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Research Article

Comparative Acuity of Emergency Department Visits Following Pregnancy Outcomes Among Medicaid Eligible Women, 2004-2015

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Abstract:

Objectives: We sought to compare the acuity of emergency department (ED) visits following various pregnancy outcomes.

Methods: Cohorts of ED visits by continuously eligible Medicaid women between 2004-2015 were determined by the type of pregnancy outcome and a control group as follows: within 30 days of a chemical (mifepristone) abortion, surgical abortion, or live birth; and at any time for women who were never pregnant. The primary outcome was the percent of ED visits coded as either severe or critical (CPT codes 99284-99285). The study population was extracted from the 17 states where Medicaid pays for abortion services.

Results: All cohorts exhibited a pattern of both increasing incidence and acuity of ED visits. For the entire observation period, an ED visit following a chemical abortion was significantly more likely to have a severe or critical acuity rating than a visit following surgical abortion, live birth, or an ED visit at any time by a woman who was never pregnant. With never-pregnant women as a reference cohort, odds ratios (ORs) are as follows: chemical abortion 2.01 [1.93-2.28]; surgical abortion 1.53 [1.43-1.63]; live birth 1.01 [1.00-1.01]. With chemical abortion as the reference cohort, odds ratios (ORs) are: never-pregnant 0.48 [0.44-0.54]; live birth 0.52 [0.49-0.55]; surgical abortion 0.73 [0.68-0.77].

Conclusion: Consistent with national trends for ED visits, both the number and acuity of ED visits following pregnancy outcomes are increasing. ED visit acuity following chemical abortion is persistently and significantly higher than for surgical abortion or live birth.

Keywords: pregnancy outcomes; induced abortion; emergency department visits; patient acuity

Introduction

Background: There is consensus that the overall incidence of adverse events and emergency department (ED) complication rates are higher following chemical abortion than surgical abortion (1,2). However, the acuity of ED visits following each type of abortion has been contested.

Importance: Some investigators have suggested that ED visits following abortion, especially chemical abortion, are frequently for observation care only rather than treatment purposes (3). This view, if demonstrated, would support the notion that the risks of chemical abortion are exaggerated by the high incidence of ED utilization. To date, no objective independently derived

acuity methodology has been applied to ED visits following pregnancy outcomes.

Goals of This Investigation: We sought to compare the acuity of ED visits within a defined population of women who had undergone abortion or birth.

Methods

Study Design: Analytic observational prospective cohort
Setting and Selection of Participants: Centers for Medicare and Medicaid Services (CMS) Medicaid Analytic eXtract files for the 17 states which funded abortion services were used to identify emergency department (ED) visits within 30 days following a chemical (mifepristone) abortion, surgical abortion, or live birth between 2004-2015. ED visits following a defined pregnancy outcome were determined for women who were 16 years of age in 1999 and who were enrolled in Medicaid in at least a single month in every calendar year 1999-2015. Observation years of 2004-2015 were selected based upon the availability of ED visits related to chemical abortion which was approved by the Food and Drug Administration (FDA) in 2000. The first chemical abortions (n=15) and related ED visits (n=1) appeared in the data in 2001 and were not of sufficient volume for analysis until 2004. In the first observation year, 2004, there were 1,319 chemical abortions and 198 related ED visits. A 5% sample from a control cohort of Medicaid enrollees with no history of pregnancy was also analyzed.

Exposures: The primary exposure of interest was the type of pregnancy outcome. Live births were identified using ICD-9 codes V27.0, V27.2, and V27.5x and ICD-10 codes Z37.0, Z37.2, and Z37.5x. Induced abortions were identified using ICD-9 codes 635.xx and ICD-10 codes O04.xx; CPT4 codes 59840, 59841, 59850, 59852, 59855, 59856, and 59857; and HCPCS codes S0199, S2260, S2265, S2267, X7724, X7726, S0190 and S0191.
Outcomes: The primary outcome of interest was the percent of ED visits coded as either severe or critical. The acuity determination uses five Current Procedure Terminology (CPT) codes to stratify ED visits: nonurgent (99281), urgent (99282), moderate (99283), severe (99284) and critical (99285). ED visits were identified using Place of Service code 23. This coding considers the severity of the presenting problem and the complexity of the medical decision making required for treatment. This method is part of the Ambulatory Payment System (APC) of coding by which the federal government prospectively pays hospitals for covered services by considering resource utilization, clinical intensity and cost (4,5).

Data Analysis: We calculated the percentage change in counts of ED visits between 2004-2015. For each cohort, we derived a linear equation to express the trend in the proportion of severe and critical (99284 and 99285) visits to total visits. Coefficients of determination (R^2, Microsoft Excel, version 16) and Cochran-Armitage Chi-squared (X^2, MedCalc) trend tests were calculated for each cohort. Logistic regression adjusted odds ratios and 95% confidence limits (SAS/STAT, version 10) were calculated with chemical abortion and never-pregnant as reference cohorts.

Ethics Approval: The study has been exempted from Institutional Review Board (IRB) review pursuant to the U.S. Department of Health and Human Services Policy for the Protection of Human Research Subjects at C.F.R. 46.101(b). See IRB ID: 7269, www.sterlingirb.com.

Results

Between 2004 and 2015, the total number of ED visits across all four cohorts increased from 51,307 to 68,798, or 17,491, which is more than a third (34.1%) larger than the 2004 number. Specific percentage increases in each of the cohorts in total visits were: no pregnancy (42.8%); surgical abortion (280.4%); chemical abortion (2649.7%); and live birth (9.2%). ED visits coded severe or critical (99284-5) increased as follows: no pregnancy (101.0%); surgical abortion (450.6%); chemical abortion (4041.1%); and live birth (20.9%) (Table 1).

CPT codes	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2004-15	Δ 2004-15
No Pregnancy														
99281-83(%)	162(61.3)	167(66.8)	162(62.3)	167(53.8)	203(57.0)	182(56.1)	184(51.8)	240(50.2)	242(50.5)	191(48.1)	205(44.8)	172(45.6)	2277(52.8)	6.2%
99284(%)	78(29.5)	59(23.6)	71(27.3)	95(30.6)	107(30.0)	92(28.3)	130(36.6)	172(35.9)	169(35.2)	131(33.0)	149(32.6)	126(33.4)	1379(32.7)	61.5%
99285(%)	24(09.1)	24(09.6)	27(10.3)	48(15.4)	46(12.9)	51(15.6)	41(11.5)	66(13.8)	68(14.1)	75(18.8)	103(22.5)	79(20.9)	652(14.5)	229.2%
Total	264	250	260	310	356	325	355	478	479	397	457	377	4,308	42.8%
99284+5(%)	102(38.6)	83(32.3)	98(34.7)	143(36.7)	153(39.8)	143(42.3)	171(46.3)	238(48.1)	237(50.2)	206(52.1)	252(54.5)	205(54.0)	2031(47.2)	101.0%
Surgical Abortion														
99281-83(%)	1502(54.3)	2144(51.7)	2565(51.3)	2876(47.9)	3281(47.6)	3362(42.8)	3538(40.4)	3828(38.3)	3926(34.9)	3611(31.1)	3228(32.5)	3562(33.9)	37423(39.5)	137.2%
99284(%)	1005(36.3)	1381(33.3)	1692(33.8)	2119(35.3)	2299(33.3)	3051(38.9)	3444(39.3)	3667(36.7)	4201(37.4)	4287(36.9)	3600(36.2)	3891(37.0)	34637(36.6)	287.2%
99285(%)	259(09.4)	621(15.0)	747(14.9)	1013(16.9)	1316(19.1)	1434(18.3)	1776(20.3)	2488(24.9)	3120(27.7)	3719(32.0)	3104(31.3)	3069(29.2)	22666(23.9)	1084.9%
Total	2766	4146	5004	6008	6896	7847	8758	9983	11247	11617	9932	10522	94,726	280.4%
99284+5(%)	1264(45.7)	2002(48.3)	2439(48.7)	3132(52.1)	3615(52.4)	4485(57.2)	5220(59.6)	6155(61.7)	7321(65.1)	8006(68.9)	6704(67.5)	6960(66.1)	57303(60.5)	450.6%
Chemical Abortion														
99281-83(%)	98(49.7)	164(51.7)	114(32.5)	174(38.6)	307(38.4)	440(39.3)	605(35.8)	899(34.1)	917(30.6)	618(27.5)	557(22.8)	1317(24.3)	6210(30.1)	1243.9%
99284(%)	70(35.5)	103(32.5)	184(52.4)	200(44.3)	299(37.4)	446(39.8)	722(42.8)	995(37.8)	1113(37.1)	912(40.5)	1100(45.1)	2269(41.9)	8413(40.7)	3141.4%
99285(%)	29(14.7)	50(15.8)	53(15.1)	77(17.1)	194(24.3)	235(21.0)	361(21.4)	740(28.1)	967(32.3)	720(32.0)	784(32.1)	1831(33.8)	6041(29.2)	6213.8%
Total	197	317	351	451	800	1121	1688	2634	2997	2250	2441	5417	20,664	2649.7%
99284+5(%)	99(50.3)	153(48.3)	237(67.5)	277(61.4)	493(61.6)	681(60.7)	1083(64.2)	1735(65.9)	2080(69.4)	1632(72.5)	1884(77.2)	4100(75.7)	14454(69.9)	4041.4%
Live Birth														
99281-83(%)	23505(48.9)	26127(47.6)	25880(45.6)	26903(44.2)	29780(43.6)	31411(42.1)	31991(41.9)	34398(42.6)	35383(41.3)	33661(41.0)	29240(44.1)	22774(43.4)	351053(43.5)	-3.1%
99284(%)	16244(33.8)	18763(34.2)	20132(35.4)	21524(35.4)	24606(36.0)	27024(36.2)	28262(37.0)	29052(36.0)	30789(35.9)	29553(36.0)	22447(33.9)	17972(34.2)	286368(35.5)	10.6%
99285(%)	8331(17.3)	9966(18.2)	10792(19.0)	12388(20.4)	13969(20.4)	16246(21.8)	16036(21.0)	17258(21.4)	19595(22.8)	18913(23.0)	14573(22.0)	11736(22.4)	169803(21.0)	40.9%
Total	48080	54856	56804	60815	68355	74681	76289	80708	85767	82127	66260	52482	807224	9.2%
99284+5(%)	24575(51.1)	28729(52.4)	30924(54.4)	33912(55.8)	38575(56.4)	43270(57.9)	44298(58.1)	46310(57.4)	50384(58.7)	48466(59.0)	37020(55.9)	29708(56.6)	456171(56.5)	20.9%
Grand Total	51307	59569	62419	67584	76407	83974	87090	93803	100490	96391	79090	68798	926922	34.1%
Grand Total 99284+5 (%)	26040(50.7)	30967(51.9)	33698(53.9)	37464(55.4)	42836(56.0)	48579(57.8)	50772(58.2)	54438(58.0)	60022(59.7)	58310(60.4)	45860(57.9)	40973(59.5)	529959(57.1)	57.3%

Table 1: ED visit acuity by pregnancy outcome

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The percentage of total visits coded severe or critical (99284-85) increased for all cohorts from 2004-2015: no pregnancy (38.6%-54.0%); surgical abortion (45.7%-66.1%); chemical abortion (50.3%-75.7%); and live birth (51.1%-56.6%). The trends in the proportion of severe and critical visits are all significant (X^2, $p<.0001$) for each cohort: never-pregnant (58.80); surgical abortion (1848.18); chemical abortion (347.88); and live birth (818.02) (Figure 1).

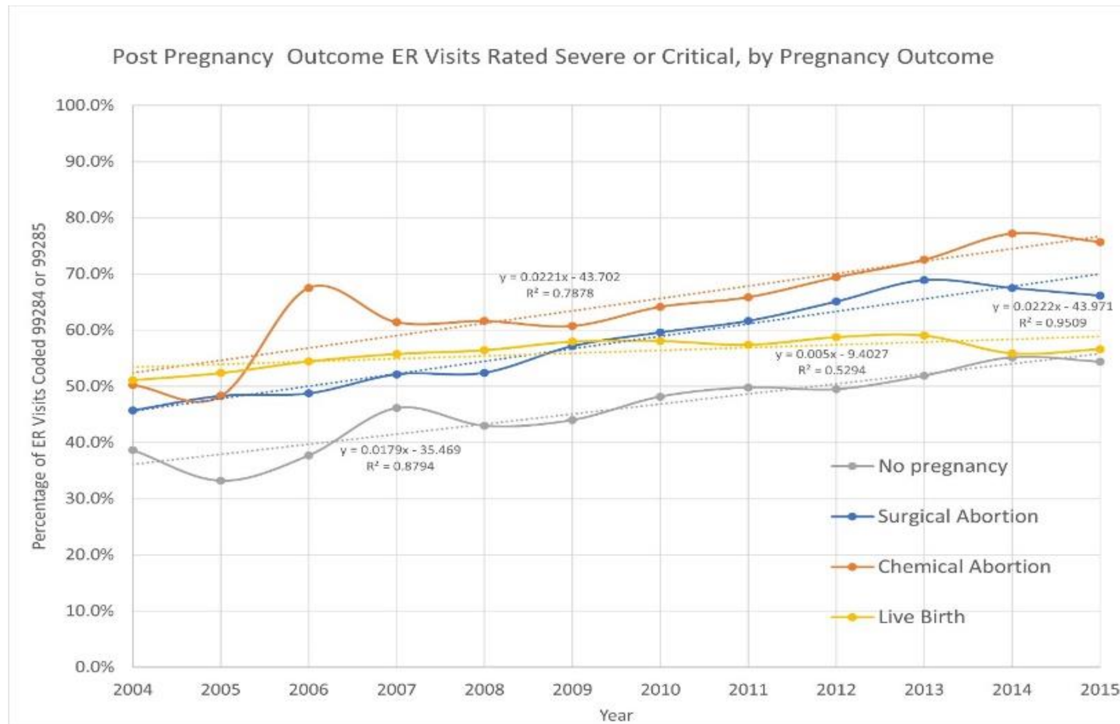

Figure 1: Post pregnancy outcome ED visits rated severe or critical, by pregnancy outcome

The logistic multiple regression adjusted odds ratios for the entire observation period (2004-2015) with never-pregnant as the reference cohort are: chemical abortion, OR 2.01 [1.93-2.28]; surgical abortion, OR 1.53 [1.43-1.63]; and live birth, OR 1.01 [1.00-1.01]. The adjusted odds ratios with chemical abortion as the reference cohort are: never-pregnant, OR 0.48 [0.44-0.54]; live birth, OR 0.52 [0.49-0.55]; surgical abortion, OR 0.73 [0.68-0.77].

Limitations

Findings from a Medicaid population may not be generalizable to populations of a different socioeconomic and demographic composition. The use of administrative claims data has recognized limitations including inconsistent and mistaken coding which may vary from state to state, the exclusion of codes considered unnecessary for billing purposes, and the possible upcoding to maximize revenue (6,7,8). Acuity increases may reflect a pattern of ED use by sicker patients (9). The use of a comprehensive measure of total acuity does not allow for comparison of specific complication rates between cohorts.

Discussion

This pattern of increasing ED utilization and acuity aligns with previous research (10). Both the volume and acuity of ED visits by Medicaid eligible women following a pregnancy outcome increased between 2004 and 2015. ED visits following chemical abortion had the greatest comparative increase in incidence, likely reflecting the rapidly growing percentage that they represented of all abortions during the observation period (11). Similarly, the growth in the percentage of high acuity ED visits was the largest for the chemical abortion cohort followed by the surgical abortion cohort. Increases in both incidence and acuity were smallest following live birth.

While multiple factors may influence these results, persistently and significantly higher ED visit acuity following chemical abortion is clearly evident. ED visit acuity for either method of abortion is significantly higher than for visits following a live birth. The increasing preference for this method of induced abortion, along with this evidence of the growing acuity of related ED visits, suggests that a greater level of surveillance will enhance patient safety for these patients.

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Conflicts of Interest: None declared

Author Contributions: conceptualization (J.S.); data collection (J.S., J.W.F., C.C.); data analysis (J.S., J.W.F., C.C.); critical review and evaluation of results (all authors); primary authorship of paper (J.S.); review and editing of paper (all authors); study supervision (J.S.); procurement of funding (J.S.).

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