeliness. Concurrently, it served as an opportunity to assess how birth clerks, the hospital staff charged with the initial collection of the birth event data, performed their tasks. Among the issues proposed for evaluation were:

- assess the degree of reporting accuracy,
- identify issues that impact quality,
- identify issues affecting timeliness,
- identify capacity for an Internet-enabled process,
- improve documentation and procedures for collecting birth event information,
- identify whether medical records are a reliable timely source of birth event information,
- provide a foundation for routine sampling of vital events data, and
- assess training issues.

In this study the terms “match” or “agree” are used as a proxy for accuracy of the birth certificate information. In the absence of retrospectively checking with parents and health care providers, it’s impossible to fully assess the accuracy of the information in the vital birth record and the infant’s and mother’s hospital medical record. The terms “non-match” or “disagree” refer to instances where the information in the vital record and hospital medical record did not match. In general this study required the information from the two sources to be exactly the same to be considered a match. The findings will detail instances where such a narrow standard was not used.

In anticipation of new standard certificates and additional data requirements, CHES hired a quality assurance coordinator to review present vital record data collection efforts, identify deficits, and propose enhancements to be incorporated with the introduction of new standard certificates. The quality assurance coordinator would evaluate data accuracy and completeness, working with facilities to improve quality. Together with other key CHES staff, the quality assurance coordinator will implement occasional studies to identify other areas in the vital record process that need improvement and develop educational methods to achieve the needed changes.

The lead researchers in this study were Fred Gatlin, CHES’ Special Assistant for quality assurance and Greg Crawford, CHES’ chief of Vital Statistics Data Analysis. Additional input and review were obtained from Lorne A. Phillips, PhD, Assistant KDHE Secretary and State Registrar; Elizabeth W. Saadi, PhD, acting CHES director; James Staehli, Field Services director, OVS; Cynthia Keeling, Chief of Registration and Amendments, OVS; Donna Calabrese, Chief

of Certification, OVS; and Charlie Hunt, MPH, epidemiologist, KDHE Bureau of Health Promotion.

Methods and Materials

Hospital Surveys

Late in 2001 the Center initiated an effort to conduct quality assurance medical record surveys large enough to produce statistically reliable results.

Medical record comparisons would be conducted at two hospitals. One was an urban hospital where a random sample of the records was reviewed. The other was a rural hospital where every birth event was reviewed. Year 2000 births would be evaluated.

The hospital surveys would compare information on the birth

Table 1. Hospital Medical Record Sources

Record Sources	Retention Notes	Comments
Birth Certificate Worksheet	No –Urban & Rural	Completed by Mother and Birth Clerk, Signed, Not retained in either hospital medical record, At the urban hospital it was abstracted to a half sheet in the birth clerk's office. Rural hospital keeps the worksheet in another location for six months.
Doctor & Nursing Notes	Yes - Urban	Notes are maintained in an electronic data system, not normally a part of the paper hospital medical record.. Electronic notes available to birth clerk.
Prenatal Records	Yes – Urban & Rural	Faxed to the hospital as early as 28 weeks gestation, perhaps later, retained in medical record at both hospitals. Three of four doctors delivering babies at the rural hospital are in a clinic attached to the hospital. Prenatal records are more complete at the rural hospital.
Admission Record "Facesheet"	Yes– Urban & Rural	Urban hospital had Electronic dataset frequently included as a paper copy in the hospital medical record. The rural hospital also used a computer based face sheet for admission that provided information.

certificate to that contained in available medical records. Hospitals generally use four principal sources of information in the process of gathering information for the birth certificate (Table 1).

One of these sources, the two-part birth certificate worksheet, serves as the sole collection source for 12 data elements (Table 2). Other information is copied to the worksheet from the other three sources or obtained from the mother. Physician prenatal care records may be faxed to the hospital as early as the beginning of the third trimester.

Information about the number of deliveries per year and percentage of birth certificates completed within 10 days was used to select facilities to be surveyed.

To determine the

Table 2. Data Elements Unavailable in Medical Record

Mother's Maiden Name	Father's Ancestry
Mother's Birth State	Father's Race
Mother's Ancestry	Father's Education
Mother's Race	Father's Occupation
Mother's Education	Father's Business/Industry
Mother's Business/Industry	Father's Birth State

data elements to be evaluated, CHES staff, including birth registration and data analysis, ranked birth certificate information important to their respective roles. The ranking resulted in the selection of 39 data elements in the vital statistics database (Attachment 1).

SAS programs were used to generate a random list of year 2000 birth events from the urban hospital (Hospital 1). The sample of 324 birth records was created from over 2,000 births at the urban hospital. A total of 84 birth records from 2000 comprised the sample at the rural hospital (Hospital 2). The required data elements were extracted from the CHES annual history natality file into a spreadsheet file.

Separate fields, for a match and the source of the matching record, were included in the spreadsheet used for data entry in the field. This made it possible to determine whether the matching information was found in the mother's or infant's medical record file.

To minimize data collection variability a single surveyor, the CHES data quality coordinator, conducted the hospital record evaluations. The ability to find information improved and collection methods changed as the surveyor gained familiarity with the medical records. Any significant collection methodology change was noted. Care was used in recording information from medical records accurately and consistently.

Individuals responsible for birth event data collection were interviewed at both hospitals to identify the processes used to collect and record the information. Both hospitals use the EBR system to record all births. At Hospital 1 six staff, including the lead birth clerk, have authority to enter birth certificate information. The data collection and reporting process for Hospital 2 involved labor and delivery nurses providing much of the information to one medical records clerk who completed the birth registration process.

Birth Certificate Worksheet Part 1 (Attachment 2) is completed by a facility employee in consultation with the mother or given to the mother to complete after delivery. A health care provider or hospital employee completes Worksheet Part 2 (Attachment 3). The data collected is entered into the EBR system. Hospitals print a paper birth certificate (Attachment 4) that is submitted along with the electronic data to the Office of Vital Statistics. Some smaller facilities still use a paper-based system to report a birth event.

Only paper medical records were reviewed. During the birth year studied, Hospital 1 was in the midst of converting to a "paperless" medical record system. Admission records, nursing notes, and some physician's notes were maintained in an electronic system at Hospital 1. Admission records and some physician's notes were printed out and put in the medical record.

Hospital 1, subsequent to inputting the relevant birth data into the EBR system, abstracted information from the Birth Certificate Worksheet to a small form on one side of a half-sheet of paper. Identifiers, some demographic information, and selected details about the birth are maintained. The sheets were maintained in monthly packets in the birth clerk's office. Since these sheets were not part of the hospital's official medical record, they were not included in

the evaluation. Hospital 1 discards the worksheet after the certificate is completed.

All medical records at Hospital 2 were paper based. The worksheets were kept for six months after data was entered into EBR. No abstracting of the worksheet or retention of birth record information outside of medical records was reported.

Before records were used for a match, the surveyor evaluated the record's creation or printing date to determine if it was available for use in compiling information for the respective birth certificate. Records created within two days of the birth were deemed to be timely for birth certificate preparation.

An infant's birth weight is reported in grams on the birth certificate. When pounds and ounces are entered into the EBR system at a hospital they are converted to grams. Hospital records that contained pounds and ounces were converted using a standard conversion table. When the only medical record contained grams, that figure was used to compare to the birth certificate.

Birth Clerk Telephone Survey

The Office of Vital Statistics routinely communicates with birth clerks, answering procedural questions and querying information where necessary. However, birth clerks had not been surveyed heretofore on a wide range of issues that impact the vital record data collection process. Since clerks represent the focal point of hospital birth certificate data collection and submission, researchers felt it best to survey them. Letters to hospital administrators informed them of the survey, requesting their support.

Hospitals providing birth certificates to the state fall into two categories: those that use the electronic birth registration (EBR) system and small hospitals that continue the paper process. As part of an upgrade of the Vital Statistics data system, a web-based electronic birth registration system is proposed. CHES staff proposed surveying all hospitals using the EBR process. Fourteen of 32 facilities using the paper-based birth certificate process were surveyed. Facilities with fewer than five births per quarter were not included.

A telephone survey instrument (Attachment 5) was developed in consultation with CHES staff and a KDHE epidemiologist. It was tested with birth clerks from an urban area and a rural area. Modifications were made to address those comments.

The survey addressed eight areas of concern. The first part asked who completed Part 1 and Part 2 of the Birth Certificate Worksheet. A second set of questions asked about the completed worksheet and what happened to it after completion. A series of five questions asked about the sources of information for parts of the worksheet. A pair of questions sought the survey participant's assessment of the mother's ability to understand certain worksheet questions. Survey participants were also asked about the layout of the worksheets. Other areas dealt with knowledge of computers and the Internet, training issues, and the manner in which ancestry was recorded.

At the time of the survey during May and June of 2002, one hospital using EBR was not using their birthing unit. It was not included. The total number of hospitals surveyed was 78. For consistency a single surveyor, the CHES data quality coordinator, contacted the birth clerks.

Findings and Discussion

Hospital record evaluations were grouped in six categories: infant and parent names, demographic information about the parents, delivery information, previous pregnancies, conditions of the mother, and conditions of the infant. The findings review match rates, record location challenges, and other issues effecting results.

Hospital 1

Hospital 1 is an urban hospital. It ranks among the top 10 hospitals in the state for number of births and rated high in the timeliness of data submission. It receives admissions from a large part of its region. It maintains a neonatal unit, thereby receiving more at-risk births than other smaller hospitals. Over one dozen OBGYN or family practice/OB physicians deliver at Hospital 1. Physician prenatal care record forms ranged from commercially available forms to specialized forms developed by various practices.

Medical records for a sample of 324 births were surveyed. Birth certificate data entry is completed at the birthing unit.

Of the 39 birth certificate data elements studied, match rates for 15 were greater than 90.0% (Table A). The data element with the highest match rate was facility where the birth occurred and county of occurrence with 99.4%, followed by Mother's residence state at 99.1%. Eight of the data elements had match rates between 80% and 90%. Eight data elements had match rates between 15% and 79%. Eight of the data elements had match rates of less than 15%.

Hospital 1 medical records staff were asked to pull mother and infant files based on the names found on the 324 birth certificates.

Mother's medical records for 12 birth events at Hospital 1 were deficient or missing: four had no mother's medical record; five mother's charts had no record of the studied birth; and three mother's charts were missing the prenatal care record. No reasons for the missing and deficient records were available. In other medical records the prenatal care record was very limited.

The infant's chart is begun at birth. The infant's medical record information was missing for two events. Hospital 1 could find neither the medical record number nor the file. A third event had a medical record number and a file, but no information from the birth.

Hospital 1 medical records for each mother and infant varied greatly in size and content. Some files were so minimal they failed to contain important information. Other files for mother or infant were so voluminous that key information was difficult to find. Infants who were delivered with no complications generally had files in which it was easier to find the information.

The senior birth clerk at Hospital 1 indicated mothers do not always include abortions or miscarriage occurrences when completing previous pregnancy outcome information on the worksheet part 1. The mother also reviewed the completed part 1 before signing it. This created a problem for Hospital 1 when the mother would request that different information be submitted rather than what the birth clerk might obtain from the medical records. The clerk

reported that when requested she included what the mother completed on part 1, even if the prenatal care record contains different information. The clerk reported she felt she must not counter what the mother puts down or risk angering a customer.

Child and Parent Names

The survey found a varying match rate between birth records and the hospital medical records for name information. The name used to compare to the birth certificate information came from a variety of sources within the medical record file.

Because an infant's middle name was infrequently available in hospital medical records, a match was deemed when the infant's first and last name were the same in both records. If middle names were found and were different, it was considered a non-match. As hospital charts did not always have the information, various release forms would frequently be the source of the infant's name. In 278 birth certificates (85.8%), the child's name matched that found in the hospital medical records (Figure 1). For five birth records, hospital medical record information was missing. Of those birth records that did not match, differences were attributed to middle name being different (2), last name different (22), and order of name or spelling different (3). In the case of 14 births name information matched but was not confirmed since medical record information was not timely.

Mother's name matched between the birth record and the hospital medical records 95.7% of the time. The non matched records differed for one of four reasons: different last name (3), different first or middle name (4), other reasons, generally spelling or name order different (2), and names unable to be confirmed from the medical record (5).

The match rate for mother's maiden name was 4.6%. Few prenatal records contained a maiden name. In most instances the hospital medical record lacked a specific reference to a maiden name. In some instances an individual accompanying the expectant mother had the same last name. That person may have been a parent, a spouse or another relative. Seldom did the medical record contain a name that confirmed the mother's maiden name.

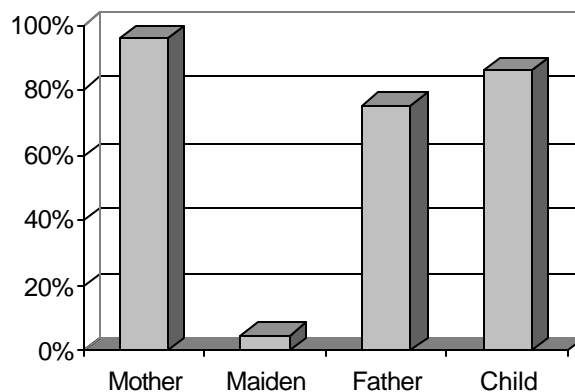


Figure 1. Hospital 1 Name Match Rates

The inability to match a mother's maiden name is due largely to the fact the information is not required by any item in the medical record other than the Birth Registration Worksheet. Medical records occasionally contained a relative's name but the relationship to the mother and the relation's marital status were not easily established.

Hospital 1 procedures required that their records contain the payer's name. This accounted for some instances where the mother's name could not be confirmed from the infant's medical record or where the father's name was absent from the medical records.

The father's name was considered a match when the birth record and the hospital medical record either contained no mention of a father's name or when the names in both records matched. Unless the father was identified as paying for care or signing a release form, it was not a part of either the mother's or infant's medical record. Matches – wherein neither record contained father's information or the information was the same -- were reported in 75.3% of the birth records compared. In six of the 36 non-matching birth events (1.9%) hospital medical records contained a father's name that was not recorded on the respective birth certificate.

Parent Information

Demographic information on the parents was inconsistently retained in hospital medical record files. The Birth Registration Worksheet – containing all of the parent information – was not retained in Hospital 1 medical records.

Information about father's state of birth, race, and ancestry was almost universally missing. Father's Education and date of birth were seldom found. The mother's information was more readily found. Social security numbers were found for most mothers and the marital status of the mother was found 86.4% of the time (Figure 2).

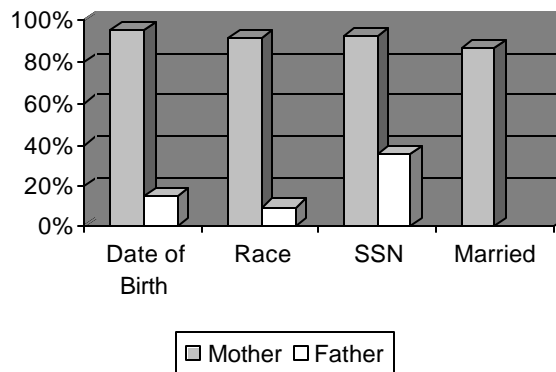


Figure 2. Hospital 1 Parent Information Match Rates

Delivery Information

The time and date of birth are data elements where there is a high expectation of the hospital medical record matching the birth certificate data. Of the 324

records evaluated, 2.2% did not match on the date of birth. In 8.3% of the records the time of birth did not match. Over half of the non-matches represented differences of less than 30 minutes (Figure 3). When records with birth time differences of less than 29 minutes were deemed a match, the mismatch rate declined to 4.9%.

High match rates were expected for facility and attendant information. Facility information matched in all but two cases. One case was a birth where both mother and infant medical records were missing. The second was a birth that occurred en route to the facility that the hospital listed as occurring there.

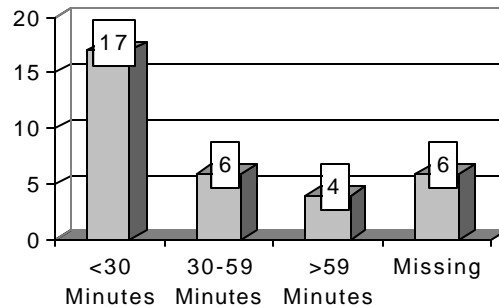


Figure 3. Hospital 1 Length of Difference for Time of Birth Non-matches

The prenatal record submitted to the hospital was used to match attendant information to the birth record. The type of medical care provider attending the birth matched in 307 of the 324 births studied. In some births attended by certified nurse midwives (CNM) employed by OBGYN practices it was difficult to differentiate from the information whether the attendant was a physician or CNM. This impacted the number of matches involving CNM-attended births. No effort to distinguish between doctors of medicine and doctors of osteopathy was made during data collection.

Previous Pregnancy Information

Previous pregnancies fall into four categories; live births now living, live births now dead, terminations before 20 weeks, and terminations after 20 weeks. The number for an individual category had to be the same in the birth certificate and hospital medical records for it to be considered a match. Each of these categories had match rates exceeding 80%

The surveyor allocated terminations wherein the weeks gestation was not specified in the hospital medical records to the under-20 week category. This may have influenced the non-match rate. In some prenatal care records terminations were characterized as induced or spontaneous but without weeks gestation.

Birth Characteristics – Condition of Mother

This group included the data elements of month prenatal care began, number of prenatal care visits, date of last menses (LMP), weeks gestation, prenatal procedures, conditions of labor, and method of delivery. Match rates for these characteristics – components of adequacy of prenatal care determinations and birth outcome assessments – varied widely.

Only 7.7% of the records survey matched for month prenatal care began (Figure 4). Information on the birth certificate was obtained through the Birth Certificate Worksheet, making it self-reported by the mother. The prenatal care record obtained from the doctor was used to compare to the birth data. In 212 of the events studied, the birth record showed prenatal care began in the first month, where the prenatal care record indicated a different month.

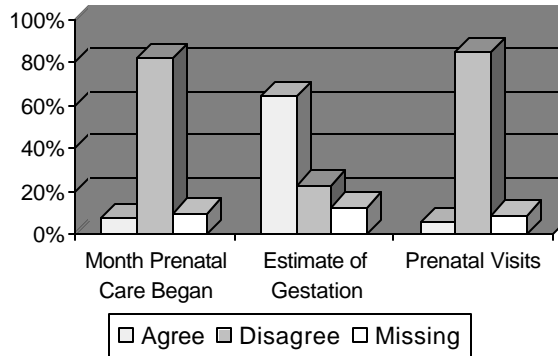


Figure 4. Hospital 1 Birth Characteristics Condition of Mother Rates

The surveyor compared the number of weeks gestation recorded on the birth certificate to the hospital medical records or extrapolated a value from information contained in the prenatal care record. Weeks gestation matched in only 208 of the birth events studied (64.2%). The number of weeks gestation did not match in 75 instances (23.1%). Information on weeks gestation was either missing or could not be calculated based on information in the hospital medical record file for 41 births (12.7%).

The survey reported a low-match rate for the number of prenatal visits (5.9%). To be considered a match the number of visits needed to be the same on the birth certificate as the value derived from hospital medical records. Some of the non-matches may be attributed to the mother's poor recollection or the birth clerk's extrapolation of the number of visits recorded in a prenatal care record delivered early.

Date of last menses (LMP) information on the birth certificate matched the hospital medical record information for 28.1% of the births studied. Since LMP may be based either on mother's recollection or estimated from sonograms, dates could easily differ. The surveyor determined the extent of mismatch. LMP varied by less than seven days in 105 (32.4%) of the births studied. It varied by 7-13 days in 29 births (9.0 %) (Figure 5). LMP varied by more than 13 days in 50 (15.4%) births and

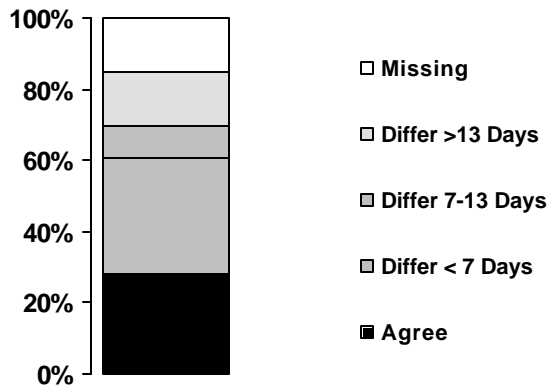


Figure 5. Hospital 1 LMP Match Rates

information was missing from the hospital medical record in 49 (15.1%).

Evaluations of medical risk factors, prenatal procedures, conditions of labor, and method of delivery complete the review of Birth Characteristics – Mother’s Condition. All four of these categories had match rates over 50 percent (Figure 6). Two important items in the mother’s condition group with very different match rates were: conditions of labor (61.7%) and method of delivery (91.4%). The match rate for medical risk factors was only 53.1%.

Mismatched records for prenatal procedures and medical risk factors were further evaluated into one of two categories: more information on the birth certificate than in the hospital medical records and less information on the birth certificate than in the hospital medical records.

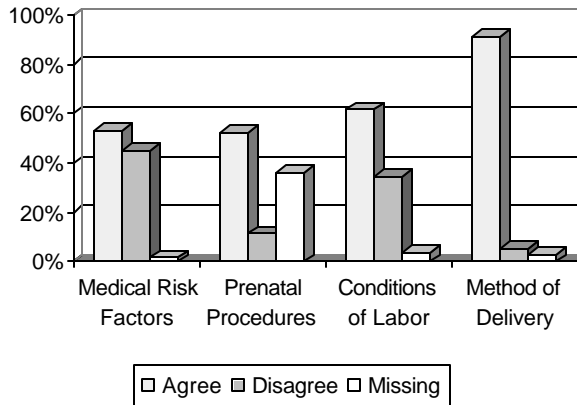


Figure 6. Hospital 1 Birth Characteristics – Mother’s Condition Rates

Of the 146 birth events where medical risk factors did not match, 64 (19.8%) had more information on the birth certificate than could be confirmed in the medical record. Eighty-two birth events (25.3%) showed less information on the birth certificate than was found in the medical record.

Mismatches for conditions of labor and method of delivery fell into three categories: more information on the birth certificate than in the hospital medical records, less information on the birth certificate than in the hospital medical records, and totally different information in the certificate and medical records.

In 61 of the birth events the hospital medical record contained more conditions of labor than the birth certificate (18.8%). In 46 birth events (14.2%) the birth certificate contained conditions of labor not found in the hospital medical record. In 5 births (1.5%) the two records had completely different conditions of labor.

Eight birth certificates (2.5%) showed more information for method of delivery than was found in the hospital medical records. Hospital 1 medical records contained more method of delivery information than the birth certificate in eight birth events (2.5%). In 2 births the two records had substantially different method of delivery information.

Birth Characteristics – Condition of Infant

Condition of the infant included: birth weight, plurality, Apgar scores, and condition of the newborn. Matches were considered an exact agreement for birth weight with a breakout of the non-matches by range of difference. Exact

agreement of all three Apgar scores was considered a match. Condition of the newborn information either matched or was broken into two categories of mismatch: more information on the birth certificate than in the hospital medical records and less information on the birth certificate than in the hospital medical records.

Plurality matched between the birth certificate and hospital medical records 96.9% of the time. In only one of the 324 birth events was there a mismatch. In nine birth events information was not available in the hospital medical record to determine plurality.

Birth weight matched between the birth certificate and the medical record for 139 birth events (42.9%) (Figure 7). It differed by less than 28 grams or one ounce in 162 births

(50.0%), by 28-56 grams in one birth (0.3%), and by more than 56 grams in 11 births (3.4%).

Information was missing from the hospital medical record for 11 births (3.4%).

Birth weight data on birth certificates are reported in grams. Yet in many instances the only figures in the medical record were pounds and ounces. Conversion of pounds and ounces to grams is imprecise and could result in a difference of up to 28 grams. Defining a birth weight difference of up to 28 grams as a match increased the match rate to 92.9%.

Apgar scores matched in 281 births (86.7%). Scores differed between the certificate and the medical record in 22 births (6.8%). Information was not available in the medical record for 21 births (6.5%)

Condition of the newborn matched in 271 births (83.6%). The mismatches were as follows: 18 births (5.6%) where the birth certificate reported information not found in the medical record and 30 births (9.3%) where the medical record contained information not reported on the certificate. The medical record was missing information to determine matches for 5 births (1.5%)

The birth anomalies portion of the birth certificate allows for the entry of none or any of 23 specified anomalies and an open-ended other anomaly category. A match was either an exact match on the number and type of anomalies in both records or that both records had no anomalies.

The anomalies ranged from cleft palate to heart defects. Evaluations were made using only those items included in the medical record within the two-day period considered timely. Two diagnoses of Down's syndrome, which may not be confirmed while the infant is in the hospital, were found in the hospital medical

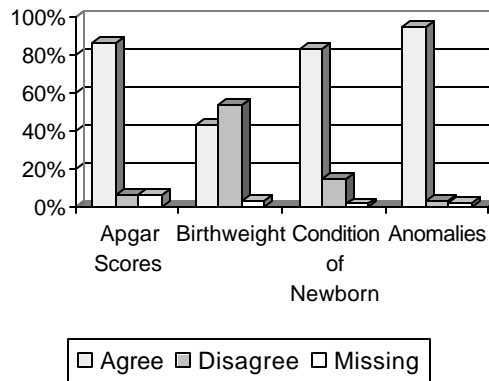


Figure 7. Hospital 1 Birth Characteristics Condition of Infant Rates

record and not on the birth certificate. Hospital medical records contained information on several births involving anomalies more likely to be diagnosed prior to submission of the birth certificate – cleft palate, facial abnormalities, serious heart defect, and an abnormal foot. These were not found in the corresponding birth certificate.

Birth certificate information for congenital anomalies matched medical records in 307 instances (94.8%). Ten (3.1%) did not match. Five of the 17 birth events (1.5%) had more information about anomalies in the medical record than in the certificate. Another five birth events (1.5%) had more anomaly information on the birth certificate than was found in the medical record. No medical record information was available in seven instances (2.2%).

Hospital 2

Hospital 2 is in a rural community. Most of the birth events appeared to have occurred to individuals from within a small service area. All 2000 birth events at Hospital 2 (N=84) were surveyed. Birth certificates are completed in medical records. One birth was missing the prenatal record.

Three physicians, in a clinic affiliated with Hospital 2, delivered babies there in 2000. A fourth doctor from another town also delivered at Hospital 2. Some cesarean sections were performed at Hospital 2. Among the physicians, at least three different prenatal record forms were used. The forms varied greatly in the information collected, and therefore affected the scope and ease of information collection.

Experiences with Hospital 1 resulted in survey instrument changes to improve Hospital 2 data entry efficiency and accuracy. Researchers provided hospital record numbers, obtained from the master vital record database, to the hospital. This helped assure that the records were available.

Information for 22 of 39 birth certificate data elements (56.4%) matched at rates greater than 90.0% (Table A). Ten of the elements had 100% match rates. Four data elements (10.3%) had match rates between 80.0% and 90.0%. Fourteen data elements matched at rates less than 80.0%.

Demographic Information

Hospital 2 mother's information match rates exceeded 90 percent in a number of areas (Figure 8). Conversely, match rates for mother's maiden name and father's birth date were less than 50 percent. Match rates for child's name (100%),

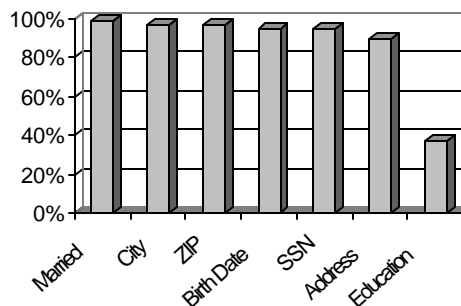


Figure 8. Hospital 2 Mother's Information Match Rates

mother's name (100%), mother's maiden name (35.7%) and father's name (96.4%) were all better than Hospital 1. (The father's name was considered a match when the birth record and the hospital medical record either contained no mention of a father's name or when the names in both records matched.) Match rates for the mother's demographic information were relatively good with six fields matching at more than 90%, while the remaining three fields ranged from 35.7% to 89.3%.

Father's information, other than name, is much less complete (Figure 9). The father's social security number is sometimes found as a part of insurance information. Availability

of the father's social security number was limited by the use of the mother's insurance as the primary payer for the birth event.

Hospital 2 match rates for three father's Information data elements – father's race, 6.0%, state of birth, 10.7%, and education, 7.1% –

were lower than Hospital 1. Match rates for remaining demographic data elements were higher at Hospital 2.

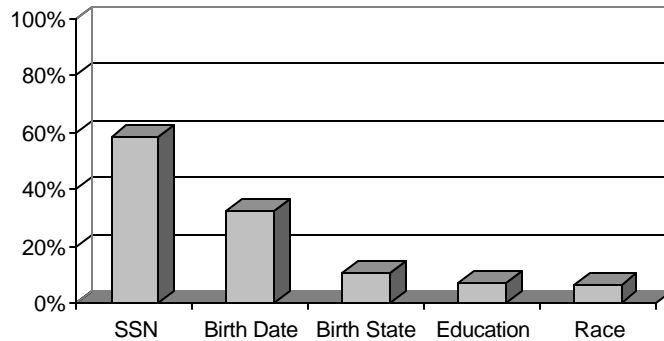


Figure 9. Hospital 2 Father's Information Match Rates

Delivery Information

Match rates for delivery information were higher at Hospital 2. The time of birth match rate was 91.7%. Records for seven births did not agree on time of birth: differing less than 30 minutes on four, between 30 minutes and 1 hour on one, and more than one hour for two. Match rates of 100 percent for date of birth, facility, and attendant information were all higher than at Hospital 1.

Previous Pregnancy Information

Match rates for previous pregnancy outcomes were higher at Hospital 2. Rates were: terminations less than 20 weeks, 96.7%; live births now living, 98.8%; live births now dead, 100%; and terminations over 20 weeks, 100%.

Birth Characteristics – Condition of Mother

Hospital 2 findings showed four of the eight birth characteristics for conditions of the mother over 80 percent (Figure 10). Match rates for prenatal care visits (32.5%) and month prenatal care began (42.9%) were the lowest of this group of birth characteristics.

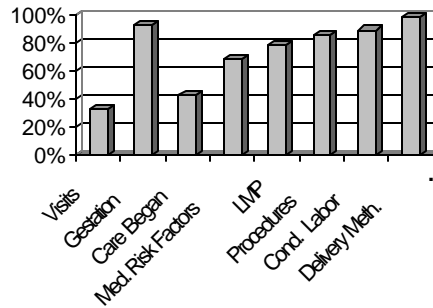


Figure 10. Hospital 2 Conditions of Mother Match Rates

The surveyor used the newborn maturity rating and classification form found in each infant’s chart. In 78 birth events (92.9 %) the weeks of gestation reported in the maturity form found in the infant’s medical record matched information in the birth certificate.

Birth Characteristics – Condition of Infant

Four of the five categories representing condition of infant exceeded 79 percent match rates (Figure 11). Plurality (100%) and anomalies (100%) were in complete agreement.

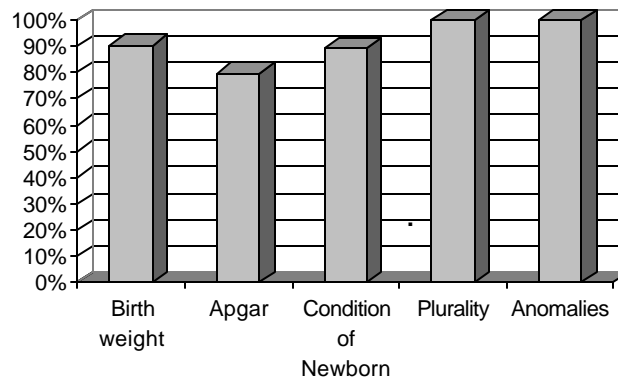


Figure 11. Hospital 2 Infant’s Condition Match Rates

Hospital 2 appeared to use pounds and ounces to record births and converted values to grams to record information on the birth certificate. This may account for some non-matches. If birth weights matched (38 events) and those with less than 28 grams difference (38 events) were combined, the match rate would be 90.4 percent instead of the 45.2 percent exact matches. Differences were greater than 28 grams and less than 56 grams for four events (4.8%) and greater than 56 grams in another four events (4.8%). Apgar scores (79.8%) and condition of the newborn (89.3%) were the next highest in agreement.

Birth Clerks Telephone Survey

While the survey was well received, some birth clerks expressed concern about having sufficient knowledge of the vital statistics process to answer the questions. Some of the medical records unit clerks who complete and submit the birth certificate have little or no contact with the birth unit. In two hospitals the medical record clerk was in one building and the birthing unit in another. In the case of one survey participant, the medical records unit clerk, who completes and submits the birth certificate, asked the surveyor to call a nurse in the birthing unit to obtain some of the survey answers.

Birth Certificate Worksheet

Many of the data elements for the birth certificate are compiled on the Birth Certificate Worksheet Part 1 and Part 2. The individual who fills it out and when it's completed may affect accuracy. Worksheet Part 1 seeks demographic information about the parents and the infant, as well as a pregnancy history.

Of the 78 facilities surveyed birth clerks at 23 hospitals (29.5%) reported the mother alone completed Part 1. Thirteen facilities (16.7%) reported that the birth clerk maintained control of Part 1. The birth clerk and mother completed Part 1 at 38 hospitals (48.7%). Four facilities (5.1%) indicate some other person was involved with completing Part 1.

Of the 65 birth clerks that did not maintain exclusive control of Part 1, 13 reported giving the form to the mother before she is admitted, 16 gave the mother the form upon admission, 29 gave the mother the form after the delivery. Two indicated that they did not have a set time to give the mother Part 1. Five birth clerks did not answer.

The survey asked the primary job responsibility of the person who completed Birth Registration Worksheet Part 2 that contains medical and statistical research data. At 32 of the hospitals (41.0%) physicians complete worksheet part 2, followed by nurse, 29 (37.2%), birth clerk, 10 (12.8%), medical record clerk, 5 (6.4%), ward clerk in birth unit, 1 (1.3%), and other, 1 (1.3%).

Retention of the worksheet impacts CHES' ability to retrospectively assess the quality of the data entry of this information. Birth clerks at 39 facilities (50.0%) include the worksheets in the medical record, and 39 facilities (50%) did not retain the worksheet. Of the hospitals that did not retain the worksheet in the medical record, three reported the facility discards the worksheets, eight reported retaining the worksheets permanently somewhere other than in the medical record, and 28 reported retaining the worksheet somewhere other than in the medical record but for a limited time. Retention periods were: up to six months, 9; six months to one year, 2; one to five years, 6; and over five years, 11.

A majority of the hospitals, 73 (93.6%) did not give the mother a copy of the worksheet to keep.

Anecdotal reports exist that mothers are occasionally asked for information on number of prenatal visits, month prenatal care began, and pre-pregnancy weight in lieu of obtaining the information from the hospital's copy of the prenatal care record. Other anecdotal reports inferred that occasionally

mothers will change medical or statistical research information with which they do not agree. The survey attempted to assess the level of such activity.

Birth clerks were asked their perception of how often the mother supplies information inconsistent with that of the hospital medical record or physician's prenatal care record. Ten (12.8%) reported never, 40 (51.3%) not frequently, 27 (34.6%) occasionally, and 1 (1.3%) frequently.

Birth clerks were asked to identify the source of information for several key data elements. In five subject areas, the physician's prenatal record was used as the source of the information for the birth certificate by a majority of birth clerks (Table 3).

Table 3. Sources of Selected Birth Certificate Information

Data Element	Source							
	Mother		Physician Prenatal Record		Hospital Medical Record		Other	
	(N)	%	(N)	%	(N)	%	(N)	%
Pre-pregnancy Weight	19	24.3	52	66.7	6	7.7	1	1.3
Month Care Began	12	15.4	59	75.6	5	6.4	2	2.6
Smoking History *	24	31.2	41	53.2	10	13.0	2	2.6
Alcohol Use History *	24	31.2	43	55.8	8	10.4	2	2.6
Date of Last Menses *	16	20.8	55	71.4	5	6.5	1	1.3

* N=77 clerks answering

However, birth clerks reported they consulted the others sources if they were uncertain of the information from the primary source. One clerk was unable to supply answers for three of the questions.

The large number of Hospital 1 births wherein the mother reported beginning prenatal care in the first month of pregnancy raised concern that mothers were misinterpreting the question. Birth clerks were asked their perception of whether mothers misinterpret the question about the month prenatal care began, i.e., were mothers reporting they obtained prenatal care during the first month they "learned" they were pregnant rather than month of pregnancy during which they first saw a physician. Forty-seven clerks (60.3%) agreed with the statement "Mothers may misinterpret the question about when they began prenatal care," 28 (35.9%) disagreed, and two clerks were not sure and one did not answer the question. Birth clerks were evenly split on whether the question should be written differently or left as it is.

CHES staff wondered whether moving data elements from Worksheet Part 1 to Part 2 would reduce the likelihood of conflicting information. Clerks were asked about moving nine data elements to Worksheet Part 2. A majority of clerks in each instance responded the data elements should be left in Part 1 (Table 4).

Table 4. Retention of Selected Data Elements in Worksheet Part 1

Data Element	Keep in Part 1	Move to Part 2
Live Births living and Dead	56	22
Terminations <20weeks, >20weeks	50	28
Date Last Menses Began	55	23
Month of Prenatal Care Began	59	19
Plurality	64	14
Birth weight	67	11
Clinical Estimate of Gestation	49	29
Prenatal Visits	52	26
If Not Single Birth, Order	62	16

Kansas remains one of only a few vital registration areas that records ancestry, instead of Hispanic-only ethnicity as requested by the National Center for Health Statistics. Some mothers indicate several ethnicities,

occasionally several European ancestries. Birth clerks were asked to describe their practice in this regard.

Twenty-one (26.9%) birth clerks reported they will list up to three ancestries, 26 (33.3%) said all would be listed, 25 (32.1%) said the term “European” would be used, three (3.8%) said they would do whatever the mother wants, two (2.6%) did not know what the hospital did, and one (1.3%) said the term “other” was used.

Internet Use

The development of the Electronic Birth Registration system initiated the practice of electronic collection of vital statistics information. Many registration areas view the Internet as the next wave in data collection and submission. One of the many considerations in implementing such a system will be whether hospitals are Internet-enabled.

The birth clerk’s Internet capability will be essential to successful implementation of a web-based system. Sixty-eight (87.2%) birth clerks had Internet access, six clerks (5.1%) did not have Internet access but could get it if needed, and four (7.7%) did not have access (Table 5). Of the 68 clerks with

Internet access 55 clerks had authority to use it and 13 did not. A majority of the 68 clerks with Internet access said they felt capable of using the Internet. Asked about interest in using a new electronic system for completing birth certificates only one clerk declined, citing a concern about security for the proposed site.

Table 5. Birth Clerk Capability & Willingness to Use Internet

Question	Response			
	Can do it	May need training	Uncertain	Won't try/no comment
Ability to access the internet	56	22	0	0
Ability to locate an internet site	60	18	0	0
Ability to use an interactive Internet site	64	14	0	0
Willingness to use a Secure Web site	54	24	0	0

In addition to possible training on Internet use, any new electronic birth registration system will require birth clerk training. The survey asked clerks their views on training. Seventy-three (93.6%) said they would be able to attend one-day regional training sessions. Seventy-seven (98.7%) said training that closely simulated a new web-based birth registration system would be adequate. Thirty-four (43.6%) of the birth clerks report they use e-mail to communicate with OVS staff.

A question was asked about the length of service of birth clerks. The largest group was the 33 (42.4%) clerks with over five years experience. The least experienced were the six clerks (7.7%) with less than six months experience. The remaining 39 clerks fell into three categories between the two mentioned above.

Conclusions

The hospital medical record findings indicate paper medical records generated or available within two days of birth did not always provide sufficient matching information for certain data to be considered accurate. Incomplete or contradictory information in the medical record could not be resolved from a worksheet as neither hospital retained them. The impact of mismatched information would be minimal on the issuance process where name and date accuracy is imperative. However, lower match rates for some medical fields raise concern about the validity of eliminating the worksheet in lieu of collecting the information solely from medical records. Birth clerk surveys show an inconsistent application of birth data collection protocols, but a desire for training and accuracy

Hospital Medical Records Surveys

These results show generally high rates of agreement for mother's information, child's name, and delivery information. Since applicants submit some of these data elements when applying for a certified copy of a birth certificate, the higher accuracy levels could translate to fewer requests going to conflict resolution.

Lower match rates for the health conditions of the child and mother raises concerns about the validity of aggregate analyses for maternal and child health research and evaluation. Match rates at Hospital 1 could have been influenced by the transition to an electronic medical records system and the absence of the birth certificate worksheet in the medical record. The use of a two-day time period for timeliness may also have negatively impacted the match rates.

Collecting information for the Hospital 1 survey proved to be a much more time-consuming process than originally thought. Medical record information was keyed into the data collection spreadsheet. Based on Hospital 1 surveys, the spreadsheet was redesigned for the Hospital 2 survey. This allowed the surveyor to record values for whether the data elements matched and the source of the matching record.

Other factors that contributed to completion time of the survey were: the number of data elements surveyed and medical record completeness and uniformity. Hospital 1 records were not uniform in their compilation. Hospital 2, with less than five percent of the births annually as Hospital 1, had more consistently organized records.

Lower volume, proximity to several of the delivering physician's offices, and the close-knit, smaller community served may be factors in the higher match rates at Hospital 2. Thus, the smaller population base and service area may contribute to a higher match rate for demographic information. Evidence of this is higher match rates for mother's maiden name, father's SSN and father's birth date.

Hospital 2 medical records had fewer date-generated stamps. Hospital 1 records were stamped, making it easier to determine the record was timely or not. Only one individual at Hospital 2 served as birth clerk. Six persons at Hospital 1 could create birth certificates.

Missing or seriously incomplete medical records for either the mother or infant were a point of concern at Hospital 1. Admittedly the facility was in the process of converting records. However, if hospital medical records clerks are unable to find the information, it raises concerns that such information may not be available to the birth clerk to enter into an EBR system within the two days defined as timely.

Medical records may not always serve to verify the name information needed for the birth certificate. At Hospital 1 the infant's medical record is set up at or before birth when no name is available. Thus vaccination or other release forms sometimes become the source of the infant's name. When at risk infants went to the Hospital 1 neonatal care unit, some infant name information, as well as other information important to the completion of the survey, failed to meet the test of timeliness, thereby delaying or eliminating inclusion of routine documents in the infant's medical record. On occasion at Hospital 1, the infant's last name in the infant's medical record was the same as the mother's, yet the birth certificate used the father's last name. The timing of the father signing paternity consent may influence last name accuracy. These issues should be addressed in birth clerk training but may be impossible to completely eliminate.

Each file of the mother's medical record at Hospital 1 began with an admissions face sheet that included the mother's name. The prenatal record also carried the mother's name. These forms served as a baseline for medical record accuracy and completeness. The inability to match mother's name resulted from the entire mother's medical record being missing. Occasionally an infant's files would provide the mother's name if the mother's record could not be found.

High match rates were expected from the date and time of the birth event data elements. While the match rate appears lower than expected, the margin of difference was extremely small. The small differences should be considered near matches or inconsequential. The larger errors defy easy or logical explanation.

The type of health care provider that attended the birth was difficult to discern on occasions where a large OBGYN practice employed Certified Nurse Midwives to deliver the infant. This may not have matched with medical records that routinely list the physician, especially in the prenatal care record.

Differences in extrapolation methods and availability of the most current prenatal record may account for some of the differences on prenatal care visits non-matches. Hospital 1 reported receiving prenatal care records as early as 28 weeks gestation and in some cases never received a more current record prior to the birth. That left up to 12 weeks of information unavailable. A 40-week pregnancy with a prenatal record from 28 weeks may not list the majority of prenatal visits. Hospital 1 reported it used the prenatal care record, mother's memory, and a twelve to fourteen visit standard to extrapolate the number of prenatal care visits. In the case of Hospital 2 with three hospital-affiliated physicians, the birth clerk reported she visited the physicians' offices in the adjoining building to get the number of visits. More emphasis should be put on

hospitals obtaining and using the most current prenatal care record for physician visits.

Date of last menses (LMP) differences in non-matches may be attributed to the mother attempting to recall the date, or LMP dates being revised in the prenatal care record as the pregnancy progressed. Some prenatal records contained a date with a question mark. When differences of up to two weeks are included with the matches, match rates are more favorable. The greatest concern is with dates varying by greater than fourteen days and missing numbers.

Method of delivery information was generally available in the medical record. Normal vertex delivery or c-section deliveries were easy to determine. For those instances where the records disagreed between normal and c-section delivery, no logical justification comes to mind.

Because some hospitals still report in pounds and ounces, converting and transcription errors may account for some of the differences found in birth weight. Including births with less than 28 grams difference with matched births, accounted for these incremental errors. Thus overall match rates at both hospitals were higher. The remaining births with differences greater than 28 grams or where birth weight was missing, represents the true extent of the mismatch issue.

CHES requires Apgar scores at one minute and five minutes, and at ten minutes, if the scores at one minutes and five minutes are below seven. Many birth records contained all three values, regardless of the requirement. Some of the mismatches were due to the absence of the ten-minute score from one record or the other. Other mismatches could have been due to transposition.

The nature of condition of newborn non-matches is a matter of concern. As a group, the multiple answer categories were more difficult to match. At Hospital 1, of 48 non-matches of condition of the newborn, 18 resulted from the medical record not confirming what was on the birth certificate. Almost twice as many errors (30) were the result of the certificate not containing the information that was found in the medical record. These errors may indicate the medical record is incomplete at the time the birth clerk must complete the birth certificate.

Birth Clerk Telephone Survey

Equally important as the formal questionnaire answers were comments provided to the surveyor. While not every birth clerk provided comments with all of their responses, the comments do provide insight. Where appropriate, conclusions incorporate and summarize those comments.

While formal and informal responses to the survey indicate birth clerks strive to record the information accurately and completely, improvements can still be made. The two hospital medical record surveys indicated that in many instances medical records containing the data elements are available when the certificate is prepared. Birth clerks appear open to regional, one-day training.

Since 92.3% of hospitals keep the Birth Registration Worksheet either in the medical records file or elsewhere for a period of time, future evaluations

comparing the medical record to the worksheet and the worksheet to the birth certificate are possible.

The high facility retention rate for the worksheet, which contains the mother's signature, bodes well for potential use of the worksheet to digitally capture the signature in order to attest to the accuracy of the information.

Collecting accurate information on the Birth Registration Worksheet requires that mothers are unable to contradict information found in the medical records. That 85.9% of the clerks reported mothers infrequently or more often provide contradictory information confirms anecdotal information. The survey did not characterize how contradictory information was introduced.

Offsetting the concern about contradictory information are the results of the five questions on source of information. Clearly a majority of the birth clerks are using the medical records as the primary source. Birth clerks are making a good effort to acquire information from the appropriate source. This practice needs to be reinforced in any new system.

Clerks frequently reported they may go to a second source, sometimes the mother, to resolve any questions. This may be an indication that the appropriate medical records are not readily available when the clerk is completing the certificate. This leaves little alternative for the birth clerk but to visit with the mother. Higher percentages of birth clerks say they consult the mother for information on smoking and alcohol use. These are areas recognized as under-reported on the birth certificate. The hospital medical record evaluations found some births where smoking was reported in the prenatal care record but not on the birth certificate. Training should strongly discourage birth clerks from asking mothers for this information.

Hospitals that provide Worksheet Part 1 to the mother exclusively to complete have more potential for contradictory information. In answer to Question 6 of the Telephone survey, 85.9 percent of birth clerks perceived that a mother gave information that conflicted with information from other sources. The percentage of facilities that allow such a practice should be reduced. Almost one-fifth of the hospitals reported mothers who completed Worksheet Part 1 received it prior to admission, another fifth upon admission. In giving the form to mothers prior to admission, birth clerks relinquish a greater degree of control over the accuracy of information. Using the admission record and prenatal care record will reduce the dependence on the mother for certain birth information. Still for other data elements the mother may be the only source for some information entered into the worksheet. Training should emphasize the mother is the last resort for information that is more accurately obtained from the medical record.

Questions about moving elements of Worksheet Part 1 to Part 2 may not have been fully understood by birth clerks. Some of the clerks that answered they wanted no changes to the worksheet said they did so because they are comfortable with the present forms. Sentiment for moving elements was highest for gestation, pregnancy terminations, and number of prenatal visits.

While a majority of the clerks surveyed felt mothers don't understand the question about month prenatal care began, they were evenly divided on making

changes to it. Some were unsure whether the question was the problem. Birth clerk training should continue to emphasize the need to completely explain this question to mothers.

Responses to the question on recording ancestry clearly indicate clerks are challenged in trying to provide complete and accurate information in a limited space on the birth certificate. These responses serve as another basis for CHES to consider discontinuing collection of full ancestry information in favor of Hispanic ethnicity. The few data requests for ancestry information combined with concerns that persons of color are not adequately identified in vital records warrants adhering closely to the methodology adopted in the new standard certificates.

Since this study did not compare worksheets to the birth certificate or medical records the impact, if any, of transcribing errors is unknown.

Recommendations

Future evaluations of birth events to hospital medical records should be conducted. Surveys should include a facility where the Birth Registration Worksheet is retained in the hospital medical records. Surveys should also continue to use a two-day definition of timeliness. Issues for future surveys will be the impact of the Health Insurance Portability and Accountability Act and electronic records on what medical records hospitals can share with the KDHE surveyor. The Hospital 1 transition to electronic records had a minor impact on record availability. It appeared greater hospital resources were directed to the transition than maintaining the paper-based system that was being replaced.

Several areas in need of improvement have been identified. This survey should be of value as CHES moves to a browser-based system for birth certificate processes. Proper design of the forms for collecting and submitting birth certificate information and knowledge of the hospital's birth data entry process will enable the department to more accurately collect essential public health information.

- Retain the worksheet as a data collection tool and require it be maintained in the medical record. Since worksheets are the sole source for validating some birth event information, CHES guidance to birth clerks should be revised. Hospitals should be told to retain the worksheets.
- Improve quantity and quality of birth clerk training. Birth clerks desire training. It must be provided in a quality manner and on a regional basis to help ensure data quality and facilitate a smooth transition to a new web-enabled birth registration process. Regional trainings will enable some hospitals to send additional clerks to such sessions. Inclusion of training information within the web-based system will be important.
- Use information from the mother for the certificate when it is not available in the medical record within the time period the mother is in the hospital. Birth clerks should be discouraged from reporting information provided by the mother that contradicts available medical records. Telephone survey results indicate mothers occasionally provide information that contradicts the medical record. A birth clerk at one of the hospitals where records were reviewed said clerks may occasionally change information to satisfy the mother.
- The implementation of a browser-based EBR at hospitals should be accompanied by advice that the system be located in the birthing unit and operated by a clerk assigned to that unit. This will maximize the likelihood of obtaining the most accurate birth event information and assure greater timeliness in reporting the event.
- Enhance computerized edit checks and validation programs to identify data anomalies. Edit checks of incoming data from hospitals should be enhanced. This study identified a concern about Hospital 1 reports of month prenatal care began. The sample of 324 births showed high

numbers of mothers reporting they began prenatal care in the first month of pregnancy. An analysis of all 2000 births at Hospital 1, showed prenatal care began in the first month for almost two-thirds of the births (65.8%). Excluding Hospital 1 births, the rate for prenatal care beginning in the first month of pregnancy was 24.7% for Kansas occurrence births. This study did not determine the reason for the high Hospital 1 rate.

- Conduct additional hospital record surveys. Include hospitals that retain worksheets to better assess accuracy for data elements (mother's state of birth, father's state of birth, mother's maiden name and father's SSN) generally found only in the worksheet Part 1.

Table A. Birth Certificate - Medical Record Match Counts and Rates by Hospital by Data Element

ELEMENTS BY GROUP	Hospital 1				Hospital 2			
	MATCH	NON-MATCH	MISSING	% MATCH	MATCH	NON-MATCH	MISSING	% MATCH
INFANT AND PARENT NAME								
Child's Name	278	41	5	85.8%	84	0	0	100.0%
Mother's Name	310	9	5	95.7%	84	0	0	100.0%
Mother's Maiden Name	15	0	309	4.6%	30	0	54	35.7%
Father's Name	244	36	44	75.3%	81	2	1	96.4%
PARENTAL INFORMATION								
Mother's Date of Birth	309	3	12	95.1%	80	0	4	95.2%
Mother's Street Address	283	39	2	87.3%	75	9	0	89.3%
Mother's City	308	15	1	95.1%	81	3	0	96.4%
Mother's State	321	2	1	99.1%	84	0	0	100.0%
Mother's Zip Code	296	25	3	91.4%	81	3	0	96.4%
Mother's Race	297	9	18	91.7%	59	1	24	70.2%
Mother's Social Security #	299	20	5	92.3%	80	2	2	95.2%
Mother Married?	280	30	14	86.4%	83	0	1	98.8%
Mother's Education	6	8	310	1.9%	30	8	46	35.7%
Father's State of Birth	45	0	279	13.9%	9	0	75	10.7%
Father's Race	29	0	295	9.0%	5	0	79	6.0%
Father's Education	40	1	283	12.3%	6	0	78	7.1%
Father's Date of Birth	46	278	0	14.9%	27	1	56	32.1%
Father's Social Security #	115	6	203	35.5%	49	0	35	58.3%
DELIVERY INFORMATION								
Time of Birth	291	27	6	89.8%	77	7	0	91.7%
Date of Birth	317	7	0	97.9%	84	0	0	100.0%
Facility Where Birth Occurred	322	1	1	99.4%	84	0	0	100.0%
Attendant	307	16	1	94.8%	84	0	0	100.0%
PREGNANCY OUTCOMES								
Live Births	286	29	9	88.3%	83	1	0	98.8%
Live Births Now Dead	301	8	15	92.9%	84	0	0	100.0%
Terminations < 20 weeks	268	46	10	82.7%	82	2	0	96.7%
Terminations >20 weeks	302	12	10	93.2%	84	0	0	100.0%
CONDITION OF MOTHER								
Date of Last Menses (LMP)	91	184	49	28.1%	66	12	6	78.6%
Month Prenatal Care Began	25	266	33	7.7%	36	42	6	42.9%
Weeks of Gestation	208	75	41	64.2%	78	6	0	92.9%
Number of Prenatal Visits	19	275	30	5.9%	27	54	3	32.5%
Mother's Medical Risk Factors	172	146	6	53.1%	58	25	1	69.0%
Prenatal Procedures	169	37	118	52.2%	72	6	6	85.7%
Conditions of Labor	200	112	12	61.7%	75	9	0	89.3%
Method of Delivery	296	18	10	91.4%	83	1	0	98.8%
CONDITION OF INFANT								
Birth weight	139	174	11	42.9%	38	46	0	45.2%
Condition of the Newborn	271	48	5	83.6%	75	9	0	89.3%
Plurality	314	1	9	96.9%	84	0	0	100.0%
Birth Anomalies	307	10	7	94.8%	84	0	0	100.0%
Apgar Scores	281	22	21	86.7%	67	9	9	79.8%

Source: KDHE Center for Health and Environmental Statistics

Table B. Telephone Survey Questionnaire Results

Question 1

Mother, exclusively	23	29.5%
Birth Clerk, exclusively	13	16.7%
Birth Clerk and Mother	38	48.7%
Other	4	5.1%

Question 1a (Asked of individuals that did not answer B to Question 1)

Before she is admitted for delivery	13	20.0%
On admission for delivery	16	24.6%
After birth of baby	29	44.6%
No set time	2	3.1%
No answer	5	7.7%

Question 2

Nurse in the birth unit	29	37.2%
Birth clerk	10	12.8%
Ward clerk in birth Unit	1	1.3%
Doctor	32	41.0%
Medical record clerk	5	6.4%
Other	1	1.3%

Question 3

Yes	39	50.0%
No	39	50.0%

Question 4 (Asked of persons answering "No" to Question 3)

Discarded	3
Kept elsewhere in the facility	8
Kept elsewhere for a time, then discarded	28

Length of time kept

Up to six months	9
Six Months to One year	2
One to five years	6
Over Five years	11
Forever	8

Question 5

Yes	5	6.4%
No	73	93.6%

Question 6

Never	10	12.8%
Not Frequently	40	51.3%
Occasionally	27	34.6%
Frequently	1	1.3%

Question 7a

Mother	19	24.4%
Doctors prenatal care record	52	66.7%
Facility medical record	6	7.7%
Other	1	1.3%

Question 7b

Mother	12	15.4%
Doctors Prenatal Care record	59	75.6%
Facility Medical record	5	6.4%
Other	2	2.6%

Question 7c

Mother	24	31.2%
Doctors Prenatal Care record	41	53.2%
Facility Medical record	10	13.0%
Other	2	2.6%

Question 7d

Mother	24	31.2%
Doctors Prenatal Care record	43	55.8%
Facility Medical record	8	10.4%
Other	2	2.6%

Question 7e

Mother	16	20.8%
Doctors Prenatal Care record	55	71.4%
Facility Medical record	5	6.5%
Other	1	1.3%

Question 8

Agree	47	60.3%
Disagree	28	35.9%
Not Sure	2	2.6%
Missing	1	1.3%

Question 9

Yes	39
No	39

Question 10

Data Element	Keep in Part 1	Move to Part 2
Live Births living and Dead	56	22
Terminations <20weeks, >20weeks	50	28
Date Last Menses Began	55	23
Month of Prenatal Care Began	59	19
Plurality	64	14
Birth weight	67	11
Clinical Estimate of Gestation	49	29
Prenatal Visits	52	26
If Not Single Birth, Order	62	16

Question 11

List 1-3	21
All ancestries	26
European	25
Other	1
Don't know	2
Whatever Mom Wants	3

Question 12

EBC	64
Paper	14

Question 13

Yes	68
No	4
No, but available if needed	6

Question 14 (asked if yes to Question 13)

Yes	55
No	9
No, but available if needed	4

Question 15

Yes, I can do it	56
I think I could do it but may need some training	22
I do not know if I can	0
I would not try (No comment)	0

Question 16

Yes, I can do it	60
I think I could do it but may need some training	18
I do not know if I can	0
I would not try (No comment)	0

Question 17

Yes, I can do it	64
I think I could do it but may need some training	14
I do not know if I can	0
I would not try (No comment)	0

Question 18

Yes, I can do it	54
I think I could do it but may need some training	24
I do not know if I can	0
I would not try (No comment)	0

Question 19

Yes	77
No, I plan to use the paper form	1

Question 20

Less Than Six Months	6	7.7%
Six Months to a Year	10	12.8%
One to Three Years	17	21.8%
Three to Five Years	12	15.4%
More than Five Years	33	42.3%

Question 21

Yes	73
No	2
Maybe	3

Question 22

Yes	77
No	0
Maybe	1

Question 23

Yes	34
No	44