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Recent trends in treatment admissions for prescription opioid abuse during pregnancy

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Abstract

Prescription opioid abuse is a significant and costly public health problem among pregnant women in the United States. We investigated recent trends in substance abuse treatment admissions for prescription opioids during pregnancy using the Treatment Episodes Data Set. From 1992 to 2012 the overall proportion of pregnant admissions remained stable at 4%, however admissions of pregnant women reporting prescription opioid abuse increased substantially from 2% to 28% especially in the South. Demographic characteristics of pregnant opioid admissions changed from 1992 to 2012 with younger, unmarried White non-Hispanic women, criminal justice referrals, and those with a psychiatric co-morbidity becoming more common ($p < 0.01$). About a third received medication assisted therapy despite this being the standard of care for opioid abuse in pregnancy. While substance abuse treatment centers have increased treatment volume to address the increase in prescription opioid dependence among pregnant women, targeting certain risk groups and increasing utilization of medication assisted therapy should be emphasized.

Introduction

Among women in the US, opioid pain reliever overdose deaths have increased more than 500% since 1999 (Centers for Disease Control and Prevention (CDC), 2011), surpassing motor vehicle accidents as a leading cause of death (Centers for Disease Control and Prevention (CDC), 2013). Opioid abuse by women also carries unique impacts when used during childbearing years (Behnke, Smith, Committee on Substance Abuse, & Committee on Fetus and Newborn, 2013). Antepartum drug abuse is associated with adverse outcomes for both mother and child such as low birth weight as well as neonatal (Behnke et al., 2013) and maternal mortality (Hardt et al., 2013). Additionally, many newborns exposed to opioids prenatally develop neonatal abstinence syndrome (NAS) (Hudak, Tan, Committee on Drugs,

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Committee on fetus and newborn, & American Academy of Pediatrics, 2012), a costly problem requiring longer newborn lengths of stay and higher hospital charges (Patrick et al., 2012).

Overall prescription opioid sales and overdose deaths have increased dramatically over the past decade (Centers for Disease Control and Prevention (CDC), 2011) along with both maternal opioid abuse and NAS (Pan & Yi, 2013; Patrick et al., 2012). However, what is not known is whether treatment rates among pregnant women have followed this increase in opioid abuse. Standard of care calls for universal substance use screening during pregnancy and referral to treatment, specifically methadone maintenance, for opioid abuse (ACOG Committee on Health Care for Underserved Women & American Society of Addiction Medicine, 2012). When provided within a comprehensive care program, this regimen improves maternal and neonatal outcomes as well as reduces associated adverse health consequences (Jones, O'Grady, Malfi, & Tuten, 2008; Kaltenbach & Finnegan, 1998).

Thus, the objectives of this study are to describe recent national trends in drug treatment admissions for prescription opioid abuse among pregnant women as well as to assess how treatment rates and characteristics for this special population have changed over time. We describe changes in overall and regional prevalence of pregnant prescription opioid admissions as well as changes in their demographic, substance abuse and treatment characteristics from 1992 to 2012 using the Treatment Episodes Data Set (Substance Abuse and Mental Health Services Administration (SAMHSA), 2013a).

Materials and methods

Data were obtained from the Treatment Episode Data Set (TEDS) (Substance Abuse and Mental Health Services Administration (SAMHSA), 2013a), an administrative data system designed to track admissions into all substance treatment facilities that receive federal funding. TEDS data are collected by all 50 States (including Washington DC and Puerto Rico) and submitted to the federal government. TEDS is estimated to include 83% of all eligible drug or alcohol treatment admissions in the United States (Substance Abuse and Mental Health Services Administration (SAMHSA), 2013a). As TEDS data are publically available without subject identification, the University of Maryland IRB exempted this study from review.

At intake, treatment programs record data regarding basic client characteristics and self-reported substance use which is then made available as Treatment Episode Data Set – Admissions (TEDS-A). TEDS-A provides information on demographics (age, race, housing), substance abuse behavior (type of substance, mode of use), treatment characteristics (referral source, prior treatment, service setting) from 1992 to 2012. Of note, the number of substances reported is capped at 3. Starting in 2006, available admissions data were linked to discharge data and made publicly available as Treatment Episode Data Set – Discharges (TEDS-D). In addition to data available with TEDS-A, TEDS-D contains discharge information (i.e. reason for discharge). Thus, variables only available in TEDS-D were analyzed using this dataset of discharges from 2006 to 2010 (years available at time of submission).

Our analysis included all treatment admissions in which the client was identified as pregnant at the time of entry. For our study sample, we further focused on admissions of pregnant women reporting prescription opioid abuse, defined as those for which the client reported either non-prescription methadone or other opioids (excluding heroin) as the primary, secondary or tertiary substance of abuse. Those completing treatment were defined as those noted to have completed all parts of their admission treatment plan/program or transferred to another substance abuse treatment program/facility.

Admissions data (TEDS-A) were used to describe the prevalence of prescription opioid abuse admissions among pregnant women from 1992 to 2012. Trends across time were assessed using the Cochran-Armitage test. Regional variation in the prevalence of pregnant prescription opioid admissions was investigated using Global Moran's I autocorrelation tests in a geographic information systems (GIS) analysis using ArcGIS10.2 (Environmental Systems Resource Institute, 2013). Geographic analyzes were done by US census region to match previous reporting standards (Substance Abuse and Mental Health Services Administration, 2003; Substance Abuse and Mental Health Services Administration, 2011). Global Moran's I tests with significance set at $p=0.01$ were used to assess the association between location (census region) and the prevalence of prescription opioid use among pregnant treatment admissions. TEDS-A data were also used to describe changes in demographic, substance abuse and treatment characteristics of pregnant admissions reporting prescription opioid abuse. TEDS-D data were used to describe changes in additional treatment characteristics from 2006 to 2010. Chi squared tests were used to compare each variable of interest by admission year. Given the large sample size, a p -value less than 0.01 was considered significant, and clinically significant changes over time were defined as those with at least a 5% difference in frequency. Data were analyzed using STATA v. 12 (StataCorp, 2011).

Results

Overall, there were 420,665 substance abuse treatment admissions of pregnant women from 1992 to 2012. From 1992 to 2012, the proportion of pregnant treatment admissions among all female admissions remained stable at 4%. However, among pregnant admissions, the proportion reporting any prescription opioid abuse increased substantially from 2% ($n=351$) in 1992 to 28% ($n=6,087$) in 2012 ($p<0.01$). Pregnant admissions reporting prescription opioids as the primary substance of abuse similarly increased from 1% ($n=124$) in 1992 to 19% ($n=4,268$) in 2012 ($p<0.01$) (Figure 1).

In general, most pregnant substance abuse treatment admissions from 1992 to 2012 reporting any prescription opioid use were among young (21-29 years 41-68%), unmarried (69-85%), non-Hispanic white women (62-85%) who had housing (76-94%) and at least a high school diploma (61-68%) but were not employed (81-88%). About a third had a psychiatric illness other than substance abuse (14-43%). Demographic characteristics of pregnant prescription opioid admissions from 1992 to 2012 are detailed in Table 1.

The increase in prescription opioid abuse among pregnant admissions was observed in all US geographic regions (Figure 2) with the greatest increase in the South (38% from 1992 to

2012) and the smallest increase in the West (26% from 1992 to 2012). Pregnant prescription opioid admissions also showed an age shift, gradually becoming dominated by younger women aged 18-29 years from the late 1990's onward (Figure 3). Specifically, the proportion of pregnant women aged 21-29 years increased from 48% in 1992 to 68% in 2012 ($p<0.01$). Other demographic variables increased over time, such as the proportion of white non-Hispanic admissions (62% in 1992 to 83% in 2012) and those reporting a psychiatric illness other than substance abuse (14% in 1992 to 31% in 2012; $p<0.01$) (Table 1).

Table 2 details the substance use characteristics of pregnant prescription opioid admissions from 1992 to 2012. The majority of admissions indicated prescription opioids as the primary substance, with this proportion increasing over time (38% in 1992 to 70% in 2012). Despite this, poly-substance use was common with only about a quarter reporting use of only one substance (16-27%), but the proportion reporting three or more substances decreased over time from 50% in 1992 to 39% in 2012 ($p<0.01$). Of those not reporting prescription opioids as the primary substance, the next most common primary substances were heroin, cocaine and alcohol with all three decreasing over time (heroin 37% to 15%; cocaine 8% to 2%; alcohol 8% to 3%; $p<0.01$). Intravenous drug use was not uncommon and fluctuated over time from 39% in 1992 to 22% in 2008 and 30% in 2012 ($p<0.01$).

Tables 2 and 3 detail the treatment characteristics of pregnant prescription opioid admissions and discharges. About a third (32-40%) were first time substance abuse treatment admissions; the majority had 1 to 4 prior treatment episodes (50-56%). Most admissions were into ambulatory service settings (69-77%), almost a quarter to residential (16-23%) and a small percentage (6-15%) to detoxification. Ambulatory service utilization decreased from 77% in 1992 to 69% in 1996 then increased again to 75% in 2008 ($p<0.01$) with residential treatment following an opposite pattern (21% in 1992; 23% in 1996; 19% in 2008; $p<0.01$). Most admissions (56-77%) did not utilize medication assisted therapy (MAT), and this proportion increased over time (56% in 1992 to 63% in 2012; $p<0.01$). The proportion not receiving MAT among primary opioid admissions was similar (58-78%) and did not change substantially over time (63% in 1992 to 61% in 2012; data not shown). Admissions referred by the criminal justice system increased from 11% in 1992 to 17% in 2012 ($p<0.01$). Among pregnant prescription opioid treatment discharges, more than half completed treatment, and this proportion increased over time (50% in 2006 to 66% in 2010; $p<0.01$). Of those not completing treatment, most left against professional advice (56-60%) or were terminated by the facility (15-20%) for reasons such as non-compliance or rule violations.

Discussion

Our results show that admission rates for substance abuse treatment among pregnant women in the United States have remained relatively stable over the past two decades. This is similar to rates of self-reported illicit drug use during pregnancy which has remained unchanged (pregnant women aged 15-44 years: 3.2% in 1996 to 4.4% in 2010) over same period of time (Substance Abuse and Mental Health Services Administration, 1997; Substance Abuse and Mental Health Services Administration, 2003; Substance Abuse and Mental Health Services Administration, 2011). However, reported abuse of prescription

opioids among pregnant admissions has increased substantially over the same period. These results correspond with reported increases in maternal opioid abuse (Kellogg, Rose, Harms, & Watson, 2011a), neonatal opioid exposure (Pan & Yi, 2013) and neonatal abstinence syndrome (Patrick et al., 2012).

Similar to previous findings, prescription opioid abuse has become more common among young, white non-Hispanic women (Martin, Mak, Miller, Welsh, & Terplan, In press; McCabe & Arndt, 2012; Muhuri & Gfroerer, 2009). Prescription opioid abuse is also common among unmarried (Creanga et al., 2012), unemployed women (Terplan, Smith, Kozloski, & Pollack, 2009) who have a co-morbid psychiatric illness (Creanga et al., 2012; Terplan et al., 2009) and insurance (Creanga et al., 2012; Patrick et al., 2012; Terplan et al., 2009). Our results conflict with research showing illicit drug abuse among pregnant women to be associated with older age (Azadi & Dildy, 2008; Creanga et al., 2012; Martin et al., In press) and lack of a high school education (Creanga et al., 2012). This heterogeneity in findings likely reflects differences in sample populations (e.g., institution vs. U.S. state), drug types used (e.g., any illicit drug vs. opioids) and study designs utilized (e.g., retrospective analysis of billing codes vs. linked birth records). These differences highlight the need to evaluate the epidemiology of substance abuse among women of reproductive age at local, regional and national levels in order to follow trends more accurately.

The increase in prescription opioid abuse among pregnant admissions varied geographically, with Southern states experiencing the fastest increases. This tracks to rates of overdose deaths which are highest in the South (Centers for Disease Control and Prevention (CDC), 2011; Centers for Disease Control and Prevention (CDC), 2013). This geographic variation presents a concerning disparity and may be due to differences in statewide drug use patterns, substance abuse treatment accessibility, criminal justice, and/or healthcare system substance abuse treatment referral systems. For example, opioid prescription rates are disproportionately high in certain Appalachia counties and southern states (McDonald, Carlson, & Izrael, 2012). Also, the inappropriate use of “pill mills” has been documented in states such as Florida (Rigg, March, & Inciardi, 2010).

Our results agree with previous research (McCabe & Arndt, 2012) illustrating that pregnant first-time admissions for prescription opioids have increased since the 1990's as has the proportion reporting opioids as the primary substance of abuse. These findings likely reflect the growing epidemic of prescription opioid abuse nationally, with more patients becoming new illicit users and resultantly seeking treatment (Substance Abuse and Mental Health Services Administration, 2013). We also found polysubstance and intravenous drug abuse to be common (Terplan, Smith, & Glavin, 2010) in our population. However, these findings differ with those reporting polysubstance abuse to be decreasing among opioid using mothers in Washington State (Creanga et al., 2012). As prescription opioid abuse and overdose deaths both continue to increase (Centers for Disease Control and Prevention (CDC), 2011), it is apparent that more must be done to expand the already existing framework to improve treatment utilization and quality with special attention on ambulatory treatment.

The small proportion of opioid admissions receiving medication assisted therapy is disconcerting. Medication assisted therapy is standard of care for opioid dependent pregnant women (ACOG Committee on Health Care for Underserved Women & American Society of Addiction Medicine, 2012; Jones, Finnegan, & Kaltenbach, 2012) with methadone as the standard medication for decades (Newman, Bashkow, & Calko, 1975). Methadone therapy leads to improved maternal medical status, decreased fetal morbidity, and better prenatal care utilization (Fullerton et al., 2014; Mattick, Breen, Kimber, & Davoli, 2009; Winklbaur-Hausknost et al., 2013). More recently, buprenorphine has emerged as an alternative to methadone with the possible benefit of a decrease in the severity and duration of NAS (Jones et al., 2012). In our study, we found that only a minority of opioid admissions are receiving medication assisted therapy. Some of the admissions were certainly among women not physiologically dependent for which medication assisted therapy might not have been offered. However, it is implausible that two thirds of pregnant admissions would not benefit from medication assisted therapy. Furthermore, federal regulations for methadone consider pregnant patients to be a special population susceptible to relapse and therefore waive the 1-year history of addiction requirement for the initiation of therapy. The low utilization of medication assisted therapy in our study also reflects a lack of access to such therapies in general. For example, only 9% of substance abuse treatment facilities in the US offer medication assisted therapy, with this percentage remaining stable over the past decade (Substance Abuse and Mental Health Services Administration (SAMHSA), 2013b).

Our study has limitations. Although TEDS captures more than 80% of U.S. treatment admissions, exclusion of private facilities likely biases the sample. TEDS also does not distinguish treatment readmissions within individuals; it counts every admission (and readmission) as a separate episode. This limited our ability to track the treatment progress of individuals over time and raises questions about the independence of events observed. However, given that we restricted our study to only pregnant women, our study population likely contains few repeat observations.

Overall, the demand for treatment of prescription opioids during pregnancy has increased in recent years parallel to the increase in abuse among the general population (Centers for Disease Control and Prevention (CDC), 2011; Centers for Disease Control and Prevention (CDC), 2013; Pan & Yi, 2013; Patrick et al., 2012). Our findings suggest that substance abuse treatment centers have increased their treatment volumes in an attempt to meet this demand. This may represent an increased recognition of treatment availability and/or effectiveness (Jones et al., 2008; Kaltenbach & Finnegan, 1998; Substance Abuse and Mental Health Services Administration, 2013). This increase, though, may not be able to continue to meet such demands due to continued upward national trends in prescription opioid abuse and the resulting costs (Fox, Merrill, Chang, & Califano, 1995; Kellogg, Rose, Harms, & Watson, 2011b; Patrick et al., 2012). Also, even if substance abuse treatment programs appear to be meeting this increased demand, the lack of a corresponding increase in the utilization of medication assisted therapy suggests otherwise as such treatment programs are the standard of care.

As opioid abuse among women of reproductive age continues to increase, a multidimensional approach to preventing its impacts should be emphasized. Following the

trends observed here, further tailoring to additional risk groups may be required to meet the increasing need for the treatment of prescription opioid abuse in pregnancy. Lastly, additional measures for increasing utilization of medication assisted therapy by programs should be prioritized.

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Figure 1.
Pregnancy and prescription opioid abuse among substance abuse treatment admissions, TEDS-A 1992-2012

Figure 2.
 Geographic distribution of prescription opioid abuse among pregnant substance abuse treatment admissions, TEDS-A 1992-2012

*Cochran-Armitage Trend Test $p < 0.01$

Figure 3.
Age distribution of prescription opioid treatment admissions among pregnant women, TEDS-A 1992-2012

Table 1

Demographic characteristics of pregnant women reporting any prescription opioid abuse at substance abuse treatment admission, TEDS-A 1992 to 2012

Characteristic	1992 N=321 (%)	1996 N=353 (%)	2000 N=589 (%)	2004 N=1,583 (%)	2008 N=3,793 (%)	2012 N=6,087 (%)
Age ^{^*}						
20 years	13 (4)	21 (7)	72 (12)	201 (13)	376 (10)	446 (7)
21-29 years	153 (48)	154 (44)	242 (41)	907 (57)	2,551 (67)	4,154 (68)
30-39 years	137 (43)	158 (45)	219 (37)	401 (25)	774 (20)	1,372 (23)
40 years	18 (5)	15 (4)	56 (10)	74 (5)	92 (3)	115 (2)
Race/ Ethnicity ^{^a}						
White Non- Hispanic [*]	194 (62)	223 (68)	436 (80)	1,253 (85)	3,157 (85)	5,067 (83)
Black Non-Hispanic [*]	75 (24)	57 (18)	60 (11)	103 (7)	157 (4)	252 (4)
Hispanic [*]	30 (10)	35 (11)	31 (6)	63 (4)	183 (5)	407 (7)
Other	12 (4)	11 (3)	19 (3)	54 (4)	197 (5)	361 (6)
Marital status ^{^*b}						
Married	71 (31)	84 (31)	128 (25)	303 (22)	670 (20)	920 (15)
Not married	161 (69)	183 (69)	377 (75)	1,064 (78)	2,662 (80)	5,167 (85)
Education ^{^*c}						
Completed high school	196 (61)	214 (61)	359 (61)	994 (63)	2,460 (65)	4,155 (68)
Did not complete high school	125 (39)	139 (39)	230 (39)	589 (37)	1,333 (35)	1,932 (32)
Employment ^{^*d}						
Employed	34 (11)	49 (14)	108 (19)	190 (12)	618 (17)	748 (12)
Not employed	276 (89)	302 (86)	453 (81)	1,345 (88)	3,122 (83)	5,339 (88)
Living arrangement ^{^*e}						
Homeless	50 (24)	14 (6)	35 (8)	100 (8)	270 (8)	432 (7)
Not homeless	161 (76)	230 (94)	428 (92)	1,206 (92)	3,324 (92)	5,655 (93)
Other Psychiatric illness ^{^*f}						
Yes	28 (14)	56 (24)	107 (27)	436 (43)	1,208 (42)	1,860 (31)
No	178 (86)	177 (76)	287 (73)	587 (57)	1,684 (58)	4,227 (69)

[†] Percentages may not add up to 100% due to rounding

[^] p<0.01

^{*} 5% change in frequency over time

^a 3% missing

^b 11% missing

^c2% missing

^d2% missing

^e8% missing

^f22% missing

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Table 2

Substance use and treatment characteristics of pregnant women reporting any prescription opioid abuse at substance abuse treatment admission, TEDS-A 1992-2012

Characteristic	1992 N=321 (%)	1996 N=353 (%)	2000 N=589 (%)	2004 N=1,583 (%)	2008 N=3,793 (%)	2012 N=6,087 (%)
Number of substances ^{^*}						
1	53 (16)	61 (17)	157 (27)	406 (26)	949 (25)	1,588 (26)
2	109 (34)	123 (35)	175 (30)	497 (31)	1,226 (33)	2,121 (35)
3	159 (50)	169 (48)	257 (43)	680 (43)	1,578 (42)	2,378 (39)
Primary substance problem ^{^†}						
Prescription opioids [*]	124 (38)	149 (42)	316 (54)	991 (63)	2,541 (67)	4,268 (70)
Heroin [*]	118 (37)	121 (35)	116 (20)	209 (13)	471 (12)	898 (15)
Alcohol [*]	27 (8)	31 (9)	48 (8)	81 (5)	182 (5)	210 (3)
Cocaine [*]	27 (8)	31 (9)	36 (6)	120 (8)	223 (6)	111 (2)
Marijuana	9 (3)	5 (1)	29 (5)	63 (4)	180 (5)	283 (5)
Methamphetamines	4 (1)	3 (1)	18 (3)	76 (5)	98 (3)	196 (3)
Benzodiazepines	3 (1)	3 (1)	7 (1)	13 (1)	52 (1)	66 (1)
Intravenous drug user ^{^*}						
Yes	125 (39)	127 (36)	165 (28)	420 (27)	830 (22)	1,821 (30)
No	196 (61)	226 (64)	424 (72)	1,163 (73)	2,963 (78)	4,266 (70)
Service setting ^{^*}						
Ambulatory	246 (77)	244 (69)	403 (69)	1,141 (72)	2,813 (75)	4,479 (73)
Residential	38 (21)	81 (23)	94 (16)	313 (20)	732 (19)	1,248 (21)
Detoxification	34 (11)	27 (8)	88 (15)	121 (8)	239 (6)	348 (6)
Referral source ^{^*a}						
Criminal justice	34 (11)	40 (12)	97 (17)	279 (18)	719 (19)	1,037 (17)
Other source	278 (89)	306 (88)	478 (83)	1,270 (82)	3,002 (81)	5,050 (83)
# prior episodes ^{^*b}						
0	93 (34)	96 (32)	215 (40)	527 (37)	1,411 (39)	2,399 (39)
1-4	153 (56)	158 (53)	266 (50)	760 (53)	1,894 (52)	3,216 (53)
5 or more	28 (10)	45 (15)	52 (10)	145 (10)	350 (9)	472 (8)
Medication assisted therapy used ^{^*c}						
Yes	133 (44)	109 (34)	132 (23)	486 (34)	1,351 (37)	2,236 (37)
No	172 (56)	216 (66)	438 (77)	955 (66)	2,261 (63)	3,851 (63)

[^] p<0.01

* 5% change in frequency over time

† Percentages may not add up to 100% due to rounding

^a 2% missing

^b 5% missing

^c 4% missing

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Table 3

Treatment completion status of prescription opioid treatment discharges among pregnant women, TEDS-D 2006-2010

Treatment completion status	2006 N=1,479 (%)	2007 N=2,277 (%)	2008 N=3,045 (%)	2009 N=3,184 (%)	2010 N=5,482 (%)
Completed treatment ^{^*}	744 (50)	1,300 (57)	1,828 (60)	1,765 (55)	3,639 (66)
Did not complete	735 (50)	977 (43)	1,217 (40)	1,419 (45)	1,843 (34)
Left against professional advice	439 (60)	564 (58)	734 (60)	793 (56)	1,075 (58)
Terminated by facility [*]	109 (15)	149 (15)	199 (16)	267 (19)	366 (20)
Incarcerated	28 (4)	42 (4)	53 (4)	71 (5)	101 (5)
Death	4 (<1)	2 (<1)	6 (1)	9 (1)	12 (1)
Other or unknown [*]	155 (21)	220 (23)	225 (19)	279 (20)	289 (16)

[^]
p<0.01

^{*}
5% change in frequency over time