OBSTETRICS CARE GUIDE
TECHNICAL MANUAL (2009)[1]
Written by the University of Virginia Department of Health Evaluation Sciences[2] and Virginia Health Information

Introduction

This technical manual describes the methods used for data extraction, linkage, correction and validation, statistical modeling, and analysis in the development of the *Obstetrics Care Guide*.

Methodology Used for Defining and Including Delivery Records

Record Set 1

Delivery records for statistical modeling of primary and repeat Cesarean rates (Record Set 1) were included from the 2006 patient level data (PLD) file based on the following Centers for Medicare & Medicaid Services (CMS) diagnostic related group (DRG) codes:

Delivery Type	CMS-DRG
Cesarean section	370, 371
Vaginal	372,373,374,375

The total in this set was 97,111 deliveries.

Record Set 2

To capture additional delivery records not coded as one of the DRG codes above for length of stay and total charge calculations (Record Set 2), the following obstetrical procedure codes and diagnosis codes were also used:

Procedure Description	Procedure/Diagnosis Code	PLD Fields
Forceps or other instrumental delivery	72.0 through 72.9	PX1-PX6
Episiotomy	72.1, 72.21, 72.31, 72.71, 73.6	PX1-PX6
Cesarean section	74.0 through 74.29, 74.4, 74.99	PX1-PX6
Normal Delivery	650	DX1-DX9
History of Cesarean	654.2, 654.20, 654.21, 654.23	DX1-DX9

Because this set was used for length of stay and total charge calculations, a delivery record had to have a hospital length of stay greater than 0 days and total hospital charges greater than $0 to be included. Only one birth record was used for analysis if a mother delivered multiples.

[1] Delivery data from 2006

[2] VHI would like to acknowledge the contributions and friendship of Dr. Doug Wagner who passed away during the development of the guide.

For example:

- A valid delivery record in this set is a patient record where: {DRG=370-375} ***or*** {PX1-PX6=72.0-72.9, 73.6, 74.0-74.29, 74.4, or 74.99} ***or*** {DX1-DX9=650} and {los>0 and tchg>0}.

- A valid repeat Cesarean record is a patient record where: {DRG=370 or 371} ***and*** {DX1-DX9=654.2, 654.20, 654.21, or 654.23} and {los>0 and tchg>0}.

The total in this set was 96,987 deliveries.

Counts and Calculations

The following table gives an overview of *actual* counts and calculations used in the *Obstetrics Care Guide*. The methodology for *expected* counts and calculations are described in "Risk-Adjusted Calculations of Expected LOS and Average Hospital Charges" and "Statistical Modeling of Primary and Repeat Cesarean Rates."

Description	Definition/Calculation	Abbreviation (guide)	Record Set
# of Vaginal Deliveries	see Record Inclusion Criteria from Table 1	Vaginal Deliveries	1
# of Episiotomies	Vaginal deliveries with episiotomy procedure	Episiotomy-Total	1
% Episiotomy	# of Episiotomy/# of Vaginal Deliveries*100	Episiotomy-Rate	1
Vaginal Length of Stay (DAYS)	Average Length of Stay for Vaginal Delivery.[3]	Hospital Length of Stay-Vaginal Actual	1
Vaginal Total Charges ($)	Average Total Hospital Charges for Vaginal Delivery[4]	Average Hospital Charge-Vaginal Actual	1
Cesarean Delivery Length of Stay (DAYS)	Average Length of Stay for Cesarean Delivery.	Hospital Length of Stay-Cesarean Actual	1
Cesarean Total Charges ($)	Average Total Hospital Charges for Cesarean Delivery	Average Hospital Charge-Cesarean Actual	1
Vaginal Birth with No Prior Cesarean	Vaginal deliveries with NO history of Cesarean (see inclusion criteria from Table 1 and Table 3)	Not shown in guide	1
Vaginal Birth After Cesarean (VBAC)	Vaginal deliveries with history of Cesarean	Not shown in guide	1
# of Primary Cesarean Deliveries	(# of Cesarean Deliveries)-(# of Repeat Deliveries)	Primary Cesareans-Deliveries	2
% Primary Cesarean Deliveries	# of Primary Cesarean Deliveries/(# Primary Cesarean Deliveries + # non VBACS)*100	Primary Cesareans-Act. Rate	2
# of Repeat Cesarean Deliveries	Cesarean deliveries with history of Cesarean	Repeat Cesareans-Deliveries	2
% Repeat Cesarean Deliveries	(# of Repeat Cesareans)/(# of Repeat Cesareans + # of VBACs)*100	Repeat Cesareans-Act. Rate	2

[3] The LOS and TCHG for a delivery record had to be within a "normal range", as defined for the severity level established by 3M™'s APRDRG system, to be included for statistical testing. See "Risk-Adjusted Calculations of Expected LOS and Average Hospital Charges."

Minimum Counts for Inclusion ("Too few to calculate") and Episiotomies

VHI's Obstetric Task Force agreed that a physician and hospital should have at least 30 and 100 total deliveries to be included in the *Obstetrics Care Guide.*

For length of stay and total charge calculations, a physician and a hospital should have at least 30 deliveries and 100 deliveries (vaginal or Cesarean), respectively, in the numerator to receive a rating. For primary and repeat Cesarean rates, a physician and a hospital should have at least 30 deliveries in the denominator to receive a rating.

VHI's Obstetric Task Force decided not to include expected rates of episiotomies since the literature, as of the writing of this manual, did not indicate any clinical means by which to risk-adjust.

Risk-Adjusted Calculation of Expected LOS and Average Hospital Charges

The information in this section applies to the deliveries in Record Set 2 with the inclusion criteria already described above. The record set was further refined by using Version 20 of 3M™'s All Patient Refined Diagnosis Related Groups (APRDRG):

Version 20 APRDRG	Description
540	Cesarean Delivery
541	Vaginal Delivery w Sterilization &/OR D&C
542	Vaginal Delivery w Complicating Procedures exc Sterilization &/or D&C
560	Vaginal Delivery

Additionally, records with "unusually" low or high lengths of stay were removed from the dataset before any calculations were performed. These "outliers" are based on trim points defined by 3M™.

The first step is to calculate the statewide values (expected) by APRDRG and severity level. The resulting table is the expected length of stay (LOS) for each APRDRG at each level of severity (patient differences relating to severity of condition or complications).

The second step is to calculate hospital (or physician) actual and expected values for each APRDRG at each level of severity. The actual value is the average length of stays for each patient. The hospital's (or physician's) expected value is the average of each patient's expected length of stay based on the statewide value for a particular APRDRG and severity level.

In the final step, using methodology developed by 3M™, the variation of each patient's actual length of stay compared to their expected length of stay is calculated and weighted by the number of deliveries by severity level ("patient mix"), aggregated for the delivery type. The difference between the actual length of stay for the hospital (or physician) is statistically compared to the expected value (at a 95% confidence level) to determine if the difference is statistically significant. The same methodology was applied total charges. The following hypothetical table shows the average length of stay for a Cesarean delivery (APRDRG=540) by (increasing) severity level.

	Average Length of Stay (days)	
APRDRG (severity level 1-4)	Virginia (expected)	Hospital A (or Physician A) (actual)
540*1*	3.04	2.98
540*2*	3.53	3.56
540*3*	5.18	4.98
540*4*	7.73	8.67
*540**	*4.21*	*5.32*

*Hypothetical severity-weighted, average length of stay for Cesarean delivery

Validation of Delivery Records Attributed to Physicians and Hospitals

VHI's Obstetric Task Force agreed that deliveries should be attributed to the operating physician using the federally assigned unique physician identification number (UPIN). The UPIN is recorded by the delivering hospital, according to hospital protocols, and is received as a separate field in the patient level data file submitted to VHI on a quarterly basis. In order to minimize potential errors caused by the incorrect or non-descript reporting of UPINs (e.g., UPIN was blank or reported as "other") which might lead to incorrect or no attribution of the delivery, VHI established a two step process for UPIN verification. First, each delivering hospital received a detailed summary of their reported deliveries by physician. Hospitals were provided a 90-day window of opportunity to verify the data and/or make any needed corrections.

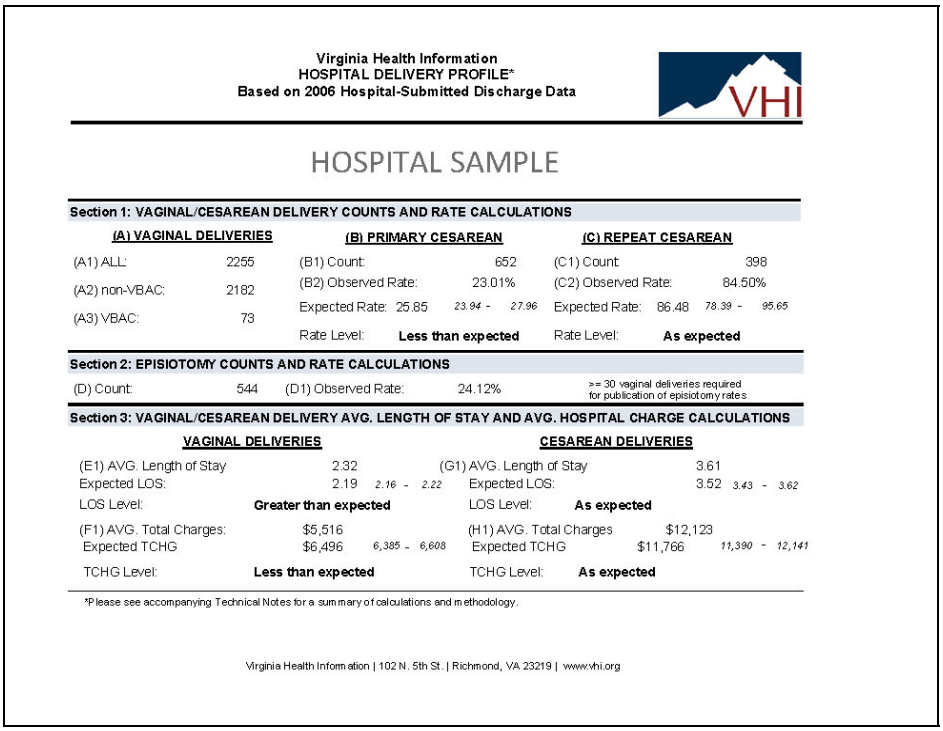
Following hospital review in November 2008, VHI notified physicians responsible for those reported deliveries (including any deliveries by nurse practitioners or nurse midwives attributed to the overseeing physician) via a summary report by hospital. Physicians were also provided a 90-day window of opportunity to work with hospitals to verify the data and/or make any needed corrections.

There were 794 physicians reporting at least 1 delivery in 2006. Of these, 494 (62%) required a UPIN correction on at least 1 delivery with an average of 10 deliveries and a range of 1 to 465 deliveries. Also, VHI was able to properly assign approximately 7,000 deliveries that were initially submitted with blank/non-descript UPINs. Approximately, 2,000 deliveries remained unattributable to an operating physician because of UPIN error.

Delivery Profile Mailing and Comment Period

VHI prepared and mailed a "Physician/Hospital Delivery Profile" to every physician and hospital with at least 30 total deliveries. The following is a sample profile. Physicians were also asked to verify standard information about office locations, hours, self-designated specialties, etc. obtained from the Virginia Board of Medicine at www.vahealthprovider.com. Any changes to this information must be made on their website.

Note that the delivery profile contained additional data not included in the *Obstetrics Care Guide* such as VBAC and non-VBAC counts and confidence intervals (95%) for calculations with expected rates.



Virginia Health Information
HOSPITAL DELIVERY PROFILE*
Based on 2006 Hospital-Submitted Discharge Data

HOSPITAL SAMPLE

Section 1: VAGINAL/CESAREAN DELIVERY COUNTS AND RATE CALCULATIONS

(A) VAGINAL DELIVERIES		(B) PRIMARY CESAREAN		(C) REPEAT CESAREAN	
(A1) ALL:	2255	(B1) Count:	652	(C1) Count:	398
(A2) non-VBAC:	2182	(B2) Observed Rate:	23.01%	(C2) Observed Rate:	84.50%
(A3) VBAC:	73	Expected Rate: 25.85	*23.94 - 27.96*	Expected Rate: 86.48	*78.39 - 95.65*
		Rate Level:	**Less than expected**	Rate Level:	**As expected**

Section 2: EPISIOTOMY COUNTS AND RATE CALCULATIONS

(D) Count: 544 (D1) Observed Rate: 24.12% >= 30 vaginal deliveries required for publication of episiotomy rates

Section 3: VAGINAL/CESAREAN DELIVERY AVG. LENGTH OF STAY AND AVG. HOSPITAL CHARGE CALCULATIONS

VAGINAL DELIVERIES			CESAREAN DELIVERIES		
(E1) AVG. Length of Stay	2.32		(G1) AVG. Length of Stay	3.61	
Expected LOS:	2.19	*2.16 - 2.22*	Expected LOS:	3.52	*3.43 - 3.62*
LOS Level:	**Greater than expected**		LOS Level:	**As expected**	
(F1) AVG. Total Charges:	$5,516		(H1) AVG. Total Charges	$12,123	
Expected TCHG	$6,496	*6,385 - 6,608*	Expected TCHG	$11,766	*11,390 - 12,141*
TCHG Level:	**Less than expected**		TCHG Level:	**As expected**	

*Please see accompanying Technical Notes for a summary of calculations and methodology.

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Physicians and hospitals were invited to submit comments that would be posted with their data in the consumer guide. During the pre-release period, 1 hospital commented (see attached) and can also be found in the hospital section of the online guide.

Obtaining and Linking Birth Certificate Data

VHI acquired birth certificate data from the Virginia Department of Health Division of Vital Records and Health Statistics for use in the statistical models requiring patient-level variables not available in the hospital administrative data set such as events of labor (e.g., breech/malpresentation).

In 2006, there were 97,111 delivery records matching the inclusion criteria of Record Set 1. VHI successfully linked 96% (93,183) of these records to birth certificate data. VHI applied a series of "deterministic" linkages, using several identifiers in each file, and only accepted "true" matches.

If multiple deliveries occurred to one mother, information from only one record (delivery) was attributed to the mother and used for analysis. The statistical modeling for primary and repeat Cesarean rates is described below.

Statistical Modeling of Primary and Repeat Cesarean Rates

In VHI's *Obstetrics Care Guide*, hospital and physician observed rates of cesarean section are reported

along with an indication of whether the observed rates are higher, lower, or not statistically distinguishable from what would be expected. The rates are reported separately for women who have not had a prior cesarean section and for woman who have had a prior cesarean delivery.

Given the many potential factors that can affect the decision to proceed with a cesarean delivery, a statistical model was required that could identify and adjust for these factors. In the previous *Obstetrical Services: A Consumer's Guide*, 48 variables were identified and adjusted for in the model. Since the publication of that report, additional studies from the academic literature have emerged that describe alternate approaches for the cesarean delivery risk adjustment. In addition, birth certificate data from the Virginia Department of Health Division of Vital Records and Health Statistics was acquired for use in the analysis. As a result, four different statistical models were developed and evaluated for use in the current Guide. These four models differ according to the variables that are included. For each model, we assessed the statistical performance of the model using the *c index*. The c index is a measure of the model's capacity to discriminate between patients with and without cesarean delivery and its value ranges between 0.5 for random results to 1.0 for perfect discrimination. Another important indicator of the quality of a model is the extent to which it includes variables that may represent post-hoc justification of the decision to deliver an infant via cesarean section (e.g. "failure to progress"). Extensive discussion among all Obstetric Task Force members was used to determine potential diagnoses of this nature.

All statistical models were developed using data spanning two calendar years, specifically discharges from January 1, 2005 to December 31, 2006. The final models were then applied to the 2006 calendar year to calculate expected rates of primary and repeat cesarean delivery.

Model 1: The Original 1998 Model
The initial modeling effort, using the original list of ICD9 codes (updated to reflect coding changes) that was developed for the 1998 project, yielded a c-index on the current data of 0.94. A weakness of this model was the inclusion of several conditions that were potentially used to retrospectively justify use of cesarean delivery, such as disproportion, dystocia, etc.

Model 2: The Revised Approach
For this model, a shortened list of ICD9 codes, excluding those that were identified by the Obstetric Task Force members as having a high likelihood of potential post-hoc justification. A new ICD9-CM code, representing fetal bradycardia, was added to this model, which had a c-index of 0.83.

Model 3: Model 2 + Birth Certificate Data
The third model includes a subset of variables from birth certificate registry that were identified by the Obstetric Task Force members as potential predictors for cesarean delivery: birth weight, gestational age, number of previous births, prenatal care indicator (present or absent), parity, and multiple birth indicator. This model had the highest performance with a c-index of 0.86. Gestational age was not found to be significant, but all other birth certificate variables were.

Peaceman model
This model includes a list of 10 conditions identified using administrative coding data and 3 birth certificate variables (birth weight, gestational age, and parity), based on a report published by Peaceman[5]. The c-index for this model was 0.75 when estimated on the women with no prior cesarean delivery.

[5]AM Peaceman. Risk-Adjustment of Cesarean Delivery Rates: A Practical Method for Use in Quality Improvement**.** Am J Med Qual. 17(3), 112-177, 2002.

After assessing the four different models on the basis of statistical tests of model performance as well as clinical appropriateness, Model 3 was selected as the optimal approach for records in which birth certificate data was available. Corresponding birth certificate data was not available for every record from the hospital discharge dataset. Of the 97,111 records analyzed, 3,928 (4.04%) did not have matched birth certificate data. For these cases, we used Model 2 as described above.

Predictor Variables

Table 1 lists the ICD9-CM codes used to identify conditions in the hospital discharge data. In some cases where specific diagnoses were very rare in the data set, clinical conditions were grouped following the same approach used in the prior report. Table 2 displays the groups that were used.

Statistical Analysis

Estimates of expected rates of cesarean section were calculated for each physician and each hospital based on a detailed statistical analysis of hospital data on all mothers discharged from a Virginia hospital during the 2006 calendar year. Statistical analyses were conducted separately for women with or without a prior cesarean section. Logistic regression, the most widely used statistical technique for predicting the occurrence of a binary outcome, was used for each analysis. This technique allowed for hypothesis testing of predictive factors and yielded a predicted probability of the binary event for every woman in the sample. Age was treated as a linear continuous variable while all other variables were categorical. Parity (the number of prior deliveries) was converted into three separate variables. In aggregate, the logistic regression model adjusted for 45 separate variables in those cases when birth certificate data was available and 38 variables when that data was not available. Table 3 displays the list of variables along with whether or not they were statistically significant.

As previously described, the model estimated on data from women with no prior cesarean delivery had an area under the receiver operator characteristics (ROC) curve of 0.86 for cases in which birth certificate data was available. For cases with missing birth certificate data, the model performance was 0.83. These results indicate that the models are good performers and that they adequately discriminate between individuals with and without cesarean delivery. For women with a prior cesarean delivery, model performance was 0.74 in all patients, regardless of the availability of birth certificate data. Part of the reason for the lower model performance was the fewer number of cases for women with prior delivery.

Hospitals and individual physicians were never entered in the models. Instead, a test for the differences between observed and expected (predicted) rates developed by Cox was used to evaluate each hospital and physician. The test was performed for each of the two models for hospitals and then for individual physicians. Thus the hospital(s) a physician performed deliveries in had no effect on that physicians' evaluation.

Rate Criteria

Two criteria were set for establishing whether an observed cesarean rate was distinguishably higher (or lower) than the predicted cesarean delivery rate. First, a 95% confidence interval was calculated for the predicted rate of each hospital and individual physician. This confidence interval, if calculated many times with different samples of data, is expected to include the observed rate 95% of the time. Hospitals (or physicians) with confidence intervals that have a lower limit above 1.0 have an observed to expected ratio that is significantly higher than the average hospital (or physician), and those with an upper limit below 1.0 have a ratio that is significantly lower than the average hospital. Secondly, the number of total deliveries associated with that hospital or physician had to be at least 30.

Table 1: ICD9-CM Codes for Diagnostic Variables

Condition	ICD-9 2005, 2006 & 2007
Fetal-maternal Hemorrhage	65600, 65601, 65603
Hemorrhage-early pregnancy	64000, 64001, 64003 64080, 64081, 64083 64090, 64091, 64093
Abruptio placenta	64120,64121, 64123
Placenta Previa	64100, 64101, 64103 64110, 64111, 64113
Hypertension	64200-64204 64210-64214 64220-64224 64230-64234 64270-64274 64290-64294
Pre-eclampsia	64240-64244 64250-64254
Eclampsia	64260-64264
Multiple gestations	65100, 65101, 65103 65110, 65111, 65113 65120, 65121, 65123 65130, 65131, 65133 65140, 65141, 65143 65150, 65151, 65153 65160, 65161, 65163 65180, 65181, 65183, 65190, 65191, 65193, 65170, 65171, 65173
Malpresentation (not breech)	65200, 65201, 65203 65240, 65241, 65243 65250, 65251, 65253 65260, 65261, 65263 65270, 65271, 65273 65280, 65281, 65283 65290, 65291, 65293
Transverse lie	65230, 65231, 65233
Obstruction caused by malposition of the fetus at onset of labor	66000, 66001, 66003
Shoulder (girdle) dystocia	66040, 66041, 66043
Deep transverse arrest & & persistent occipitoposterior position	66030, 66031, 66033
Congenital abnormality of uterus	65400-65404
Congenital or acquired abnormality of vagina	65470-65474
congenital or acquired abnormality of vulva	65480-65484
Other congenital or acquired abnormalities of cervix	65460-65464
Tumors of body of uterus	65410-65414
Forceps or vacuum extractor attempt	All ICD9 codes starting with 6607
Excessive fetal growth	65660, 65661, 65663
Breech	65210, 65211, 65213 65220, 65221, 65223
Herpes	054.10
Other viral infections	64760-64764

Renal Disease	64620-64624
Liver disorders	64670, 64671, 64673
Anemia	64820-64824 All ICD9 Codes starting with 280, 281, 282, 283, 284, 285
Thyroid dysfunction	64810-64814 All ICD9 codes starting with 240, 241, 242, 243, 244, 245, 246
Cardiovascular diseases	64860-64864 All ICD-9 codes starting with 390,391, 392, 393, 394, 395, 396, 397, 398, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429
Cardiovascular disorders	64850-64854 All ICD9 codes starting with 745, 746, 747
Other current conditions	64890-64894 with 260-269. Added codes originally from Cardiovascular diseases now placed here. 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459
Abnormal glucose tolerance	64880--64884 with 790.2-790.29
Diabetes	64800-64804 All ICD9 codes starting with 250
Prolonged pregnancy	64520, 64521, 64523
Poor fetal growth	65650, 65651, 65653
Premature	64420-64421
Rhesus isoimmunization	65610, 65611, 65613
Other isoimmunizations	65620, 65621, 65623
Cord around neck	66310, 66311, 66313
Prolapse of cord	66300, 66301, 66303
Vasa previa	66350, 66351, 66353
Hypertonic contractions	66140, 66141, 66143
Vascular lesions of the cord	66360, 66361, 66363
Oligohydramnios	65800, 65801, 65803
Polyhydramnios	All ICD9 codes starting with 6570, 6571, 6573?
CNS malformation in fetus	65500, 65501, 65503
Premature rupture of membranes	65810, 65811, 65813
Delayed delivery after artificial rupture of membranes	65830, 65831, 65833
Infection of the amniotic cavity	65840, 65841, 65843
Elderly primigravida	65950, 65951, 65953
Fetal bradycardia	65970, 65971, 65973 76381, 76382, 76383
Anemia	64820-64824 All ICD9 Codes starting with 280, 281, 282, 283, 284, 285

Table 2: Diagnostic Groups for Models

Group	Condition
Hemorrhage	Fetal-maternal Hemorrhage
	Hemorrhage-early pregnancy
	Abruptio placenta
	Placenta Previa
Eclampsia	Pre-eclampsia
	Eclampsia
Congenital Abnormality	Congenital abnormality of uterus
	Congenital or acquired abnormality of vagina
	congenital or acquired abnormality of vulva
	Other congenital or acquired abnormalities of cervix
CV Diseases / Disorders	Cardiovascular diseases
	Cardiovascular disorders
Isoimmunizations	Rhesus isoimmunization
	Other isoimmunizations
ROM	Premature rupture of membranes
	Delayed delivery after artificial rupture of membranes
	Infection of the amniotic cavity

Table 3: Variables Used In Model, Statistical Significance

Name of Variable	***No Prior CESAREAN DELIVERY, Birth Certificate Data***	***No Prior CESAREAN DELIVERY, No Birth Certificate Data***	***Prior CESAREAN DELIVERY, Birth Certificate Data***	***Prior CESAREAN DELIVERY, No Birth Certificate Data***
African-American	*	*		*
Hispanic	*	*		
Age	*	*		
Hemorrhage (group includes fetal-maternal hemorrhage, hemorrhage in early pregnancy, abruption placenta and placenta previa)	*	*	*	
Hypertension	*	*		
Eclampsia (group includes pre-eclampsia as well)	*	*	*	*
Multiple Gestations	**n/a – see 'Twins'**	*	**n/a – see 'Twins'**	
Malpresentation	*	*		
Transverse Lie	*	*	*	
Obstruction Caused by Malposition	*	*		*
Shoulder Dystocia	*	*	*	
Deep Transverse Arrest	*	*		
Congenital Abnormality (group includes various anomalies of uterus, vagina, vulva, cervix)	*	*		
Tumors of Body of Uterus	*	*	*	
Forceps Attempt	*	*		
Excessive Fetal Growth	*	*	*	

Name of Variable	***No Prior CESAREAN DELIVERY, Birth Certificate Data***	***No Prior CESAREAN DELIVERY, No Birth Certificate Data***	***Prior CESAREAN DELIVERY, Birth Certificate Data***	***Prior CESAREAN DELIVERY, No Birth Certificate Data***
Breech	*	*	*	
Viral Infections (group includes herpes)	*	*		
Renal Disease	*			
Liver Disorders	*	*		
Thyroid Dysfunction	*			
Anemia	*	*	*	*
Cardiovascular Disease / Disorder	*	*		
Other Current Conditions				
Abnormal Glucose Tolerance	*	*	*	*
Diabetes	*	*	*	
Poor Fetal Growth	*	*		
Premature			*	*
Isoimmunization (group includes rhesus, other)	*			
Cord Around Neck	*	*	*	
Prolapse of Cord	*	*		
Oligohydramnios	*	*	*	*
Polyhydramnios	*	*		
CNS Malformation In Fetus	*			
Rupture Of Membranes (group)	*	*	*	
Elderly Primigravida	*	*		
Abnormal Fetal Heart Rate	*	*	*	

Name of Variable	***No Prior CESAREAN DELIVERY, Birth Certificate Data***	***No Prior CESAREAN DELIVERY, No Birth Certificate Data***	***Prior CESAREAN DELIVERY, Birth Certificate Data***	***Prior CESAREAN DELIVERY, No Birth Certificate Data***
Birth Weight (BC)	*	n/a	*****	n/a
Gestational Age (BC)		n/a	*	n/a
Parity (BC) 1 previous birth	*	n/a	*****	n/a
Parity (BC) 2 previous births	*	n/a	*****	n/a
Parity (BC) 3 or more previous births	*	n/a	*****	n/a
Prenatal Care Indicator (BC)	*	n/a	*****	n/a
Twins (BC)	*	n/a	*****	n/a

Limitations

The methodology for the *Obstetrics Care Guide* was approved by VHI's Obstetric Task Force and has been published previously but there are several limitations which include:

- The delivery data is from 2006. VHI strongly believes in the value of involving hospitals and physicians in the data verification process. This effort does take time and, as a result, data is not as current as it would be if the process is not followed.
- The potential for hospitals to improperly assign a delivery to the wrong physician (misattribution). VHI has made every effort to minimize this error through the validation process described in the "Validation of Delivery Records Attributed to Physicians and Hospitals" section.
- Although a patient may see several physicians during their hospital stay, the operating physician, as determined by the hospital, is assigned the average total hospital charges.

VHI has also provided comments submitted by hospitals and/or physicians. Those comments are included here and on the web.

Mary Immaculate Hospital
A member of
BON SECOURS HEALTH SYSTEM

Administration

June 29, 2009

Deborah K. Waite
Operation Manager
Virginia Health Information
102 N. 5th Street
Richmond, VA 23219

RE: *A Consumer's Guide to Obstetrical Care,* 3rd Edition
Bon Secours Mary Immaculate Hospital, MPN 490041

Dear Ms. Waite:

After reviewing the data provided to Mary Immaculate Hospital in anticipation of the release of the "2009 Consumer Guide to Obstetrical Care", we conducted a review of the medical records involving the various patients which resulted in an assessment of a 'Greater than Expected' on total charges. We certainly appreciate receiving this report as it enhances our opportunity to improve clinical outcomes at Mary Immaculate Hospital. We have been performing concurrent review of discharged OB patients to ensure they receive evidence-based best practice care during their stay and take action on any opportunities for improvement.

It is important to note that hospital charges can vary from hospital to hospital and from health system to health system, based on a number of factors:

- The most prevailing factor is payer mix for each hospital, e.g., how much of its revenue comes from privately insured individuals and Medicare and Medicaid patients. Because the two government programs reimburse hospitals at rates that do not cover the cost of providing care, payments from privately insured patients generally subsidize the shortfalls created by Medicare and Medicaid and therefore represent a "hidden tax" on individuals and families not covered by government programs.
- Other factors that influence hospital charges are the amount of charity care and bad debt incurred by hospital or health system. There are about one million Virginians who are uninsured and even more who are underinsured. As a result, hospitals provide considerable care of care for which they are not compensated. This requires them to set charges at a level sufficient to recover some of those costs.

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However, it is essential to stress that charges are only a starting point for negotiations with insurance companies. In the case where a patient does not have insurance, which is very unusual with obstetrics, Mary Immaculate Hospital is pleased to share that the Bon Secours Financial Assistance program and discounting programs ensure that our patients are only responsible for a small fraction of their hospital charges.

The Bon Secours Health System follows a specific and thoughtful policy for payment practices for financial assistance and uninsured billing. This policy outlines the process by which Bon Secours provides financial assistance and describes how Bon Secours considers the financial resources of patients and their families when establishing a maximum annual liability for the costs of the care Bon Secours provides. Our practices are an outgrowth of our mission and values, and we are constantly mindful of our patients' needs. Our payment options and processes are designed to be respectful of the individual's personal dignity and his/her ability to pay.

We thank you for the opportunity to add this letter to the information released. Please post this correspondence to the web with Mary Immaculate Hospital's data outcomes.

Sincerely,

Patricia L. Robertson
EVP / Administrator