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Contraceptive use and method choice among women with opioid and other substance use disorders: A systematic review

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ABSTRACT

Aim. To systematically review the literature on contraceptive use by women with opioid and other substance use disorders in order to estimate overall contraceptive use and to examine method choice given the alarmingly high rate of unintended pregnancy in this population.

Method. Pubmed (1948–2014) and PsycINFO (1806–2014) databases were searched for peer-reviewed journal articles using a systematic search strategy. Only articles published in English and reporting contraceptive use within samples of women with opioid and other substance use disorders were eligible for inclusion.

Results. Out of 580 abstracts reviewed, 105 articles were given a full-text review, and 24 studies met the inclusion criteria. The majority (51%) of women in these studies reported using opioids, with much smaller percentages reporting alcohol and cocaine use. Across studies, contraceptive prevalence ranged widely, from 6%–77%, with a median of 55%. Results from a small subset of studies (N = 6) suggest that women with opioid and other substance use disorders used contraception less often than non-drug-using comparison populations (56% vs. 81%, respectively). Regarding method choice, condoms were the most prevalent method, accounting for a median of 62% of contraceptives used, while use of more effective methods, especially implants and intrauterine devices (IUDs), was far less prevalent 8%.

Conclusions. Women with opioid and other substance use disorders have an unmet need for contraception, especially for the most effective methods. Offering contraception services in conjunction with substance use treatment and promoting use of more effective methods could help meet this need and reduce unintended pregnancy in this population.

Introduction

Drug and alcohol use are common among women of reproductive age (15–44 years). In the US, 11% report illicit drug use in the past month, with marijuana and opioids accounting for the overwhelming majority of this use (Substance Abuse and Mental Health Services Administration, 2014). Twenty-five percent of US women of reproductive age also report binge alcohol use in the past month, with 5% meeting criteria for heavy alcohol use (Substance Abuse and Mental Health Services Administration, 2014). Worldwide, nearly 16 million are estimated to be dependent on illicit drugs (Degenhardt et al., 2013) and an estimated 63 million have an alcohol use disorder (Rehm et al., 2009).

Drug and alcohol use by women of reproductive age are associated with many negative outcomes, but one that has received relatively little attention is the high rate of unintended pregnancy. For example, unplanned pregnancy rates approach 8 of every 10 pregnancies among opioid-using women (Black et al., 2012; Heil et al., 2011; Jones et al., 2011) and women with substance use disorders have significantly greater odds of an unintended pregnancy as compared to non-drug-using women (Than et al., 2005; Wellings et al., 2013). Together, these results suggest that women with substance use disorders may have an unmet contraceptive need.

Contraceptive need can be met by a variety of contraceptive methods, however the effectiveness of these methods varies widely. For example, the World Health Organization divides contraceptive methods into four tiers of effectiveness (WHO, 2007). In the top tier are the "very effective" methods of implants, intrauterine devices (IUDs), and tubal ligation. Fewer than 1% of women using one of these methods will become pregnant in the first year of typical use because these methods do not require any additional effort on the part of the user to maintain maximum effectiveness. [Of note, because implants and IUDs provide protection for up to 10 years, but removal results in

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a rapid return of fertility, they are often grouped together and referred to as long-acting reversible contraceptives or LARCs.] In the second tier are the "effective" methods of depot injections, oral contraceptive pills, vaginal rings, and transdermal patches. Between 1 and 9% of women using one of these methods will become pregnant because their effectiveness is dependent upon continued effort by user, from taking a pill every day to getting an injection every three months, to prevent a return to fertility. In the third tier are the "moderately effective" methods of condoms, diaphragms, sponges, and fertility awareness methods (10–25% pregnancy rates) and in the fourth tier, the "less effective" methods of spermicides and withdrawal (≥26% pregnancy rates). The methods in the third and fourth tiers are less effective than methods in higher tiers because their effectiveness is dependent upon continued effort by the user and this effort is needed at or around the time of intercourse, when contraceptive decision-making is likely impaired by sexual arousal (e.g., Ariely and Loewenstein, 2006).

Assessing overall contraceptive use and specific method choice among women with opioid and other substance use disorders is difficult using standard epidemiological approaches. National-level surveys of drug use epidemiology rarely capture contraception data, and contraceptive use and method choice surveillance surveys rarely include questions about drug or alcohol use. Hence, a systematic review of the published literature was undertaken to estimate overall contraceptive use and to examine method choice among women with opioid and other substance use disorders given the alarmingly high rate of unintended pregnancy in this population.

Methods

Pubmed and PsycINFO were searched through August 21, 2014. The keywords and search strategy are described in Table 1. The first aim of the review was to describe prevalence of contraceptive use among women with opioid and other substance use disorders. The second aim was to describe method choice among contraceptive-using women in this vulnerable population. Thus, to be included in the present review, studies must have 1) reported contraceptive use, and 2) had a population comprised of at least 50% women with opioid and other substance use disorders, meaning actively using drugs and/or alcohol or in drug treatment. So as not to underestimate contraceptive use, contraceptive prevalence was calculated from the proportion of the study population who were at risk of pregnancy (i.e., those not pregnant, nor premenopausal, and without a history of hysterectomy at the time when contraceptive use was assessed). Comparison prevalence (either for contraceptive use or method choice) was reported when included in the original study. Although no geographic restrictions were placed, the search strategy was limited to English language articles.

All authors independently screened all abstracts for inclusion, and any disagreement led to the retrieval of the full text article. Full text articles were screened and extracted into premade data inclusion sheets by one author and verified by another author. All disagreements were resolved by consensus. PRISMA guidelines were followed for the review (Moher et al., 2009).

Meta analysis was precluded by heterogeneity in how contraceptive use and method choice were reported across studies. Medians and ranges are presented since the data were not normally distributed.

Table 1
Literature search terms.

Database	Years included	Search terms
Pubmed	1948 to August 2014	1 Contraception Behavior/ or Contraception/ or Contraception, Barrier/ or contraception.mp. 2 family planning services.mp. or Family Planning Services/ 3 1 or 2 4 substance related disorders.mp. or Substance-Related Disorders/ 5 substance abuse.mp. or Substance-Related Disorders/ 6 Alcohol Drinking/ or Behavior, Addictive/ or Alcoholism/ 7 Cocaine-Related Disorders/ or Heroin Dependence/ or addiction.mp. 8 4 or 5 or 6 or 7 9 3 and 8 10 limit 9 to (english language and humans)
PsycINFO	1806 to August 2014	1 family planning.mp. or Family Planning/ 2 birth control.mp. or Birth Control/ 3 contraception.mp. 4 1 or 2 or 3 5 Drug Addiction/ or Addiction/ or Heroin Addiction/ or addiction.mp. 6 alcoholism.mp. or Alcoholism/ 7 drug usage/ or drug self administration/ or needle sharing/ 8 Crack Cocaine/ or Cocaine/ 9 5 or 6 or 7 or 8 10 4 and 9 11 limit 10 to (human and english language)

Results

Literature search

As shown in Fig. 1, our search strategy retrieved 580 abstracts of which 105 were selected for full text review (103 from the abstract list and 2 from the authors' personal collections that were not identified in the search). Twenty-four articles were included in the final review. The most common reason for exclusion at both the abstract and full-text review stage was lack of data on contraceptive use.

Study publication date, location, population and population size, details of drug use, and comparison population (where applicable) are presented in Table 2. The 24 included studies assessed more than 5000 women with drug and alcohol problems and were published over a 40-year period between 1972 and 2012, with two reports in the first decade, two in the second decade, five in the third decade, and 15 in the fourth decade. The studies took place in seven different countries: United States (10), Australia (5), England (3), Canada (2), France (2), Finland (1), and Russia (1). Nine studies collected data from women in substance abuse treatment (including White et al., 1993 whose population also include needle exchange clients), seven from women using drugs or alcohol but not in drug treatment (including a subset of women from Toffol et al., 2011), and eight from other populations where >50% of the group reported drug and alcohol use (i.e., street-based female sex workers, chronically homeless women, incarcerated women, or women living with HIV or hepatitis C). Of note, fourteen studies included details about the specific type of drug(s) used, with more than half (51%) of the women in these studies reporting opioid use and much smaller percentages, alcohol and cocaine.

Prevalence of contraceptive use

Women with opioid and other substance use disorders

Table 3 outlines time frames of assessment and prevalence of contraceptive use. Prevalence of contraceptive use was assessed using seven different time frames: current (7), past/typical month (5), past 3 months (3), past 6 months (2), past year (2), lifetime (1), or not reported (4). As noted previously, prevalence of contraceptive use in each study was calculated for women with contraceptive need and details regarding these calculations are also presented in Table 3. Overall, prevalence of contraceptive use varied greatly between studies. The lowest reported prevalence was 6%, though this small (n = 18) study only reported the proportion of women who were using "reliable contraception" and noted that "condoms were occasionally used by all women, although unprotected intercourse was the norm" (Creighton et al., 2008). The highest reported contraceptive use prevalence was 77%. The remaining studies reported between 25% and 74% of women with opioid and other substance use disorders were using any contraceptive, with an overall median of 55%.

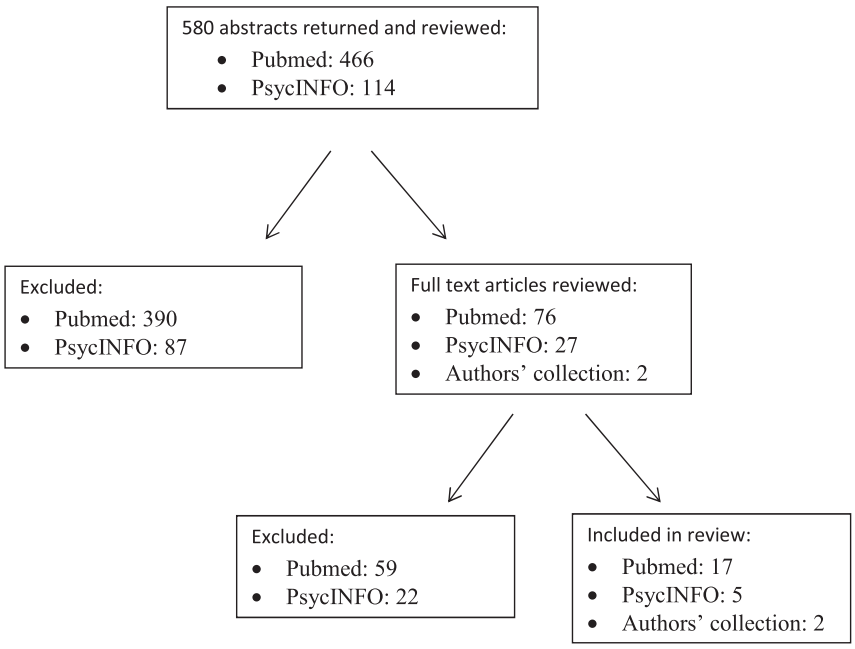

Fig. 1. Search strategy.

Women with opioid and other substance use disorders vs. comparison populations

Six studies reported prevalence of contraceptive use for a comparison population (see Table 3). The comparison populations for three studies were national survey data from the countries where the studies were conducted and the remaining three studies used local comparison populations. All six of these studies reported lower prevalence of contraceptive use among the population with opioid and other substance use disorders than among their respective comparison populations, with a median difference of 25% (56% vs. 81%).

Contraceptive method choice

Women with opioid and other substance use disorders

Twenty of the 24 studies included in the review reported on the specific contraceptive methods used. The prevalence of different methods and details about their reporting are presented in Table 4.

Very effective methods. IUD use ranged from 2%–29% with a median of 7% across eight studies. Use of tubal ligation ranged from 6%–40% with a median of 17% across seven studies. One study reported 15% of their contraceptive-using population used implants.

Effective methods. Oral contraceptive pill use ranged from 2%–77% with a median of 17% across 15 studies. Injection use ranged from 6%–58% with a median of 8% across five studies. No studies assessed vaginal ring or transdermal patch use.

Moderately effective methods. Seventeen studies presented data on condom use. Among these studies, condom use ranged from 3%–87% with a median of 62%. Interestingly, studies containing predominantly injecting drug users reported a median condom use prevalence of 65% compared to 44% in studies containing alcohol and/or non-injecting drug users. Diaphragm use ranged from 2–18% across two studies with a median of 10%. Sponge and natural family planning were reported by one study each, with very low percentages of use (≤4%).

Less effective methods. Foam was reported in one study, with a very low percentage of use (3%). Another study reported that 23% of contraceptive users were relying on vaginal douching or withdrawal as their primary contraceptive method.

Method combination. Three studies reported dual use, that is condoms in addition to another contraceptive method, with prevalence ranging from 3%–15% and a median of 7%.

Women with opioid and other substance use disorders vs. comparison populations

Five studies reported prevalence for contraceptive method choice in their target and comparison populations (see Table 4).

Very effective methods. Only two studies provided comparisons of IUD use and reported discrepant results. Armstrong et al. (1991) reported higher prevalence of IUD in their study population (6% vs. 1%), while Vidal-Trecan et al. (2003) reported lower prevalence of IUD use in their study population (8% vs. 18%). Tubal ligation was also less common among women with opioid and other substance use disorders in two studies (approximately 21% vs. 32%). None of the studies with comparison populations reported on use of implants.

Effective methods. Four of the five studies reported lower prevalence of oral contraceptive use among their study populations, with a median difference of 30% (24% vs. 54%). Only one of the five studies (Ralph and Spigner, 1986) reported higher prevalence of oral contraceptive use among their study population versus their comparison population (32% vs. 24%).

Moderately effective methods. Three of the four studies that reported on condom use separately in the study and comparison populations noted higher prevalence of condom use among women with opioid and other substance use disorders, with a median difference of 53% (76% vs. 23%). Ralph and Spigner (1986) reported that only 3% of women in a methadone maintenance program used condoms compared to 11% of women of similar economic status within a nationally representative sample, while Banwell et al. (2003) did not report condom use separately, but did state that 49% of their population used either condoms, IUDs, or diaphragms compared to 21% of their comparison population.

Table 2
Population studied and date of publication.

Author (year)	Country	Study population	N	Drug or alcohol use in study population, N (%)	Comparison population, N
Densen-Gerber et al. (1972)	US	Residential community treatment clients	57	57 (100) heroin	
Eldred and Washington (1975)	US	Drug treatment clients	79	79 (100) heroin	
Ralph and Spigner (1986)	US	Methadone maintenance clients	115	115 (100) opioid dependent	1982 National Survey of Family Growth, N not reported
Armstrong et al. (1991)	US	Drug treatment clients	599	599 (100) in drug treatment 405 (68) injecting drug users 154 (25) injected heroin in last 4 wks 93 (16) injected cocaine in last 4 wks	Family planning clinic visits in Philadelphia, PA in 1989, N = 55,223
Kouzi et al. (1992)	US	Injecting drug users with at least one sexual partner during the typical month	99	99 (100) injecting drug users	
White et al. (1993)	UK	Drug treatment and syringe exchange clients	44	44 (100) injecting drug users	
Morrison et al. (1995)	UK	Methadone maintenance clients	201	201 (100) opioid dependent	
Dudish and Hatsukami (1996)	US	Non-treatment seeking women who responded to research recruitment	88	88 (100) crack cocaine 41 (47) alcohol 5 (6) marijuana 12 (14) alcohol and marijuana 3 (3) other	
Harcourt et al. (2001)	Australia	Street-based sex workers	48	40 (83) injecting drug users 35 (88) heroin 2 (5) amphetamines 2 (5) cocaine 14 (29) alcohol	Brothel-based sex workers attending Sydney Sexual Health Centre, N = 679
Gelberg et al. (2002)	US	Chronically homeless women of reproductive age	229	105 (46) — alcohol abuse (lifetime) 140 (61) — drug abuse (lifetime)	
Banwell et al. (2003)	Australia	Women who self-reported being hepatitis C positive	462	217 (47) current injecting drug users 166 (36) past injecting drug users	1995 Australian National Health Survey, N not reported
Harding and Ritchie (2003)	Australia	Methadone maintenance clients	23	23 (100) opioid dependent	
Harvey et al. (2003)	US	14–30 years old injecting drug users and partners of male injecting drug users	94	69 (73) injecting drug users 52 (56) heroin 25 (27) cocaine 38 (41) speed 15 (16) speedball 79 (84) using drugs non-IV 63 (67) marijuana 36 (38) cocaine/crack 37 (39) speed 15 (16) heroin 2 (2) speedball	
Vidal-Trecan et al. (2003)	France	25–34 years old injecting drug users in drug treatment	81	81 (100) injecting drug users	25–34 year old Parisian subsample of the National French Survey of Sexual Behaviour, N = 130
Weber et al. (2003)	Canada	Injecting drug users ≤50 years old	311	311 (100) injecting drug users	
Carrieri et al. (2006)	France	Injecting drug users infected with HIV who also reported sex with an occasional partner of unknown HIV serostatus	90	90 (100) injecting drug users	
Clarke et al. (2006)	US	Incarcerated women ≥18 years old	484	253 (52) heroin, other opiates, cocaine 165 (34) alcohol	
Creighton et al. (2008)	UK	Street-based sex workers	25	24 (96) used any drug 24 (96) crack 7 (28) heroin 3 (12) cocaine 2 (8) benzodiazepines	
Sharpe and Velasquez (2008)	US	Women 18–44 years old, of low-income, in urban jail, drug treatment, and healthcare facilities who reported using illicit drugs	2672	2000 (75) polydrug users	Low-income women from same study populations who did not report using illicit drugs in the past 6 months, N = 1369
Olsen et al. (2009)	Australia	Hepatitis C positive women	109	85 (78) injecting drug users	
Abdala et al. (2011)	Russia	18–42 years old injecting drug users	78	78 (100) injecting drug users	
Duff et al. (2011)	Canada	Street-based sex workers	211	103 (49%) heroin 71 (34%) cocaine	
Toffol et al. (2011)	Finland	General population survey; alcohol abuse and dependence determined from Composite International Diagnostic Interview	2310 84	10 (<1) alcohol abusers 74 (3) alcohol dependent	
Black et al. (2012)	Australia	Opioid-agonist maintenance clients	204	204 (100) opioid dependent	

Table 3
Contraceptive use prevalence.

Author (year)	Women with opioid and other substance use disorders		Comparison population		Time frame of contraception assessment	Comments
	Contraceptive needs, N	Contraceptive use, N (%)	Contraceptive needs, N	Contraceptive use, N (%)		
Densen-Gerber et al. (1972)	50	26 (52)			Lifetime	7 women did not provide contraception data
Eldred and Washington (1975)	73	23 (31)			Not reported	1. 6 women were intending to conceive 2. Contraceptive use reported as either "all of the time" (23%) or "sometimes" (8%)
Ralph and Spigner (1986)	115	30 (26)	Not calculable	(49)	Not reported	N not reported for comparison group and thus could not be calculated
Armstrong et al. (1991)	368	143 (39)	42,411	41,265 (97)	Last 1 month	231 women with substance use disorders problems and 12,812 comparison women were infertile, pregnant, or not sexually active
Kouzi et al. (1992)	99	45 (45)				
White et al. (1993)	28	16 (57)			Last 1 month	1. 16 women were intending to conceive or were not sexually active 2. Contraceptive use reported as "always" (46%) and "sometimes" (11%)
Morrison et al. (1995)	135	82 (61)			Last 1 year	66 women were infertile, menopausal, pregnant, nor sexually active or intending to conceive
Dudish and Hatsukami (1996)	77	26 (34)			Current	11 women were pregnant or had hysterectomies
Harcourt et al. (2001)	42	31 (74)	679	663 (98)	Not reported	6 women were transgendered
Gelberg et al. (2002)	229	151 (66)			Last 1 year	Contraceptive use was reported as "always" (35%) or "sometimes" (31%).
Banwell et al. (2003)	399	137 (34)	Not calculable	(67)	Current	1. 63 women with substance use disorders were <18 and >49 and were excluded to match age range of comparison population 2. N could not be calculated for comparison group as it was not reported
Harding and Ritchie (2003)	12	8 (67)			Current	11 women were pregnant, menopausal, or not sexually active
Harvey et al. (2003)	91	62 (68)			Last 1 month	3 women were not sexually active
Vidal-Trecan et al. (2003)	81	62 (77)	130	109 (84)	Current	
Weber et al. (2003)	262	162 (62)			Current	49 women were infertile, pregnant, or not sexually active
Carrieri et al. (2006)	90	57 (63)			Last 6 months	
Clarke et al. (2006)	250	70 (28)			Last 3 months	1. 234 women were infertile, menopausal, intending to conceive, or not sexually active 2. 72% reported "inconsistent" use of contraceptives, which included non-use in the last 3 months
Creighton et al. (2008)	18	1 (6)			Last 3 months	1. 7 women were pregnant 2. Contraceptive use was defined as using "reliable" contraception.
Sharpe and Velasquez (2008)	Not calculable	(72)	Not calculable	(78)	Not reported	1313 women across the polydrug using and comparison groups were sexually active, not pregnant, and not intending to conceive. Authors reported percentages of contraceptive use by such women in each group, but not the n for each group.
Olsen et al. (2009)	109	47 (43)			Current	
Abdala et al. (2011)	78	53 (68)			Last 3 months	
Duff et al. (2011)	196	88 (45)			Last 6 months	15 women had a hysterectomy
Toffol et al. (2011)	84	21 (25)			Current	Contraceptive use only reported for women aged 30–54, and only for OCP and LNG-IUS
Black et al. (2012)	106	64 (60)			Last 1 month	98 women were infertile, pregnant, trying to conceive, not sexually active, or provided incomplete data

Less effective methods or method combination. None of the studies with comparison populations reported on use of less effective methods or method combinations.

Discussion

This manuscript describes results of a systematic review of the published literature to estimate overall contraceptive use and examine method choice among women with opioid and other substance use disorders and is the first effort to do so, to our knowledge. While the studies included were published over an approximately 40-year period, the observation that opioids were by far the most commonly used drug make the results especially relevant to the present day, with opioid use at epidemic levels (Maxwell, 2011) and much attention focused on the adverse consequences and costs of infants exposed in utero (e.g., Patrick et al., 2012). Recent data also clearly demonstrate that nearly all of these pregnancies are unintended (Black et al., 2012; Heil et al., 2011; Jones et al., 2011), underscoring the need to better understand contraceptive use and method choice among women with opioid and other substance use disorders.

Results of this review suggest that only about half of women with opioid and other substance use disorders use contraception. In the subset of comparison studies reviewed, contraceptive use prevalence was 25% lower among women with opioid and other substance use disorders suggesting unmet need. Perhaps more alarmingly, the data on contraceptive method choice indicate that condoms were by far the most commonly used method (approximately 62%), while prevalence of the very effective methods (tubal ligation, implants, and IUDs) was typically much lower (approximately 8%). Injecting drug users appear to rely on condoms more often than non-injecting drug users, likely as a result of public health efforts to reduce sexually transmitted infections (STIs) in this population. With continued high prevalence of HIV among drug users and a narrowing of the disparate HIV infection rates between intravenous and non-intravenous drug users (Des Jarlais et al., 2007), promoting condom use among drug users remains important for preventing STIs. However, the distressingly high rates of unintended

Table 4
Method choice among those using contraception.

Author (year)	WHO Tier	Women with opioid and other substance use disorders N(%)	Comparison population N(%)	Comments
Densen-Gerber et al. (1972)	Tier 1	IUD: 7 (27)		More than one method could be reported
	Tier 2	OCP: 20 (77)		
	Tier 3	Condom: 2 (8)		
	Tier 3/4	Diaphragm/foam: 3 (12)		
Ralph & Spigner (1986)	Tier 1	TL: (24)	TL: (30)	1. More than one method could be reported in both populations
	Tier 2	OCP: (32)	OCP: (24)	
	Tier 3	Condom: (3)	Condom: (11)	2. N not calculable for comparison population
		Diaphragm: (18)	Diaphragm: (7)	
	Tier 4	Foam: (3)	Foam: (2)	
Armstrong et al. (1991)	Tier 1	TL: 160 (>100)	TL: 2,235 (5)	1. More than one method could be reported by women with substance use disorders, but only one method could be reported in comparison population
		IUD: 9 (6)	IUD: 446 (1)	
	Tier 2	OCP: 30 (21)	OCP: 26,791 (65)	
	Tier 3	Condom: 89 (62)	Condom: 9,506 (23)	
		Sponge: 6 (4)	Sponge: 453 (1)	2. Not all contraceptive users were sexually active; TL method prevalence not used in summary evaluations in results because prevalence >100%
	Unk.	Other: 23 (16)	Other: 1834 (4)	
Kouzi et al. (1992)	Tier 2	OCP: 4 (9)		1. More than one method could be reported
	Tier 3	Condom: 39 (87)		2. Two women reported using contraception, but the exact methods were not specified
White et al. (1993)	Tier 1	TL: 1 (6)		More than one method could be reported
		IUD: 1 (6)		
	Tier 2	OCP/injection: 12 (75)		
	Tier 3	Condom: 4 (25)		
		Diaphragm: 0 (0)		
Morrison et al. (1995)	Tier 1	TL 13 (16)		1. More than one method could be reported
		IUD: 11 (13)		2. Women with hysterectomies inextricable from those with a TL
	Tier 2	Injection: 5 (6)		
		OCP: 18 (22)		
	Tier 3	Condom: 36 (44)		
		Natural family planning: 1(1)		
Dudish and Hatsukami (1996)	Tier 1	IUD: 0 (0)		Ns back-calculated
		Implant: 4 (15)		
	Tier 2	Injection: 15 (58)		
		OCP: 2 (8)		
	Tier 3	Condom/diaphragm: 5 (19)		
		Condom/diaphragm + foam: 0 (0)		
		Rhythm method: 0 (0)		
	Tier 4	Foam: 0 (0)		
Harcourt et al. (2001)	Tier 2	OCP: (12)	OCP: (42)	1. More than one method could be reported
	Tier 3	Condom: (76)	Condom: (56)	2. 26% of women with substance use disorders and 2% of comparison group reported "inadequate contraception"
Banwell et al. (2003)	Tier 1	TL/sterilization: 24 (17)	TL/sterilization: (34)	Sterilization included vasectomy
	Tier 2	Injection: 10 (8)	Injection: not reported	
		OCP: 36 (26)	OCP: (40)	
	Tier 1/3	IUD/condom/diaphragm: 67 (49)	IUD/condom/diaphragm: (21)	
Harding & Ritchie (2003)	Tier 1/2	TL/injection/OCP: 5 (63)		
	Tier 3	Condom: 3 (38)		
Harvey et al. (2003)	Tier 3	Condom (any use): 43 (69)		1. "Birth control" was not explicitly defined
	Unk.	Birth control (any use): 62 (100)		2. Ns back-calculated
Vidal-Trecan et al. (2003)	Tier 1	IUD: 5 (8)	IUD: 20 (18)	1. More than one method could be reported
	Tier 2	OCP: 19 (31)	OCP: 91 (83)	2. Tier 1/2 + 3 indicates dual use
	Tier 1/2+3	Condom + OCP/IUD: 2 (3)	Condom + OCP/IUD: 1(1)	3. Other methods could include diaphragm, spermicides, withdrawal, and periodic abstinence.
	Tier 3	Condom: 52 (84)	Condom: 13 (12)	
	Unk.	Other methods: 12 (19)	Other methods: 8 (7)	4. Ns back-calculated
Weber et al. (2003)	Tier 1	TL: 47 (30)		
	Tier 2	Injection: 10 (6)		
		OCP: 4 (3)		
	Tier 3	Condom: 101 (64)		
Carrieri et al. (2006)	Tier 2	OCP: 10 (17)		1. "Other" category included withdrawal, IUD, spermicide, diaphragm, and vaginal douching
	Tier 2+3	Condom + OCP: 4 (7)		2. Tier 2 + 3 indicates dual use
	Tier 3	Condom: 37 (65)		3. Ns back-calculated
	Tier 1/3/4	Other: 6 (11)		
Clarke et al. (2006)	Tier 3	Condom (consistent use): 50 (71)		1. "Birth control" was not explicitly defined
	Unk.	Birth control (consistent use): 70 (100)		2. Ns back-calculated
Olsen et al. (2009)	Tier 1	TL: 8 (17)		Tier 1/2 + 3 indicates dual use
		Partner's vasectomy: 3 (6)		
		IUD: 1 (2)		
	Tier 1/2	Implant/injection: 11 (23)		
	Tier 2	OCP: 6 (13)		
		Emergency Contraception: 0 (0)		
	Tier 1/2+3	Condom + pill/implant: 7 (15)		

Table 4 (*continued*)

Author (year)	WHO Tier	Women with opioid and other substance use disorders N(%)	Comparison population N(%)	Comments
	Tier 3	Condom: 10 (21) Diaphragm: 1 (2)		
Abdala et al. (2011)	Tier 1 Tier 2 Tier 3 Tier 4	IUD: 0 (0) OCP: 0 (0) Condom: 40 (75) Spermicide: 1 (2) Douching/withdrawal: 12 (23)		
Duff et al. (2011)	Tier 1 Tier 2 Tier 3 	TL: 35 (40) IUD: 3 (3) Injection: 18 (21) OCP: 2 (2) Condom: 30 (34) Female condom: 0 (0)		139 reported using condoms only with clients
Toffol et al. (2011)	Tier 1 Tier 2	IUD: 6 (29) OCP: 15 (71)		IUD was specifically levonorgestrel-releasing system
Black et al. (2012)	Tier 1/2 Tier 2 Tier 3	TL/IUD/implant//injection: 24 (38) OCP: 10 (16) Condom: 29 (46)		One woman reported using contraception, but did not specify a method

Notes: WHO Tier = World Health Organization's tiers of contraceptive effectiveness (WHO, 2007). Tier 1 = very effective (<1% of women using one of these methods will become pregnant in the first year of typical use), Tier 2 = effective (1–9% pregnancy rates), Tier 3 = moderately effective (10–25% pregnancy rates), and Tier 4 = less effective (26–32% pregnancy rates). TL = tubal ligation, IUD = intrauterine device, Injection = depot injection, OCP = oral contraceptive pills, unk. = unknown.

pregnancy among drug-using women underscore the urgent need to promote the use of more effective contraceptives.

Contraceptive method choice counseling usually takes risk for STIs into consideration and often recommends condoms for women at risk for both unintended pregnancy and STIs. For example, the first recommendation made for women at risk of unintended pregnancy and STIs in the WHO contraceptive method decision-making tool (2005) is condoms, followed by combining condom use with another contraceptive method (i.e., dual use). Results from this review suggest that dual use is uncommon, with only about 7% of women endorsing dual protection in the three studies that reported it. One way to increase dual protection may be to separate contraceptive recommendations from recommendations about condom use to prevent STIs. That is, a woman would be counseled to choose a contraceptive method based solely on her contraceptive needs and regardless of her STI risk. Then, if she is at risk for STIs, she would be encouraged to use condoms in addition to the contraceptive method. This approach may increase the chances that a woman at risk for unintended pregnancy and STIs will choose one of the very effective or effective contraceptive methods, rather than defaulting to moderately effective condom use.

Regarding the very effective methods, tubal ligation has long been the gold standard female contraceptive, but the permanence of the method combined with the vulnerability of the population has raised concerns about promoting tubal ligation among women with opioid and other substance use disorders (cf., Lucke and Hall, 2012 and associated commentaries). Fortunately, implants and IUDs have equally low, if not lower, pregnancy rates (WHO, 2007), but their contraceptive actions are reversible with a rapid return to fertility upon removal (Zieman and Hatcher, 2013), significantly reducing ethical concerns. More generally, the benefits of using LARC methods are so substantial that the American College of Obstetricians and Gynecologists now recommends LARCs as first-line contraceptives for all women (ACOG, 2009), including other populations at increased risk for unintended pregnancy like adolescents (ACOG, 2012).

While the benefits of LARCs are well established, they are a more difficult method of contraception to obtain. Implants and IUDs can cost $650 or more depending on insurance coverage and must be inserted by trained providers (Zieman and Hatcher, 2013). In an effort to address the persistent 50% unintended pregnancy rate in the general population (Mohllajee et al., 2007), a recent large study set out to promote LARCs among a wide range of women at risk for unintended pregnancy in part by providing the methods free of charge. The authors reported that 75% of participants chose a LARC and that rates of abortion, repeat abortion and teen births in the catchment area decreased significantly in subsequent years (Peipert et al., 2012). Regarding insertion by trained providers, women who enter substance abuse treatment are in frequent contact with health care professionals, suggesting that providing family planning services as part of treatment may be especially efficacious with this population. Observational studies that offered free contraceptive supplies and provided family planning services in treatment settings have reported promising results (Armstrong et al., 1991; Elko and Jansson, 2011). In addition, results of a small randomized trial of a similar approach conducted by some of the authors of this review pointed to increased use of more effective contraceptives among opioid-maintained women at risk for unintended pregnancy (Heil et al., 2013; in preparation).

The availability of different contraceptive methods has been shown to vary substantially over time and by country (Ross and Stover, 2013). Time was undoubtedly part of the reason that none of the studies in the review reported on vaginal ring or transdermal patch use, as both of these methods are relatively new to the market (2001 for ring, 2002 for patch). As another example, the availability of implants has differed at times in the US due to changes in manufacturers and formulations. Wyeth Pharmaceuticals produced Norplant from approximately 1990–2002 and Merck and Co. produced Implanon from approximately 2006–2012 and then transitioned to Nexplanon from 2011 through the present day. Method availability and other factors, like cost and public opinion, also likely contribute to variability in method choice. For example, rates of IUD use are much lower in the US as compared to most European countries and this is often attributed in part to significant problems with one brand of IUD, the Dalkon Shield, in the US in the 1970s (Sonfield, 2007). All of these aspects likely contributed to the wide variability observed in the prevalence of contraceptive use and in the use of specific methods across the studies, but point to a benefit of systematic reviews, namely that looking across a large number of studies may help bring out larger patterns that are difficult to glean from individual studies. This approach may be especially important in the study of contraceptive use and method choice.

The results of this review also suggest that there is increasing interest in assessing contraceptive use prevalence and method choice among women with opioid and other drug problems, with two papers published in first decade of the review, but 15 by the fourth decade. Future assessments of contraceptive practices would benefit from standardizing how contraceptive use prevalence is assessed and calculated. First, characteristics of the population must be considered when calculating contraceptive prevalence. Generally, contraceptive prevalence should be calculated

only among women who are at risk of becoming pregnant and are not actively trying to conceive. Second, the time frame for assessing contraceptive method use should be carefully considered and clearly reported to help prevent confusion over methods a woman has ever used vs. methods she is currently using. Finally, use of each specific contraceptive method should be reported separately with Ns as well as percentages. If grouping contraceptive methods is necessary, the groupings should be made with regard to the effectiveness of the methods. Dual method use should also be explicitly described and presented separately from use of each individual contraceptive method. More attention to these sorts of details will strengthen this literature and may permit more rigorous analysis (e.g., meta analysis) in the future.

While more detailed information about contraceptive use prevalence and method choice will help refine estimates of both, the results of this review already strongly suggest that women with opioid and other substance use disorders have unmet contraceptive need and that those who do use contraception rely too heavily on methods that are only moderately effective. Providing family planning services, including promotion of more effective methods of contraception, as part of substance abuse treatment has potential to improve reproductive health and to address the problem of unintended pregnancy in this vulnerable population.

Conflict of interest statement

The authors declare that there is no conflict of interest.

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