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Concordance of Chart Abstraction and Patient Recall of Intrapartum Variables up to 53 Years Later

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Abstract

Objective—To determine the concordance of patient recall compared to chart abstraction for distant intrapartum variables and to evaluate predictors of concordance.

Methods—A random sample from a population-representative cohort of 2,109 ethnically diverse women aged 40–74 years. Intrapartum variables reported by participants were compared to data abstracted from labor and delivery records from up to 53 years prior. Outcomes were assessed for sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) of patient recall compared to chart abstraction. Logistic regression was used to determine predictors of concordance of patient recall.

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Presentations: This study was presented in poster format at the 24th Annual Meeting of the Society for Maternal-Fetal Medicine in New Orleans, LA in February, 2004.

Results—401 births among 178 women were analyzed. Mean length of time between birth and recall was 29.6 years. Recall of cesarean delivery had the highest concordance (sensitivity=0.98, specificity=1.00, PPV=1.00, NPV=0.99), followed by birth weight ≥ 4000 gm (sensitivity=0.86, specificity=0.91, PPV=0.53, NPV=.98) Use of oxytocin and laceration requiring repair had the lowest concordance (sensitivity=0.43, specificity=0.75, PPV=0.54, NPV=0.91; sensitivity=0.37, specificity=0.68, PPV=0.34, NPV=0.81 respectively). No variables consistently predicted concordance or discordance of recall.

Conclusion—The concordance of patient recall to chart abstraction for intrapartum variables varies widely. Knowledge of the level of concordance expected for specific variables may be helpful to clinicians who often must rely on patient recall, rather than medical records, for intrapartum histories, and for researchers seeking to identify intrapartum risk factors based on patient recall.

Introduction

In obstetrics, intrapartum variables make a salient contribution to the management of future pregnancies as well as other health care decisions. Because of the transient nature of our population, information on intrapartum variables is often obtained by patient recall when it is not feasible or possible to obtain the medical record. Therefore, it is important to evaluate the concordance of recall for specific intrapartum variables and to identify predictors of concordance and discordance. Ascertaining the concordance of recall distant from the parturition event is particularly important as these older women are potentially experiencing ongoing medical issues such as urinary incontinence and pelvic prolapse for whom the obstetrical risk factors are most in question. Patient recall of intrapartum variables also provides crucial data in research on parturition. Understanding patient recall of intrapartum variables may help health care providers and researchers appropriately judge the reliability of recall and possibly give insight to how such recall may be reinforced.

The assessment of the concordance of recall for distant intrapartum variables (> 10 years) is limited. There has been one retrospective analysis evaluating the concordance of maternal recall for obstetrical variables occurring 10–15 years prior (1). This study examined multiple antepartum variables but considered few intrapartum variables. In addition, the study examined a single possible predictor of concordance (preterm labor). A second study compared narrative pregnancy and birth accounts written in the immediate post-partum period to those written 15 to 20 years later by a group of 20 women (2). This study did not compare either account to medical records and did not quantify agreement between the two accounts. A third study considered the concordance of variables relating to diethylstilbestrol (DES) exposure (3). This study evaluated the recall of distant events (10–30 years), but was focused on variables related to the association with cancer and therefore had very limited obstetrical information. The aim of this study was therefore to determine the concordance of maternal recall compared to chart abstraction for intrapartum variables, including those not addressed previously, and to evaluate potential predictors of concordance.

Materials and Methods

The Reproductive Risks for Incontinence Study at Kaiser (RRISK) enrolled women age 40 to 74, randomly selected from age and race strata, who had been members of the Kaiser Permanente Medical Care Program of Northern California, a large integrated health care delivery system, continuously or nearly continuously since age 18. Previous studies have shown that members of this organization are generally representative of the underlying geographic population served (4). Details of the recruitment have been separately reported (5). To be eligible, women had to have had at least half of their births within Kaiser. From within this group, women were randomly sampled within age and race strata with a goal of

obtaining approximately equal numbers of women in each 5-year age group with a racial composition of 20% Black/African-American, 20% Hispanic, 20% Asian-American, and 40% White/Caucasian. The current study analyzed a random 10% sample of parous women who completed a detailed parturition recall questionnaire and who had obstetrical records abstracted for all of their births.

RRISK was approved by the Institutional Review Boards of the University of California, San Francisco (UCSF) and Kaiser Permanente. Informed consent was obtained by telephone and in writing at the time of data collection. Data were collected by questionnaire and in-person interview. During the visit, the interviewer reviewed the subject's answers to the questionnaire and administered additional instruments. Trained medical record analysts abstracted labor and delivery records and surgical records from up to 50 years ago for participants who gave birth or underwent pelvic surgery at Kaiser.

Data from both the detailed patient interview and medical chart was available for the following variables: gestational age at delivery, type of delivery (cesarean section versus vaginal), use of oxytocin, use of regional anesthesia, laceration requiring repair, episiotomy, birth weight, and length of second stage of labor. For purposes of our analysis preterm birth was defined as <37 weeks, birth weight was dichotomized as less than 4000 grams and 4000 grams or greater. Length of second stage without regional anesthesia was dichotomized as prolonged if greater than 120 minutes for first delivery and greater than 60 minutes for subsequent deliveries; with anesthesia, the variable was dichotomized as prolonged if greater than 180 minutes for first delivery and greater than 120 minutes for subsequent deliveries.

The sensitivity (the proportion of women who correctly recalled having the variable over the total number who actually had it), specificity (the proportion of women who correctly reported not having the variable over the total number who actually did not), positive predictive value (the proportion of women who correctly reported having the variable over all the women who reported having the variable) and negative predictive value (the proportion of women who correctly reported not having the variable over all the women who reported not having the variable) of patient recall of variables for each delivery were calculated using the abstracted value as the "gold standard" as suggested by Maclure and Willet (6). Sensitivity, specificity, PPV and NPV were estimated using intercept-only logistic models fit by generalized estimating equations (GEE) to account for correlation between the repeated measures for women contributing more than one observation. For example, sensitivity was estimated by the antilogit of the intercept parameter estimate, equivalent to the fitted probability of positive recall, in the set of observations with the event of interest. Similarly, specificity was estimated by the fitted probability of a negative recall in observations without the event, and PPV and NPV by the fitted probabilities of an event or no event in the subsets of observations with positive and negative recall respectively. To obtain confidence intervals for these four parameters, we computed the antilogit of the upper and lower confidence bounds for the intercept parameter estimates.

To identify potential predictors of concordance, we examined univariate associations using logistic regression models. Variables significant at $p \leq 0.20$ were then entered into multivariate logistic regression models. Multivariate logistic regression was used to assess independent association of predictor variables with the concordant outcomes. Univariate variables considered included the following: age (continuous), race (Caucasian, African-American, Hispanic, Asian-American, Native American/Other), education (high school, some college or technical school, bachelor's degree or graduate school), income (<\$40,000, \$40–59,000, \$60–79,000, \$80–100,000, >\$100,000), birth order (first birth versus subsequent), type of delivery (cesarean versus vaginal), fetal presentation (breech versus vertex) and total number of births as a continuous variable. Delivery type was not included in the multivariate models for

episiotomy and laceration requiring repair as these variables only applied to vaginal deliveries. Results are presented as odds ratios (OR) and 95% confidence intervals (CI). Two-tailed p-values of ≤ 0.05 were considered statistically significant. All analyses were carried out in SAS Version 8.02 (SAS Institute, Cary, NC).

Results

Four hundred and one births among the randomly selected sample of 178 parous women were analyzed. Table 1 compares the demographics for the 178 women reported in this paper to the remaining 1538 parous women in the RRISK cohort who did not complete the detailed parturition history for a birth within Kaiser. No significant differences were identified. The age range of the participants at the time of interview was 40 to 74 years of age with a mean age of 55.9 years. Table 2 demonstrates the clinical characteristics of the 401 births. Of note, the most recent delivery occurred 3 years prior and the most distant 53 years prior to the interview. The mean time since delivery was 29.6 ± 10.0 S.D. years. The percentage of births occurring prior to the interview by decades were as follows: <10 years prior= 1.3%, 10–19 years prior=16.9%, 20–29 years prior=28.9%, 30–39 years prior=33.5%, ≥ 40 years prior=19.4%.

Sensitivity, specificity, PPV, and NPV of recall for each of the selected intrapartum variables are shown in Table 3. Sensitivity was greatest for cesarean delivery (0.98), birth weight greater than 4000 grams (0.86) and regional anesthesia (0.83). The value was lowest for use of oxytocin (0.43) and laceration requiring a repair (0.37). Specificity was greatest for recall of cesarean delivery (1.00), preterm birth (0.98) and birth weight ≥ 4000 gm (0.91). The PPV was greatest for cesarean delivery (1.00). The values were lowest for prolonged second stage (0.14) and laceration requiring a repair (0.34). The NPV was high for most of the variables considered; only use of episiotomy was low (0.52).

There was virtually no systemic bias in the recall of gestational age, with the mean by recall being 39.5 weeks versus 39.2 weeks from chart abstraction. Women tended to slightly underestimate birth weights compared to recorded weight (mean of 3326 grams versus 3463 grams). Women also slightly underestimated the length of the second stage, with the median length being 18 minutes by recall and 20 minutes from chart abstraction.

Table 4 lists those variables identified as predictors of concordance at $p \leq 0.20$ in the univariate analyses. The multivariate analysis results for significant predictors of concordance are shown in Table 5. It was not possible to evaluate concordance for type of delivery, as only one birth was discordant for this variable (the participant recalled a birth as being vaginal when medical records indicated a cesarean delivery). The model for preterm birth was limited due to low numbers and did not include income, race, education, or birth order. The model for birth weight ≥ 4000 grams could not be run due to low numbers. There were no variables that consistently predicted discordance or concordance for all variables; however women were more likely to correctly recall having had regional anesthesia, episiotomy, or prolonged second stage of labor for their first birth than for subsequent births.

Discussion

Overall, the sensitivity, specificity, positive predictive value and negative predictive value of the intrapartum variables considered varied widely. Only the recall of cesarean versus vaginal delivery had consistently high numbers for all four values. Birth weight ≥ 4000 gm also had high sensitivity, specificity and NPV, but a moderate PPV. Use of oxytocin and laceration requiring repair had particularly low concordance for all values except NPV which was moderate. The remaining variables had moderate sensitivity, specificity, PPV and NPV. The NPV for all the variables except use of episiotomy was generally high. Significant predictors

of discordance and concordance varied between variables and at times predicted concordance of one variable but discordance for another.

The data previously published on the concordance of maternal recall of obstetrical variables is limited but can be divided into studies performed immediately postpartum (7,8) less than 10 years from delivery (9,11), and greater than ten years (1). A study performed three weeks postpartum revealed moderate to excellent agreement on a number of obstetrical issues including type of delivery, use of episiotomy and use of regional anesthesia. Through an analysis using the kappa coefficient, they found kappa of 1.0 for cesarean section, 0.87 for use of episiotomy and 0.99 for use of epidural anesthesia (7). However, a second study performed at a median time of 10 weeks postpartum showed less agreement with kappa values of 0.63 for episiotomy and 0.66 for operative delivery. (8). Three studies analyzing concordance up to 10 years after delivery generally found poor to fair agreement between medical records and maternal recall of type of delivery, anesthesia used and major complications (9–11). The two studies that provided a quantitative estimate of concordance of recall more than 10 years after delivery both found high concordance rates for recall of birth weight and delivery by cesarean section, which is consistent with our findings.(1,3).

Our study was limited in that only women who had all of their deliveries within the Kaiser system were included in this study. Women who delivered elsewhere were not included. While it is not evident that this would bias the results, it should be kept in mind when generalizing the results to other populations. In addition, identification of predictors of discordance/concordance should be considered exploratory, as multiple predictors were evaluated without a strong basis for hypothesizing the direction or relative strength of their association with discordance or concordance.

Our study reveals that sensitivity of recall for an intrapartum variable is greatest for delivery type (cesarean versus vaginal), birth weight >4000gm, regional anesthesia and preterm birth but varies widely. Specificity and NPV were more consistently moderate to high for all variables. Thus, a woman who denies having had the variable is more often correct as opposed to women who believe they did experience the variable. The implications of our study results include that the evaluation of obstetrical risk factors (e.g., for incontinence or prolapse) should be drawn from the medical chart when possible. When this is not feasible, investigators should keep in mind that variables which the patient denies having had are more likely to agree with the medical record than those they believe to have experienced. In addition, clinicians should continue to maintain detailed notes, ensure patient understanding of the pertinent obstetrical variables, and encourage patients to write an account or keep records of birth and delivery variables. Further investigation of possible methods to improve patient understanding and recall of such variables would be beneficial. While we were unable to find consistent predictors of increased concordance or discordance across all variables, the specific associations we did find may be helpful to researchers who use recalled labor and delivery variables, particularly if confirmed by additional studies.

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Table 1

Demographic characteristics of the 178 women in the current study compared to the remaining parous women in the RRISK cohort

	Current participants (n=178)	Remaining participants with one or more births (n=1538)	P-value
Characteristic	n (%) [*]	n (%) [*]	
Married/Living as Married	124 (69.7)	1121 (72.9)	NS
Race/Ethnicity			NS
White/Caucasian	75 (42.1)	732 (47.6)	
Black/African-American	32 (18.0)	283 (18.4)	
Hispanic	41 (23.0)	258 (16.8)	
Asian-American	27 (15.2)	245 (15.9)	
Native American/Other	3 (1.7)	20 (1.3)	
Education			NS
≤ High school	41 (23.0)	336 (21.9)	
Some college/technical	80 (44.9)	721 (46.9)	
Bachelor's/Graduate	56 (31.5)	480 (31.2)	
Age(years)			NS
40–49	49 (27.5)	382 (24.8)	
50–59	69 (38.8)	573 (37.3)	
60–69	45 (25.3)	451 (29.3)	
70–74	14 (7.9)	132 (8.6)	
mean + s.d.	55.9±8.7	56.3±8.6	NS
Total Household Income			NS
< \$40,000	39 (21.9)	339 (22.0)	
\$40,000 to \$59,000	35 (19.7)	325 (21.1)	
\$60,000 to \$79,000	35 (19.7)	304 (19.8)	
\$80,000 to \$99,000	12 (6.7)	197 (12.8)	
≥ \$100,000	38 (21.4)	262 (17.0)	
Occupation			NS
Employed (full/part time)	116 (65.2)	953 (62.0)	
Retired, student, or homemaker	50 (28.1)	527 (34.3)	
Unemployed/other	11 (6.2)	57 (3.7)	

* Percents may differ due to missing data

Table 2

Obstetrical variables by chart abstraction for 401 births

Characteristic	n (%) [*] or mean $\pm$ SD
Mean births per woman	3.3 $\pm$ 1.6
Mean years from recall to delivery event	29.6 $\pm$ 10.0
Mean weeks gestation	39.2 $\pm$ 3.0
Preterm birth (<37 weeks)	27 (6.7)
Delivery type	
Cesarean	42 (10.5)
Vaginal (spontaneous and operative)	348 (86.8)
Use of regional anesthesia	119 (29.7)
Use of episiotomy	283 (70.6)
Laceration requiring repair	91 (22.7)
Use of oxytocin	67 (16.7)
Birth weight $\geq$ 4000g	36 (9.0)
Prolonged second stage of labor [†]	12 (4.6)

* Percents may differ due to missing data

[†] Defined as >120minutes for nulliparas or >60minutes for multiparas not receiving regional anesthesia; or defined as >180 minutes for nulliparas or >120 minutes for multiparas receiving regional anesthesia

Table 3

Concordance of intrapartum variables by self-report compared to chart abstraction as the gold standard for 401 births

Variable	Sensitivity (95% CI)	Specificity (95% CI)	PPV (95% CI)	NPV (95% CI)
Preterm birth (<37 weeks)	0.74 (.49–.89)	0.98 (.96–.99)	0.77 (.57–.89)	0.98 (.94–.99)
Cesarean delivery	0.98 (.85–.99)	1.00 (N/A)	1.00 (N/A)	0.99 (.98, 1.00)
Use of oxytocin	0.43 (.30–.57)	0.75 (.68–.81)	0.54 (.39–.68)	0.91 (.86–.94)
Use of regional anesthesia	0.83 (.73–.90)	0.76 (.68–.83)	0.65 (.55–.75)	0.93 (.87–.96)
Laceration requiring repair	0.37 (.28–.48)	0.68 (.61–.75)	0.34 (.24–.44)	0.81 (.75–.86)
Use of episiotomy	0.62 (.54–.69)	0.73 (.63–.81)	0.88 (.83–.92)	0.52 (.42–.62)
Birth weight $\geq$ 4000g	0.86 (.67–.95)	0.91 (.87–.95)	0.53 (.38–.68)	0.98 (.95–.99)
Prolonged 2 nd stage*	0.62 (.28–.87)	0.84 (.76–.89)	0.14 (.07–.31)	0.98 (.94–.99)

* Defined as >120 minutes for nulliparas or >60 minutes for multiparas not receiving regional anesthesia; or defined as > 180 minutes for nulliparas or >120 minutes for multiparas receiving regional anesthesia

Table 4

Significant univariate predictors of concordance between self-report and chart abstraction for intrapartum variables

Recall Variable	Predictor	Concordance n/N (%)	OR (95% CI)	P-Value
Preterm gestation	Presentation			0.02
	Breech	19/25 (76.0)	Ref	
	Vertex	302/309 (97.7)	13.6 (4.3 – 42.9)	
Use of oxytocin	Birth			0.003
	First birth Subsequent birth	79/131 (60.3) 189/253 (74.4)	Ref 1.9 (1.3 – 3.0)	
Use of regional anesthesia	Age			0.0003*
	40–49	96/103 (93.2)	7.1 (2.6 – 19.6)	
	50–59	115/145 (79.3)	2.0 (0.97 – 4.1)	
	60–74	85/129 (65.9)	Ref	
	Years since last delivery			0.002*
	<20	66/70 (94.3)	8.6 (2.5 – 30.0)	
	20–29	95/113 (84.1)	2.8 (1.1, 6.7)	
	30–39	93/130 (71.5)	1.3 (0.6 – 2.9)	
	≥40	42/64 (65.6)	Ref	
Laceration requiring repair	Age			0.04*
	40–49	70/103 (68.0)	1.9 (1.1 – 3.5)	
	50–59	95/146 (65.1)	1.7 (1.0 – 2.9)	
	60–74	68/129 (52.7)	Ref	
	Presentation			0.002
	Vertex	210/356 (59.0)	0.1 (0.03 – 0.6)	
	Breech	21/23 (91.3)	Ref	
	Years since last delivery			0.048*
	<20	51/71 (71.8)	2.3 (1.0 – 5.2)	
	20–29	70/113 (61.9)	1.5 (0.7 – 3.0)	
	30–39	79/131 (60.3)	1.4 (0.7 – 2.8)	
	≥40	33/63 (52.4)	Ref	
Episiotomy	Age			0.01*
	40–49	81/105 (77.1)	2.5 (1.3 – 4.8)	
	50–59	94/146 (64.4)	1.3 (0.8 – 2.3)	
	60–74	82/142 (57.7)	Ref	
	Income			0.03*
	<\$40,000	55/93 (59.1)	Ref	
	\$40,000–\$59,999	48/75 (64.0)	1.2 (0.6 – 2.5)	
	\$60,000–\$79,999	45/72 (62.5)	1.2 (0.5 – 2.6)	

Recall Variable	Predictor	Concordance n/N (%)	OR (95% CI)	P-Value
	\$80,000–\$99,999	20/30 (66.7)	1.4 (0.5 – 3.8)	
	≥\$100,000	69/89 (77.5)	2.4 (1.2 – 4.9)	
	Birth First birth Subsequent birth	104/134 (77.6) 154/263 (58.6)	Ref 0.4 (0.3 – 0.6)	<0.0001
Prolonged 2 nd stage [†]	Birth			
	First birth Subsequent birth	62/66 (93.9) 101/130 (77.7)	Ref 0.2 (0.1 – 0.8)	0.003

* P-value based on linear test for trend.

[†] Defined as >120minutes for nulliparas or >60minutes for multiparas not receiving regional anesthesia; or defined as >180 minutes for nulliparas or >120 minutes for multiparas receiving regional anesthesia

Table 5

Significant multivariate predictors of concordance*

Recall Variable	Predictor	OR 95% CI	P-Value
Preterm gestation	Presentation		0.03
	Breech	Ref	
	Vertex	9.8 (2.46 – 38.7)	
Use of oxytocin	Birth		0.03
	First birth Subsequent birth	Ref 1.6 (1.07 – 2.5)	
Use of regional anesthesia	Birth		0.04
	First birth Subsequent birth	Ref 0.6 (0.33 – 1.0)	
	Years since last delivery		0.002 [†]
	<20	8.6 (2.37 – 31.0)	
	20–29	2.6 (1.1 – 6.2)	
	30–39	1.3 (0.6 – 2.9)	
	≥40	Ref	
Laceration requiring repair	Presentation		0.002
	Breech	Ref	
	Vertex	0.1 (0.03 – 0.6)	
Use of episiotomy	Race		0.03
	Caucasian	Ref	
	African-American	0.4 (0.2 – 0.8)	
	Asian	1.0 (0.4 – 3.0)	
	Hispanic	0.4 (0.2 – 0.9)	
	Birth		0.003
	First birth Subsequent birth	Ref 0.4 (0.22 – 0.7)	
Prolonged 2 nd stage [‡]	Birth		0.003
	First birth Subsequent birth	Ref 0.2 (0.06 – 0.6)	

* Predictor variables independently associated with the recall variable at $p < 0.05$ were presented in table. If age and years since last delivery were both significant ($p < 0.20$) in the univariate analysis, years since last delivery was entered into the multivariate model and not age.

[†] P-value based on linear test for trend.

[‡] Defined as >120 minutes for nulliparas or >60 minutes for multiparas not receiving regional anesthesia; or defined as >180 minutes for nulliparas or >120 minutes for multiparas receiving regional anesthesia