Antipsychotic use during pregnancy and lactation: optimizing health for mother and newborn

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ABSTRACT

This review article will evaluate the safety of antipsychotic use during pregnancy and lactation.

KEYWORDS

antipsychotics, pregnancy, lactation, schizophrenia, bipolar

In opposition to a common doctrine held 20 years ago, pregnancy is not protective for mental illness. For patients with serious mental illness, interrupting pharmacotherapy for pregnancy or nursing is often not a safe option. The literature and guidelines regarding the use of psychotropics in pregnancy and lactation can be contradictory. Though there is potential for adverse effects and fetal anomalies with medication use, avoiding psychotropics during pregnancy is often an unreasonable option for mothers and their infants. For women with severe psychiatric disorders (including schizophrenia and bipolar disorder), emergency psychiatric services are often needed, where antipsychotics are initiated as a pharmacological management tool to stabilize the mother and prevent future psychotic episodes during pregnancy. For patients with serious psychiatric illness, the use of medication including antipsychotics during pregnancy often outweighs the risks of emergency psychiatric hospitalizations and untreated mental illness. For many of these patients, antipsychotics are required to maintain stable mental health, where psychiatric health is improved by their use, leading to enhanced prenatal care and better outcomes for both mother and infant.

As healthcare systems and providers shift healthcare delivery to more patient-centered models, including patient values while addressing difficult treatment decisions will be especially challenging for female patients during pregnancy and lactation, as no decision is risk-free. Comprehensive mental health care during a woman's reproductive lifespan includes providing relevant treatment options women can understand, that lower risk and afford safety. More importantly, the process of creating individual treatment plans during pregnancy and lactation should build partnerships that help patients understand the current information and integrate their values to create a collaborative plan for a stable pregnancy and delivery of a healthy newborn.

Importance of Treating Mental Illness During Pregnancy

Studies have shown that both affective disorders and schizophrenia increase the risk of adverse events during pregnancy and delivery.[1] Additionally infants of mothers with schizophrenia and affective disorders have increased risks of complications.[1] Inadequately treated maternal psychiatric illness may result in reduced prenatal care, poor nutrition, exposure to environmental and other toxins (such as alcohol and nicotine), reduced infant bonding and stressful family environments.[2]

Severe mental illness appears to be a major risk factor for increasing reproductive abnormalities. Women with schizophrenia are more likely to have miscarriages and antenatal hemorrhage.[2] Their newborns are more likely to be delivered preterm, have low birth weight, be small for gestational age, have congenital malformations (commonly cardiovascular anomalies) and may have higher rates of postnatal death.[2,3] Untreated schizophrenia-spectrum disorders may result in devastating effects on both mother and child. Rare reports include maternal self-mutilation, denial of the pregnancy and related prenatal care and infanticide.[2]

Bipolar disorder itself has not been shown to cause fetal malformations (such as spina bifida, cardiac defects, limb reduction defects etc.); however, the impact on obstetrical outcomes is similar to that observed with depression and may include low birth weight neonates, decreased fetal growth and postnatal complications. Impacts on the neonate may include

elevated levels of catecholamines and cortisol, increased infant crying, and higher rates of admission to neonatal intensive care units.[2] While one study reported pregnancy may be protective for bipolar disorder; this is no longer believed to be the case.[2]

Understanding the Limitations of Data in Pregnancy and Lactation

Ideally the highest level of evidence, including randomized control trials with prospective data would be available for all medications specific to the disease state(s) or affective disorder(s) of the patient, balancing the risks and benefits of each medication. Unfortunately for pregnant or lactating women, reproductive safety data is extremely limited for most medications, including psychotropics, and when available is often confounded by several exposure variables.

In 2009, a systematic review examining the safety of antipsychotic medication use during pregnancy revealed sparse evidence showing clear associations between adverse pregnancy outcomes and antipsychotic use during pregnancy. Currently available evidence remains insufficient to provide conclusive recommendations about the safety of antipsychotic medications during pregnancy.[4]

Given the ethical concerns of conducting large scale prospective medication trials in pregnant and lactating women and outcomes on their infants, healthcare providers must use available retrospective and observational research to guide decisions in most cases. Observational studies only provide an association between an exposure and an outcome. The studies are unable to conclude that any given exposure caused an outcome. Understanding the difference in causation and association may be an important counseling point when providing education regarding psychotropics and pregnancy. [5]

One way healthcare providers are attempting to collect more prospective information on the use of medications in pregnancy and postpartum period is through the formation of pregnancy registries. Typically individual registries are created by drug manufacturers to evaluate the impact of their specific medication. There are disease state registries such as an epilepsy registry. More recently a national pregnancy registry was created for atypical antipsychotics. The goal of this registry is to enroll pregnant women taking atypical antipsychotics and then evaluate the safety of their use during pregnancy and identify potential adverse outcomes and malformations in their fetuses and infants.[6] All pregnant women who take medications that have a pregnancy registry should be encouraged to enroll. A list of current pregnancy registries is available.

General Treatment Recommendations

When creating individual treatment plans, providers should generally consider previous psychiatric history (including family history and psychosocial stressors) and define the severity of illness, since it may be reasonable to stop medications in mild to moderate illness. For patients with severe mental illness, treatment plans should be created on an individual basis.

Creating Written Care Plans

Before creating a pregnancy treatment plan, providers should discuss with mothers the absolute and relative risks of treated and untreated mental illness during pregnancy and lactation. Ideally a preliminary discussion or consult will be conducted with the patient and personalized material will be provided. If possible, an audio file of the preliminary consultation will also be provided to the mother, so she can review key components of the discussion. This audio recording may be beneficial to all mothers, but may be particularly helpful to those with lower education levels or those whom are illiterate.[7]

A comprehensive care plan should be created for all women with current or previous severe mental illness that covers pregnancy, delivery and the postpartum period. Preferably the treatment plan would be written in collaboration with the mother, her partner, family and the healthcare team; to ensure the patients' goals are integrated into the care plan.[7]

The following risks should be discussed with the patient:[7]

- Risk of relapse or increased symptoms
- Coping skills of the mother
- Risks of suddenly stopping medications, acknowledging that stopping the medication may not eliminate the risk of malformations
- Review uncertainty of risks
- Educate on background risk of malformations
- Describe the risks as 50 in 100 rather than 50% and use the same common denominators when comparing different risks (i.e. instead of saying 5% vs. 50% state the risks as 5 in 100 and 50 in 100 vs. stating the risk as 5 in 100 and 1 in 2)

Once created, the care plan should be documented and shared with all relevant healthcare professionals. Ideally the care plan will also be provided to the patient in an individualized format where the healthcare team assesses

for patient comprehension and revises if needed (i.e. consider visual depictions if cognitive impairment or reading disabilities are present).[7]

Background Information for Treatment Recommendations in Women with Bipolar Disorder

At least one prospective study(n=89) has found that the risk of recurrence of mood disorders is significantly higher in pregnant women with bipolar disorder who discontinue treatment with mood stabilizers; these women were also ill more frequently compared to women that continued medication. When medications were stopped abruptly, the risk of relapse increased further.[8] Rapid discontinuation of medications was also associated with an increase in unplanned pregnancies.[8] For women with bipolar disorder, unplanned pregnancies were concerning as they were found to be a predictor of relapse during pregnancy.[8] Additionally pregnant women with bipolar disorder are more likely to stop medications abruptly and without planning.[7] After delivery, the relapse risk increases significantly. For women with bipolar disorder not receiving treatment during the postpartum period the risk of relapse may increase up to 70%.[2,8]

Additionally, though postpartum psychosis occurs rarely, woman with bipolar disorder have a significantly elevated risk of developing this inconsistently recognized condition. Therefore both the mother and her healthcare team should be vigilant for signs of psychosis after delivery, which may have rapid onset and present as a mixed state or manic psychosis. If present, psychosis should be considered a medical emergency as the condition can rapidly escalate where both the mother and infant are at risk of serious harm.[9]

The National Institute of Health and Clinical Excellence (NICE) has published guidelines with specific treatment recommendations for the use of antipsychotics during pregnancy for women with bipolar disorder or schizophrenia. The guidelines review the use of medications to prevent mania, depressive symptoms and for mothers with schizophrenia needing antipsychotics. Additionally the NICE guidelines review the use of these medications for women planning pregnancies, who are stable on antipsychotics, or who have unplanned pregnancies.[7]

Pre-Pregnancy Planning

Women who are planning a pregnancy should be counseled that increased prolactin levels are observed with some antipsychotics (commonly high potency first generation antipsychotics, risperidone and palperidone) which may reduce the chance of conception.[7] Signs of hyperprolactinemia may include sexual dysfunction, weight gain, galactorrhea and amenorrhea. If prolactin levels are elevated, alternative medications with a lower risk of hyperprolactinemia should be considered for woman trying to conceive, as ovulation may be reduced by elevated prolactin levels.[7]

First Generation Antipsychotics

First Generation Antipsychotics (FGAs) or typical antipsychotics are generally considered to have minimal risk of teratogenicity during pregnancy; although future risk for neurobehavioral and physical effects in the infant remain uncertain.[10] This uncertainty may be lessened by many studies of FGAs that suggest the risk to future infant development is small.[10] Much of the data for infants exposed to FGAs comes from studies examining women being treated for hyperemesis gravidarum, a condition associated with an increased risk of congenital malformations.[10] To further confound the data, several of the infants were only exposed to the FGAs for limited time periods; these variables make translating outcomes to mothers with psychiatric illness imperfect.[10] Studies examining neurobehavioral effects on 203 children exposed to FGA during gestation did not find measurable differences in IQ scores for children at 4 years of age.[11,12]

Low-potency FGAs used in the first trimester may have a small cardiovascular teratogenic risk, yet no specific organ malformation has been identified and surveillance data has failed to confirm any cardiovascular or other teratogenic concerns.[13] The data for higher potency FGAs and atypical antipsychotics are more limited but fail to show any conclusive trends.[13] Moderate to high potency FGAs (such as haloperidol, fluphenazine, perphenazine, thiothixene and trifluoperazine) are often preferred during pregnancy (despite their risk for self-limited extrapyramidal symptoms in infants) given more reproductive safety data than atypical antipsychotics and because of their lower risk of anticholinergic, antihistaminic and hypotensive effects.[2,14]

Chlorpromazine (Thorazine)

Chlorpromazine, a low potency FGA, appears to have the fewest reported fetal anomalies when used by mothers with psychiatric illness, though constipation, orthostatic hypotension and sedation may be problematic.[10] More than 400 cases of chlorpromazine exposure during pregnancy have been reported, where only 5 cases of fetal malformation have been associated with its use. However, use during the third trimester may be associated with perinatal complications, including extrapyramidal symptoms, seizures, respiratory distress

and transient neurodevelopmental delay.[10] Despite these concerns and being a low potency FGA, chlorpromazine continues to be considered a first choice consideration to manage psychotic disorders during pregnancy, because it has the largest number of reports for safe use during pregnancy with the least number of observed fetal malformations.[10]

Haloperidol (Haldol)

The use of haloperidol during pregnancy is limited due to lack of adequate human studies, while animal data suggests a moderate risk. Tardive dyskinesia in the neonate may be an uncommon complication of exposure to haloperidol during pregnancy. There have been 3 cases of limb defects after exposure to haloperidol during the first trimester and a fourth case after exposure to a drug in the same class (penfluridol). Thus, though there does not appear to be an increased risk of major congenital defects with haloperidol, it is typically avoided during the first trimester when possible.[15] Additionally there is evidence to suggest that exposure to haloperidol during the third trimester may pose some risks of complications to the neonate, which may include withdrawal symptoms and unstable body temperatures.[10] Despite this, the American Congress of Obstetricians and Gynecologist guidelines list haloperidol as an antipsychotic treatment option during pregnancy; this may in part be based on a study of 100 women treated for hyperemesis gravidarum during pregnancy (mean dose 1.2mg/day). No changes in gestational duration, fetal viability or birth weight were observed.[2]

Case reports of concerns with the use of FGAs in near-term newborns include neonatal dyskinesia, functional bowel obstruction and rarely neonatal jaundice with phenothiazines (specifically chlorpromazine and promazine).[10,13] The onset of symptoms reported with dyskinesia in infants exposed to FGAs has ranged from 24 hours to four weeks post-delivery. The range in onset of symptoms raises the question if the symptoms are better attributed to extrapyramidal symptoms in newborns (which includes tremors, difficulty feeding, torticollis, increase muscle tone and abnormal movements) than dyskinesia. Regardless, once reported, these symptoms continued anywhere from 8 days to 6 months.[13] Mothers should be counseled to monitor their newborns for dyskinesia which may include abnormal extremity and tongue movements, difficulties suckling and feeding or shakiness.[13]

Second Generation Antipsychotics (SGAs)

Though both FGAs and Second Generation Antipsychotics (SGAs) have been associated with some risk of neonatal complications, data are too limited to define the risk of structural malformations associated with these agents.[10] However, it appears that SGAs increase the risk of metabolic complications in the infant both during and after pregnancy compared to those exposed to FGAs. Thus, in pregnant mothers requiring an antipsychotic who are treatment naïve, FGAs are often preferred.[10]

As mentioned in the 2009 American Congress of Obstetricians and Gynecologists (ACOG) guidelines, "the reproductive safety regarding the use of SGAs remains extremely limited." To date, no long-term studies have examined the effects of SGAs in children exposed in utero. Given the lack of data on their use in pregnancy and lactation, ACOG is unable to provide a recommendation about their routine use in this population of patients.[2] In a similar fashion, for all antipsychotics available in the US (both FGAs and SGAs) the American Academy of Pediatrics (AAP) does not rate any antipsychotics as compatible for use during breastfeeding. Rather a limited number of individual antipsychotics (several are not reviewed) are listed in the table "***Drugs for Which the Effect on Nursing Infants is Unknown but May Be of Concern***", as they believe the long-term neurodevelopmental impacts are difficult to determine as the medications may change neurotransmitter function in the developing infant.[14] Despite a scarcity of data for using SGAs in pregnant women, it may not be appropriate to switch to FGAs if the patient is already stabilized on a SGA or if the mother had relapses while being treated with a FGA.[2]

Clozapine (Clozaril)

Though clozapine has an FDA pregnancy rating of B, it is not commonly a first line recommendation for use during pregnancy given the lack of data for use during pregnancy and concerns about potential serious side effects. The AAP lists clozapine as a medication for which the effects on the nursing infant are unknown but may be of concern.[16] The NICE guidelines recommend women be switched from clozapine to another antipsychotic.[7] Though there does not appear to be an increased risk of malformation with the use of clozapine, some concerns for use include gestational diabetes, floppy baby syndrome, decreased suckling, cardiovascular instability, neonatal seizures and the theoretical risk of agranulocytosis in the fetus/neonate.[7,17] Nonetheless, given the superior effectiveness of clozapine,

discontinuing clozapine places most women at risk of relapse. Often when the available evidence is balanced with relapse risk for individual patients on clozapine, clozapine is continued during pregnancy. Given the potential for fetal-induced agranulocytosis, it has been recommended that all newborn infants whose mothers were on clozapine during pregnancy should have white blood cell counts monitored weekly for the first 6 months of life.[10] For women taking clozapine and considering breastfeeding, alternative treatments are typically advised, due to drug accumulation in breast milk and risk of agranulocytosis in the infant.[10]

Olanzapine (Zyprexa)

Of the SGAs, olanzapine currently has the most data available. Its use in pregnancy has been associated with lower birth weights and perinatal complications; this may be because this antipsychotic has a higher rate of passage into the placenta than similar medications.[10] There are also sporadic concerns of fetal malformation and self-remitted neurodevelopmental impairment, though much of the data (including the available olanzapine registry data) appears to be confounded by the use of other psychotropic medications.[10] Despite these concerns, there are several reports of healthy infants exposed to olanzapine throughout pregnancy.[10] There are a small number of reports(n=4) of various effects in nursing infants exposed to olanzapine, ranging from more self-limiting effects such as sedation, poor suckling and diarrhea to more serious concerns such as jaundice, cardiomegaly and heart murmur.[17] However, a later study examining the effects of olanzapine in nursing infants (n=7) identified no observable effects and milk to plasma ratios suggest exposure to nursing infants is small.[18] The olanzapine pregnancy registry has shown prospective data (from 23 pregnancies) indicating the rate of spontaneous abortion, still birth, major malformation and prematurity are all within normal rates compared to controls. The registry has also included 2 retrospective cases of olanzapine exposure during lactation which did not identify any observable risks to the infant.[19] When deciding to prescribe olanzapine to a pregnant woman, risk factors for gestational diabetes and weight gain should be included.[7] Additionally family history and current weight should be taken into account.[2]

Risperidone (Risperdal)

The risperidone pregnancy registry has evaluated data from 68 prospectively reported cases and 197 retrospective cases of pregnant women who received risperidone. No increased rate of birth defects (including organ malformations and spontaneous abortions) were detected above normal background rates. There were 12 retrospective pregnancies which involved major organ malformations, where the most frequently reported cases affected the heart, brain, lip and/or palate. Perinatal syndromes were reported in 37 retrospective cases, where a majority involved behavioral and motor disorders. Several of these cases also included a cluster of symptoms including tremor, jitteriness, irritability, feeding problems and somnolence, which were thought to represent a withdrawal syndrome as a result of risperidone exposure during the third trimester. The evaluation of data concluded that risperidone exposure did not appear to increase risk of spontaneous abortions, structural malformations and fetal teratogenic risk above background rates.[20] However, this study and other references suggest that more data would be helpful to determine what risks may exist with taking risperidone during pregnancy.[10]

Quetiapine (Seroquel)

Limited data suggests quetiapine is teratogenic in humans, though much of the available data is confounded by the use of other psychotropics.[10] Additionally, fetal malformations occurred from an unknown cause in a limited number of cases with quetiapine use.[10] The manufacturer has released information from the quetiapine pregnancy registry including 36 prospective cases of women treated with quetiapine during pregnancy, where quetiapine did not demonstrate an increased teratogenic risk and effects on neonates were not observed.[21] However, the study findings are limited by the small sample size, and confirmation with larger prospective data is recommended. Therefore, no conclusion has been determined about the safety of this medication during or after pregnancy.[10]

Other SGAs

Currently ziprasidone lacks data in humans and teratogenic risk.[E] There is one published case report regarding the use of ziprasidone during pregnancy. The woman in the case report was a 26 year old African American taking ziprasidone 40mg daily with citalopram 60mg daily for severe depression, suicidal ideation and olfactory hallucinations. Though no formal assessments were completed, informal pediatrician assessments (at birth 2, 9, and 18 weeks postnatally) did not identify any withdrawal symptoms or medication complications. Breastfeeding was started at birth through 6 months of age. At 6 months of age, the infant had normal growth and development and was found healthy by the

pediatrician.[22] Aripiprazole has only a limited number of case reports available, one of which included transient effects on neonatal cardiac rhythm. Given the lack of data for use in pregnancy and lactation both of these SGAs are typically avoided in pregnant women. Published data related to other SGAs remain scarce.[2,10,15,16,17]

Increasingly, SGAs are being used in obsessive compulsive disorder, bipolar disorder and treatment-resistant depression.[2] ACOG guidelines recommend a comprehensive risk-benefit analysis for mothers that conceive while taking SGAs. In some cases it may be preferred to continue therapy rather than switch to a FGA, to which the fetus has not yet been exposed.[2]

Other Treatment Considerations

Depot Antipsychotics

This formulation of medication should not be routinely prescribed to pregnant women given a lack of safety information along with their long duration of action. Additionally, infants may develop extrapyramidal symptoms several months after administration of the injection.[7]

Monitoring of Antipsychotics During Pregnancy and Following Delivery

Monitoring recommendations for use of antipsychotics during pregnancy include:[10]

- Regular gynecological exams (including ultrasound monitoring)
- Following relevant endocrinological parameters (including HbA1C, blood glucose, cholesterol, triglycerides, and bodyweight) especially with use of SGAs
- Coordinated care between the gynecologist, neonatologist and pediatrician to monitor for any perinatal complications during and after delivery
- Regular follow-up of children exposed to antipsychotics to manage and diagnose any concerns of neurodevelopmental or physical delay

Discontinuation of Antipsychotics During Delivery

Some guidelines recommend discontinuing antipsychotics several days prior to delivery to minimize neonatal complications. However, a growing body of evidence shows this may put mother and infant at risk. Discontinuation may not always be necessary or desirable. Careful consideration should be given to the risk of psychiatric decomposition, as the risks may outweigh the potential benefit.[10,13,15]

Antipsychotic Use and Breastfeeding

The benefits of breastfeeding are numerous, and evidence shows that most medications do not enter the milk in levels hazardous to the nursing infant.[23] For safe medication use, guidelines encourage a risk -benefit analysis of neonate exposure while nursing, given that some medications may sequester in the milk placing the neonate or infant at risk for adverse effects. Literature should be evaluated to assess for potential medication levels in breast milk and to assist with the decision-making process.[2]

Key determinants of drugs passing into milk include: low molecular weight, low protein binding, long half-life, the lipid solubility of the drug and its ability to cross the blood brain barrier, and the fat content of the milk. Factors that may influence the amount of medication the infant receives include prematurity, instability, size and age. Additionally, the oral bioavailability affects several medications, where some medications may be destroyed in the infant's stomach (i.e. insulin) while others may be largely removed by the hepatic first pass effect.[23] One way clinicians can get an idea of how much medication the infant may be exposed to is to use the Relative Infant Dose (RID) equation. This is calculated by dividing the infants' dose via milk (mg/kg/day) by the mothers' dose in mg/kg/day. For most medications, an RID of less than 10% is considered compatible with breastfeeding.[23]

While guidelines do not routinely recommend measuring drug serum levels in neonates, they do routinely recommend diligent monitoring of nursing infants and mothers. When using oral antipsychotics the lowest dose possible should be used. Following delivery and while nursing, the neonate should be monitored routinely for adverse side effects, medication toxicity or withdrawal (i.e. constant crying, shivering, tremors, agitation, increased muscle tone, feeding and sleeping troubles, irritability, floppy baby syndrome and rarely seizures). When abnormal symptoms commonly associated with exposure to the medications develop, breastfeeding should be stopped.[2,7]

SUMMARY

In a patient-centered care model, for pregnant women or those considering pregnancy with affective mood or thought disorders, simply comparing and contrasting the various pregnancy categories with possible teratogenicity information is insufficient. The benefit of antipsychotic treatment has been established for women with severe psychiatric disorders during pregnancy, childbirth and postpartum. Clinicians should strive to help patients and their families understand the benefits and risks associated

with both psychopharmacologic treatments as well an untreated mental illness. Though the selection of appropriate medication use during this critical time period is challenging, understanding the patient-specific risks for psychiatric instability, reviewing previous medication trials and responses while integrating available safety data of individual medications, can reduce potential risks and provide relevant treatment options, individualized to each mother.

PREGNANCY AND MEDICATION RESOURCES FOR HEALTHCARE PROVIDERS AND THE PUBLIC

National Institute of Health and Clinical Excellence Summary Guidelines

A summary of the NICE pregnancy guidelines with recommendations is written for patients. Topics including the treatment of specific mental health problems during pregnancy and post-partum, recognizing mental health problems during this time period, and information on medications are available for patients. http://publications.nice.org.uk/mental-health-problems-during-pregnancy-and-after-giving-birth-ifp45/about-this-information

MotherToBaby

MotherToBaby is a service and website provided by the non-profit group Organization of Teratology Information Specialists (OTIS). Their mission is to provide evidence-based, clinical information to patients, health care professionals and the general public about medication exposures during pregnancy and lactation. The website also offers a limited amount of medication fact sheets for patients with up- to-date and easy to understand information on risks associated with medication use during pregnancy and/or lactation. Some psychotropic medication fact sheets are available; and all fact sheets are available in English or Spanish. Teratology experts are available by calling 1-866-626-6847. A link to local affiliates in different US and Canadian geographical areas is provided on the website. http://www.mothertobaby.org/

OTIS Consultative Service for Exposures in Pregnancy

Information on exposures to medication or toxins during preplanning or in pregnancy is available for patients, providers, and/or adoptive parents through affiliate member programs of OTIS. This is a free consultative service where information is provided verbally on the phone. However email, fax and chat lines are other means of communications that are available to both patients and healthcare providers; though services tend to vary by individual affiliate centers. Written consults are not provided on a regular basis due to time limitations. The consultative service is provided by information specialists with expertise in pregnancy and lactation. The service most commonly receives calls about exposures to vaccinations, hair dye and fumigation on apartments (fact sheets also available) though information on medications is also available. http://www.mothertobaby.org/find-a-tis-s13040

Mother's Risk

Mother's Risk is a teratology information specialist website created for both mothers and healthcare professionals. The website provides links to journal articles, expert opinions, forums, helplines for mothers and more. The organization is affiliated with OTIS. www.motherisk.org

Perinatology.com

Perinatology.com is run by Focus Information Technology; a resource for obstetricians, ultrasonographers and genetic counselors. Information on the site is written by specialists, though the site also provides a plethora of links to evidence based resources. This website provides monographs, general links to several relevant abstracts, journals, and more. It also provides links to pregnancy registries, including the national pregnancy registry for atypical antipsychotics, and provides links to general topics associated with pregnancy for patients. www.perinatology.com

National Pregnancy Registry for Atypical Antipsychotics

This website is affiliated with Massachusetts General Hospital with a goal of the registry including to collect information about atypical antipsychotics use during pregnancy to evaluate their safety in this population. It also provides a limited amount of patient guides, such as information on major depression during conception and pregnancy. 1-866-961-2388 http://www.womensmentalhealth.org/clinical-and-research-programs/pregnancyregistry

U.S. Food and Drug Administration (FDA) Women's Health Topics: Pregnancy

This is an FDA clearinghouse for pregnancy information directed to the consumer and includes links to pregnancy registries. Patient information related to pregnancy includes medication, food safety, breast pumps and more. www.fda.gov/pregnancyregistries

http://www.fda.gov/ForConsumers/ByAudience/ForWomen/WomensHealthTopics/ucm117976.htm

REFERENCES

1. Martínez-Frías ML. [The thalidomide experience: review of its effects 50 years later]. Med Clin (Barc). 2012;139(1):25-32. DOI: 10.1016/j.medcli.2011.10.011. PubMed PMID: 22177324.
2. ACOG Practice Bulletin: Clinical management guidelines for obstetrician-gynecologists number 92, April 2008 (replaces practice bulletin number 87, November 2007). Use of psychiatric medications during pregnancy and lactation. Obstet Gynecol. 2008;111(4):1001-20. DOI: 10.1097/AOG.0b013e31816fd910. PubMed PMID: 18378767.
3. Jablensky AV, Morgan V, Zubrick SR, Bower C, Yellachich L-A. Pregnancy, delivery, and neonatal complications in a population cohort of women with schizophrenia and major affective disorders. Am J Psychiatry. 2005;162(1):79-91. DOI: 10.1176/appi.ajp.162.1.79. PubMed PMID: 15625205.
4. Einarson A, Boskovic R. Use and safety of antipsychotic drugs during pregnancy. J Psychiatr Pract. 2009;15(3):183-92. DOI: 10.1097/01.pra.0000351878.45260.94. PubMed PMID: 19461391.
5. Tanzi, Maria. Explaining clinical study designs to patients. American Pharmacists Association (Pharmacy Today). 2012 March: (col. One to One).
6. Reproductive Psychiatry Resource and Information Center [Internet] Boston, MA. Massachusetts General Hospital Center for Women's Mental Health. 2013[cited 2013 June 12] Available from: http://www.womensmentalhealth.org/.
7. National Institute for Health and Clinical Excellence: Guidance. Antenatal and Postnatal Mental Health: The NICE Guideline on Clinical Management and Service Guidance. National Collaborating Centre for Mental Health (UK). Leicester (UK): British Psychological Society; 2007.
8. Viguera AC, Whitfield T, Baldessarini RJ, Newport DJ, Stowe Z, Reminick A, et al. Risk of recurrence in women with bipolar disorder during pregnancy: prospective study of mood stabilizer discontinuation. Am J Psychiatry. 2007;164(12):1817-24; quiz 1923. DOI: 10.1176/appi.ajp.2007.06101639. PubMed PMID: 18056236.
9. Jones I, Craddock N. Bipolar disorder and childbirth: the importance of recognising risk. BrJ Psychiatry. 2005;186:453-4. DOI: 10.1192/bjp.186.6.453. PubMed PMID: 15928351.
10. Gentile, S. Antipsychotic Therapy during Early and Late Pregnancy. A Systematic Review. Schizophr Bull. 2010; 36(3):267-79.
11. Kris EB. Children of mothers maintained on pharmacotherapy during pregnancy and postpartum. Curr Ther Res Clin Exp. 1965;7(12):785-9. PubMed PMID: 4954450.
12. Slone D, Siskind V, Heinonen OP, Monson RR, Kaufman DW, Shapiro S. Antenatal exposure to the phenothiazines in relation to congenital malformations, perinatal mortality rate, birth weight, and intelligence quotient score. Am J Obstet Gynecol. 1977;128(5):486-8. PubMed PMID: 879206.
13. Collins KO, Comer JB. Maternal haloperidol therapy associated with dyskinesia in a newborn. Am J Health Syst Pharm. 2003;60(21):2253-5. PubMed PMID: 14619120.
14. Transfer of drugs and other chemicals into human milk. Pediatrics. 2001;108(3):776-89. PubMed PMID: 11533352.
15. Briggs GG, Freeman K, Yaffe, SJ. Drugs in Pregnancy and Lactation. 9th edition. Philadelphia, PA: Lippincott Williams and Wilkins; 2011. Haloperidol; p. 674-6.
16. Transfer of drugs and other chemicals into human milk. Pediatrics. 2001;108(3):776-89. PubMed PMID: 11533352.
17. Ernst CL, Goldberg JF. The reproductive safety profile of mood stabilizers, atypical antipsychotics, and broad-spectrum psychotropics. J Clin Psychiatry. 2002;63 Suppl 4:42-55. PubMed PMID: 11913676.
18. Gardiner SJ, Kristensen JH, Begg EJ, Hackett LP, Wilson DA, Ilett KF, et al. Transfer of olanzapine into breast milk, calculation of infant drug dose, and effect on breast-fed infants. Am J Psychiatry. 2003;160(8):1428-31. PubMed PMID: 12900304.
19. Goldstein DJ, Corbin LA, Fung MC. Olanzapine-exposed pregnancies and lactation: early experience. J Clin Psychopharmacol. 2000;20(4):399-403. PubMed PMID: 10917399.
20. Coppola D, Russo LJ, Kwarta RF, Varughese R, Schmider J. Evaluating the postmarketing experience of risperidone use during pregnancy: pregnancy and neonatal outcomes. Drug Saf. 2007;30(3):247-64. PubMed PMID: 17343431.
21. McKenna K, Koren G, Tetelbaum M, Wilton L, Shakir S, Diav-Citrin O, et al. Pregnancy outcome of women using atypical antipsychotic drugs: a prospective comparative study. J Clin Psychiatry. 2005;66(4):444-9; quiz 546. PubMed PMID: 15816786.
22. Werremeyer A. Ziprasidone and citalopram use in pregnancy and lactation in a woman with psychotic depression. Am J Psychiatry. 2009;166(11):1298. DOI: 10.1176/appi.ajp.2009.09060765. PubMed PMID: 19884241.
23. Hale, T. Medications and Mother's Milk. 14th edition. Amarillo, Tx; Hale Publishing; 2010. Preface; p. 5-20

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