



Interconception Health Services for Women at High Risk for Adverse Pregnancy Outcomes: A Descriptive Study

**Dean V. Coonrod^{1,2,3*}, Debra Welborn¹, Rosie Casillas¹,
Blanca-flor Jimenez^{1,2}, Amber N. Sturgeon^{1,2}, Kathie Records⁴
and Colleen Keller⁴**

¹*Department of Obstetrics and Gynecology, Maricopa Integrated Health System, Phoenix, Arizona, USA.*

²*Department of Obstetrics and Gynecology, District Medical Group, Phoenix, Arizona, USA.*

³*Department of Obstetrics and Gynecology, University of Arizona College of Medicine, Phoenix, Arizona, USA.*

⁴*College of Nursing and Health Innovation, Arizona State University, Phoenix, Arizona, USA.*

Authors' contributions

This work was carried out in collaboration between all authors. Author DVC designed the study, performed the statistical analysis and provided the preconception care. Author DW wrote the descriptive sections of the care coordinator services. Author RC provided outreach services and facilitated the postpartum depression support groups. Author ANS entered clinical data in the project and study database and was involved in maintaining the database. Author BJ oversaw the administrative aspects of the study. Authors KR and CK designed the postpartum support group and walking group interventions. All authors reviewed early drafts, read and approved the final manuscript.

Original Research Article

Received 31st December 2013

Accepted 9th March 2014

Published 7th May 2014

ABSTRACT

Aims: To describe and present results of preconception care services aimed at underserved women who have experienced an adverse birth outcome.

Study Design: Retrospective descriptive study.

Place and Duration of Study: Sample: Maricopa Integrated Health System's Internal Clinic, a public safety-net hospital in Phoenix, Arizona USA, between March 2008 and October 2011.

*Corresponding author: Email: dean_coonrod@dmgaz.org;

Methodology: 102 women who have experienced a prior preterm birth or stillbirth currently enrolled in an “Internatal Clinic” where interconception and prenatal care is provided. The interventions included education by clinicians and trained support staff, support groups, a walking program to address physical activity, contraception, folic acid intake, dental care, overweight/obesity, mental health and substance use issues prior to a future pregnancy. Chart reviews were performed and a preconception health survey addressing knowledge (pre/post) and patient satisfaction were analyzed using descriptive and univariate statistics.

Results: Of current enrollees (N=102), 79% have been in the program for 12 to 18 months. 100% of those with mental health needs have had them addressed, 93% of those not desiring pregnancy are using contraception, 75% are consuming a folate supplement, 53% are engaging in regular exercise and 37% had oral health needs addressed despite no insurance coverage. Of the 102 patients, only 21% had a normal body mass index (18.5 to 24.9 kg/m²). Improvements in patient knowledge and attitudes were documented.

Conclusion: Women in our program had improved preconception knowledge, attitudes and behaviors.

Keywords: Preconception care; care coordination; primary care; birth outcomes; health disparities.

1. INTRODUCTION

Despite unprecedented access to prenatal care, high rates of low birth weight, preterm birth and consequent infant morbidity and mortality persist [1]. One proposed solution is improving the health of women prior to pregnancy or before pregnancy is recognized, i.e preconception health [2]. Preconception care has been defined by the CDC’s Select Panel on Preconception Care as, “a set of interventions that aim to identify and modify biomedical, behavioral, and social risks to a woman’s health or pregnancy outcome through prevention and management. Certain steps should be taken before conception or early in pregnancy to have a maximal effect on health outcomes” [2]. One aim is to improve birth outcomes for high risk women through interconception care by providing interventions to women who have experienced a previous pregnancy with an adverse outcome such as neonatal death, fetal loss, low birth weight, or preterm birth [2]. This is based on the knowledge that prior adverse outcomes are important risk factors for future adverse poor outcomes [2]. Despite these recommendations, few clinical programs for these populations have been published. One exception is a description of an Interpregnancy Care (IPC) program in which women who had delivered a very low birth weight (<1500 gram) live birth or stillbirth received 24 months of primary care, oral health care, case management and community outreach [3,4]. Key components were the combination of primary care, care coordination and social support to manage conditions linked to adverse pregnancy outcomes, having participants develop a reproductive life plan and through their community support personnel, “Resource Mothers”, acquire vocationally oriented life skills.

To address the limited information on clinical based interconception programs we developed an Internatal Clinic derived from the IPC program. Similar to that program we target women with prior adverse pregnancy outcomes, employ a combination of primary care and care coordination. Goals of our program are three-fold: 1) Identify and manage risk factors and conditions that pose a risk to a future pregnancy; 2) avoid short interval between pregnancies (< 12 to 18 months); 3) provide continuity from the preconception to prenatal

period. The latter is accomplished because health care is provided by the same obstetrician gynecologist (DVC) in the preconception and prenatal period. Because Arizona has a program of home visitation for infants who have required neonatal intensive care, we did not include this element in our program. The clinical content of our program was based on clinical recommendations for "internatal care" [5] and clinical recommendations for preconception care [6]. The objective of this study is to describe and present results of a program aimed to promote preconception health for uninsured and underserved women who have experienced an adverse birth outcome in our Internatal Clinic.

2. MATERIALS AND METHODS

2.1 Design

This was a retrospective descriptive study of a program aiming to improve the interconception health status and reproductive outcomes of women.

2.2 Setting

This is a clinic-based program at a public safety-net health system in Phoenix, Arizona USA. The health system consists of 11 community-based family health centers, an acute care hospital with a level III neonatal intensive care unit (NICU) and an adjacent outpatient specialty and primary care center which houses the Internatal Clinic.

2.3 Subjects

Women are eligible if they have experienced an adverse pregnancy outcome: 1) second trimester pregnancy loss (15 weeks estimated gestational age (EGA) or greater); 2) intrauterine fetal death; 3) preterm birth (35 weeks EGA or less); 4) low birth weight (2,500 grams or less); 5) prolonged NICU stay (5 or more days). Women permanently sterilized are excluded. Most participants enter the program after they are identified as having met the criteria listed above, based on clinical information obtained from the hospital "Labor Log". Women who meet the criteria are contacted by the care coordinators via a telephone call 1-2 weeks after the date of delivery, and are invited into the Internatal Clinic Program. The first appointment to the Internatal Clinic is made at that time after being contacted by a care coordinator. Women are also referred by other health system providers who are familiar with the program and are contacted by the care coordinators via telephone within 1-2 days of the referral.

2.4 Measures

Demographic information, reports of health behaviors and clinical measures were derived from chart review and a preconception health survey. Health behaviors include self-report of folic acid use and physical activity. Clinical measures include the administration or report of contraception use, body mass index (BMI), dental visits and use of mental-health services (participation in support groups, medical treatment or use of other mental health services). The preconception health survey consists of selected items (listed in Tables 3 and 4) from an instrument used previously [7]. It is repeated at 6 month intervals and when repeated assesses patient satisfaction with 2 items scored on a 5-point likert scale relating to the care coordination and the medical care.

2.5 Interventions

Many interventions are clinic-based and revolve around scheduled visits. An idealized schedule includes one or two visits during the first two months after delivery, another at 6 and 12 months and yearly thereafter with a preconception visit scheduled prior to conception of another pregnancy. In practice clinical visits occur more frequently to assure compliance with contraception or to manage conditions or identified risk factors. At the first visit, a comprehensive review of the prior pregnancy is undertaken and additional studies are obtained as indicated by the clinical provider (DVC). Patients are screened for a history of reproductive risks (past medical history, family history, infections, immunizations, physical activity and medication use) and a preconception assessment tool which assesses for relevant environmental exposures, eating disorders, food security issues, risk for blood borne infection, sexually transmitted infection, family violence and substance abuse is completed. This tool is administered yearly and an annotated version is available on request from the corresponding author. A reproductive life plan is developed by the patient taking into consideration the prior pregnancy, recurrence risks and risk factors identified. Family planning is provided congruent with the reproductive life plan and patient choice. Modifiable risk factors are managed as needed; for example patients with no documentation of varicella infection immunity are vaccinated. At each visit the status of the infant is reviewed with promotion of exclusive breastfeeding and “back to sleep”; the reproductive life plan and contraception use are reviewed and the patient is screened for depression with the Edinburgh Postnatal Depression Scale. Patients are queried regarding folic acid supplementation, physical activity, dental hygiene and care. The BMI is obtained at each visit and a physical examination performed as needed. Basic primary care is provided including preventive screening (e.g. chlamydia screening, cervical cytology and mammography). Common conditions such as hypertension, diabetes mellitus, hypothyroid, obesity and overweight, bereavement and depression are managed in the clinic or by referral to primary or specialty care.

Care coordination and case management are essential components of the program. Goals of this component are to introduce the program to prospective patients, make initial appointments, assure compliance with visits and assist with referrals to other clinics and services. This team (DW, RC) also provide education regarding preconception care, child development screening and referral, oral health education, promotion of healthy eating, stress and stress release. They are available for patients between visits with phone contact for additional support. Home visits are not part of this program. They conduct two groups identified to be priorities for health promotion, a walking group to increase physical activity and a postpartum depression / bereavement support group. Other psychosocial support is provided by visits with a clinic-based domestic advocate with all patients and the availability of a social worker.

2.6 Analysis

Descriptive statistics of the population, selected clinical measures, favorable responses to preconception knowledge and attitudes (such as the percent of women agreeing or strongly agreeing that a woman should start taking folic acid prior to pregnancy) and patient satisfaction were tabulated. The qualitative section describes crucial elements of care coordination / case management revolving around compliance with visits, health education and promotion, the walking program and the depression / bereavement support group.

Finally change in preconception attitudes and attitudes over time was assessed with a Mantel-Haenszel test for trend using WINPEPI software [8].

2.7 Human Subjects

This study was approved by the Maricopa Integrated Health System (MIHS) Institutional Review Board (IRB) by expedited review.

3. RESULTS AND DISCUSSION

3.1 Sociodemographics

From March 2008 through October 2011, 189 women had at least one visit to the Internatal Clinic. This is a study of the 102 women still receiving routine care in the clinic (seen in the last 6 months). Of these, 81 (79%) have been in the program for 12 to 18 months. The median age was 29 years, the participants were predominately unmarried Hispanics with nearly half speaking no English, a majority had high school education or less and a third experienced food security issues or income concerns reported as sometimes or more often (Table 1).

Table 1. Sociodemographic characteristics of the 102 women currently active in the Internatal clinic

Characteristic	N	%
Age		
<18 years	3	3%
18-25 years	36	35%
26-35 years	50	49%
36-41 years	13	13%
Race/Ethnicity		
Hispanic	93	91%
African/African American	5	5%
White, Non-Hispanic	1	1%
Native American	1	1%
Mixed/Other	2	2%
Language (Speak & Read)*		
English	8	11%
English more than Spanish	7	9%
English and Spanish Equal	8	11%
Spanish more than English	12	16%
Spanish Only [†]	40	53%
Marital Status		
Single	34	34%
Married	31	30%
Living with a Partner	35	34%
Divorced / Separated	2	2%
Education*		
< 12 years	29	39%
12 years	31	41%
> 12 years	15	20%

Table 1 Continued.....

Food Security and Income Concerns*		
Almost Never	33	47%
Once in a While	14	20%
Sometimes	16	23%
A Lot of the Time / Almost Always	7	10%

* N=75. Data derived from the preconception survey. Not collected on all enrollees early in the program. † One subject speaking neither Spanish or English is included in this group

3.2 Care Coordination Services Provided and Tools/Strategies Used

Two grant funded full-time care coordinators, one bilingual, provide both care coordination and health promotion/education and contribute greatly to program success. Social support is imbedded in all services for patients and their families. Their central activities involve compliance with visits, health education and promotion, the walking program and the depression / bereavement support group (described below). These activities are summarized by presenting services provided, and the tools and strategies used to ensure success.

Compliance with visits is enhanced by managing the schedule closely, treating each patient as a “VIP” and providing value-added services.

3.2.1 Manage appointments/visits

Schedules are tightly managed in order to see the maximum number of women in a clinic that operates only one half-day a week. In the last year there were 555 appointments scheduled with a 15% no-show rate as compared to 30% in the women’s clinic which houses the program. An additional 8% of the appointments were rescheduled on the same day of the appointment. In order to accomplish this, care coordinators initiate telephone reminder calls 48 hours prior to each appointment, which complements the health system’s automated telephone appointment reminder system. Patients are also counseled during their visits about the importance of keeping their appointments and are instructed to call the care coordinators the morning of an appointment if any problems arise so that the appointment can be expeditiously rescheduled.

3.2.2 Treat every woman as a “VIP.”

Clinic staff strive for every contact to be warm and reassuring so that every woman is treated as a “VIP”. Telephone calls average 10-30 minutes each and clinical visits average 30-60 minutes each. During a clinic visit, 15-20 minutes are spent with the physician, 15-20 minutes with the care coordinators, 10 minutes with the family violence advocate. This objective is met by a welcome phone call made to each patient by the bilingual care coordinator within 1-2 weeks after the delivery date. At the first visit to the Clinic, the patient is welcomed in the waiting room and at that time receives a bilingual preconception healthcare booklet containing Internatal Clinic contact information and general preconception care information. Frequent contacts are made after the initial visit through telephone calls, follow-up appointments, e-mails, educational sessions and group activities.

3.2.3 Provide value added services, when available

The project as a whole is a comprehensive set of services; however, every added service, when requested or needed, contributes to participation and satisfaction. The following tools/strategies are used to accomplish this: Care coordinators provide assistance with insurance enrollment into the Medicaid program or into the health system's discounted fee program. In addition, referrals to other physicians and clinics are made, and additional resources for food, shelter, home visiting services, domestic violence, head start, nutrition, parenting and physical activity are provided.

Health promotion and education are vital components of the project. In addition to the clinical care provided, care coordinators and physicians provide health education and promote healthy lifestyle changes. In order for this to be accomplished, care coordinators use motivational interviewing techniques to promote lifestyle changes in diet and physical activity. Bilingual education materials based on evidence-based practices are used for instruction and distribution. Health information on chronic diseases is also provided.

Weekly walking groups have been provided since 2010 based on an identified need for increased physical activity in this population. The groups, which are offered in two neighborhood locations, are bilingual and open to all women in the community with young children. The walking group curriculum created by Arizona State University entitled "Madres Para la Salud" encourages women to walk at least 30 minutes most days of the week for a period of 12 weeks [9]. These one-hour walking sessions include stretching, walking and strength training. Walking kits are provided to complement the sessions and include lesson cards, a walking journal, pedometer, sunscreen and sunglasses.

Weekly post partum depression and bereavement support groups have also been implemented since 2010. These are open to the public and are advertised on the Arizona perinatal mood disorder website, as well as in health-system educational newsletters. This 12-week program was developed by one of the co-authors (KR) with expertise on perinatal mood disorders [10]. These weekly support groups are held on Wednesdays and Thursdays at the hospital or health centers and are facilitated by the care coordinators. Women are encouraged to attend as many sessions as they would like. Topics in the 12-week curriculum include depression symptoms, grief and loss, stress, fatigue and sleep, nutrition and family support. The curriculum is supplemented by printed materials such as the book "Beyond the Blues".

3.3 Chart Review of Clinical Characteristics

A chart review of recent visits of active patients revealed high rates of contraception use, addressing mental health needs and, that three quarters of women reported using a folic acid supplement (Table 2). While half were engaging in regular physical activity only 21% had a BMI in the normal range, with most overweight or obese. 37% had a dental visit despite extremely low rates of dental insurance. Among pregnancies in our program (N=22), 87% had prenatal care in the first trimester.

Table 2. Clinical characteristics of the 102 women in the Internatal clinic from chart review

Characteristic	N	%
Women not desiring pregnancy using contraception*	92	93%
Mental health needs addressed	102	100%
Normal Body Mass Index	21	21%
Women consuming a folate supplement	77	75%
Women engaging in regular physical activity	54	53%
Women with a dental visit	38	37%

* N = 99 as 3 women were actively attempting pregnancy

3.4 Preconception Survey and Patient Satisfaction

Subjects demonstrated either high levels of favorable preconception knowledge (Table 3) attitudes (Table 4) at baseline (relating to overall health status prior to pregnancy / control of one's health, alcohol and pregnancy) or demonstrated significant improvements over time. Areas with significant improvement related to the importance of folic acid, avoiding certain fish products; also, knowledge of the relationship of age and pregnancy outcome and the effect of exercise on pregnancy was greatly improved (Table 3). The attitude relating to the importance of seeking health professionals for preconception care showed significant improvement (Table 4). Finally of those who completed the patient satisfaction survey (N=60), 95% were very satisfied with the care coordination and medical care respectively.

Table 3. Changes in preconception knowledge among Internatal clinic participants, percent with favorable responses (strong agreement / agreement or strong disagreement / disagreement)

Preconception knowledge	Percent with favorable response			P value*
	Initial N=75	6 month N=48	12 month N=28	
A woman should start taking folic acid before she gets pregnant	81%	100%	100%	<.001
A woman who is thinking about getting pregnant should avoid some fish products	56%	77%	89%	<.001
The age of the mother does NOT affect the outcome of the pregnancy [†]	47%	63%	75%	.006
One alcoholic drink per day will NOT hurt a fetus in the 1st trimester [†]	77%	98%	86%	.06
Regular exercise can harm an unborn child [†]	48%	73%	71%	.008

*Mantel-Haenszel test for trend. [†] Items scored where disagreement or strong disagreement is a favorable response

Table 4. Changes in preconception attitudes among Internatal Clinic participants, percent with favorable responses (strong agreement / agreement or strong disagreement / disagreement)

Preconception attitude	Percent with favorable response			
	Initial N=75	6 month N=48	12 month N=28	P value*
A woman should improve her health as soon as she knows she's pregnant	97%	98%	100%	.42
A woman who is thinking about getting pregnant should do things to improve her health	95%	100%	96%	.39
A woman has control over her health	87%	96%	89%	.41
A woman needs the help of health professionals to improve her health	80%	94%	93%	.03

*Mantel-Haenszel test for trend

4. CONCLUSION

This clinic-based program of interconception and prenatal care, internatal care, which serves uninsured and low income Latino women, found high rates of compliance with visits, rates of self-reported contraception use, addressing mental health needs and folic acid supplementation. More limited success was seen with regular physical activity and receipt of dental care. These are all behaviors believed to be important for optimal preconception health [6]. Finally a number of preconception attitudes revealed either high baseline rates or significant improvement over time. Our program for women with a prior adverse pregnancy outcome includes a comprehensive clinic-based intervention with a high level of support from a team of care coordinators. The latter are a crucial component toward compliance with clinic visits and addressing needs that are otherwise difficult to meet in a usual clinic setting such as encouraging physical activity and addressing mental health issues. Whether or not this combination of factors will improve health outcomes targeted for by preconception care such as ability to achieve one's preconception plan or improved birth outcomes, is unknown. We do note however, at least one factor, early receipt of prenatal care is high in this population.

Our study needs to be assessed in the context of its limitations. First, there are no controls thus any changes in clinical characteristics, self-reported behaviors and attitudes may be due to selection bias. However there is limited information on a "package" of interconception care for women at high risk and as such lessons learned in our program will be relevant to consider when undertaking a necessary randomized trial. Second, we rely on self-report of behaviors and attitudes for our results. For example, we did not measure physical activity with accelerometers or check serum folate levels such that desirability bias may in part explain our results. Finally, our program was specific to our population. We acknowledge that a study of a low-income, low acculturated population may not be applicable to settings with higher income women or with a different racial / ethnic profile. It is possible that a tailored approach specific to population served is the "best" route to improved outcomes but this would make testing "packages" of preconception care more difficult and likely lead to heterogeneous results.

We compared selected clinical indicators to those of populations those from Health People 2020 [11] and to a recent report of preconception and interconception health from the Pregnancy Risk Assessment Monitoring System a population-based survey of recently pregnant women [12]. Our population demonstrated 93% rates of use of contraception among women not desiring conception. By contrast the PRAMS survey reported rates of use of 47%, however the survey was of women who had recently completed a pregnancy so this rate may be artificially low, indeed they report rates of contraception use of 85% in the first 2 to 9 months postpartum. Some of our women are in this time frame, thus it would be instructive to examine the use of contraception over time. We report rates of multivitamin use of 75% versus nearly double the rates of the PRAMS survey 35%. Rates of dental visits (37%) were lower than reported in PRAMS in the preconception time frame (78%) but similar to those reported in the postpartum period, 30%. We found our rates higher than expected given high rates of no dental insurance in our population, indeed national rates are 23% for the uninsured for visits in the last 12 months [11]. Finally PRAMS reported on prepregnancy BMI and noted that only 42% of subject had a normal BMI versus 21% in our population which is not surprising given their risk factors for obesity [12]. As we had implemented a program to promote physical activity we were disappointed to see than only 53% engaged in regular physical activity. However, this rate is higher than the target of 47.9% set by Healthy People 2020 for moderate physical activity and higher than rates in population subgroups comparable to our (uninsured 35%, Latino 33%, poor (<100% FPL) 29%) [11].

When we compared our rates of preconception knowledge and attitudes to those of a prior survey in the health-system's women's clinic we found very similar rates at baseline to that survey [7]. One exception is relates to the need to avoid some fish products prior to pregnancy, in our survey a higher rate of agreement was seen 56% vs 30% at baseline, possibly because of increased publicity on this topic. It was interesting to note that in all items with rates of agreement at baseline of 85% or less that we found significant improvements indicating that health promotion messages were being received by our program participants.

There have been few studies of "packages" of preconception care, especially those targeting women in the interconception period. Hillemeier et al. reported on their "Strong Healthy Women" randomized trial of a multidimensional, small group educational intervention [13]. Among their findings they reported improvement with intent to eat healthier and increase physical activity and more reported behaviors relating to reading food labels, using a folic acid supplement or engaging in regular exercise. For preconception attitudes and behaviors we note improvement in some of the same domains such as more knowledge of the importance of folic acid. The Healthy Start Program has also been focusing on preconception and interconception care, a recent evaluation reported on a number of interconception indicators [14]. They reported high rates of birth control use, 84% comparable to our study but lower rates of multivitamin use 32% in that study. Finally, reports of a program most comparable to our, the Grady Interconception Care Program, reported interpregnancy intervals and birth outcomes and did not report on intermediate outcomes as we did, limiting comparison of our study to theirs [3,4].

Our study suggests improvements in preconception knowledge attitudes and behaviors as a result of our program's clinical interventions, care coordination and health promotion and educational activities. Clearly comparison with a control group, preferably with a randomized trial is needed. Considering the limited number of studies of "packages" of preconception care and the diversity of outcomes reported in these studies of preconception care, we recommend that such a study consider proximate outcomes such as preconception

knowledge, attitude and behaviors, receipt of recommended preconception services, especially those that are evidence-based, [6] as well as interpregnancy interval (or achieving one's reproductive life plan) and ultimately improved birth outcomes among those desiring pregnancy. Given that women with prior adverse pregnancy outcomes are more likely to have poor outcomes, [2] this may be a population in which to begin these studies.

CONSENT

Not applicable.

ETHICAL APPROVAL

This study was approved by the Maricopa Integrated Health System (MIHS) Institutional Review Board (IRB) by expedited review. As this was a retrospective review of medical and project records no informed consent was deemed necessary as the telephone contact to subjects was outreach to participate for the clinical intervention and the research was a retrospective review of records. All authors hereby declare that all experiments have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

ACKNOWLEDGEMENTS

This project was funded by grants from the Arizona Chapter March of Dimes and the Arizona Early Childhood Development and Health Board (First Things First). The funding agencies had no role in the study design, collection, analysis and interpretation of data; in the writing of the manuscript.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Atrash HK, Johnson K, Adams M, Cordero JF, Howse J. Preconception care for improving perinatal outcomes: The time to act. *Maternal and Child Health Journal*. 2006;10(5):3-11.
2. Johnson K, Posner SF, Biermann J, et al. Recommendations to improve preconception health and health care-United States. A report of the CDC/ATSDR Preconception Care Work Group and the Select Panel on Preconception Care. *MMWR. Recommendations and reports: Morbidity and mortality weekly report. Recommendations and reports / Centers for Disease Control*. 2006;55(6):1-23.
3. Biermann J, Dunlop AL, Brady C, Dubin C, Brann A Jr. Promising practices in preconception care for women at risk for poor health and pregnancy outcomes. *Maternal and Child Health Journal*. 2006;10(5):21-28.
4. Dunlop AL, Dubin C, Raynor BD, Bugg GW Jr, Schmotzer B, Brann AW Jr. Interpregnancy primary care and social support for African-American women at risk for recurrent very-low-birthweight delivery: A pilot evaluation. *Maternal and Child Health Journal*. 2008;12(4):461-468.

5. Lu MC, Kotelchuck M, Culhane JF, Hobel CJ, Klerman LV, Thorp JM Jr. Preconception care between pregnancies: The content of prenatal care. *Maternal and Child Health Journal*. 2006;10(5):107-122.
6. Moos MK, Dunlop AL, Jack BW, et al. Healthier women, healthier reproductive outcomes: recommendations for the routine care of all women of reproductive age. *American Journal of Obstetrics and Gynecology*. 2008;199(6-2):280-289.
7. Coonrod DV, Bruce NC, Malcolm TD, Drachman D, Frey KA. Knowledge and attitudes regarding preconception care in a predominantly low-income Mexican American population. *American Journal of Obstetrics and Gynecology*. 2009;200(6):686e681-687.
8. Abramson JH. WINPEPI updated: Computer programs for epidemiologists and their teaching potential. *Epidemiologic Perspectives & Innovations: EP+I*. 2011;8(1):1.
9. Keller C, Records K, Ainsworth B, et al. Madres para la Salud: Design of a theory-based intervention for postpartum Latinas. *Contemporary Clinical Trials*. 2011;32(3):418-427.
10. Records K, Welborn D, Casillas R, Coonrod D. Mamas Saludables, Familias Saludables [Healthy Moms, Healthy Families]: Support group designed for Latinas with postpartum depression symptoms. Paper presented at: Association of Women's Health, Obstetric and Neonatal Nursing: Inspire, Lead and Forge New Directions; 2011.
11. Healthy People 2020; 2011.
Available: <http://healthypeople.gov/2020/topicsobjectives2020/default.aspx>. Accessed January 12, 2012.
12. D'Angelo D, Williams L, Morrow B, et al. Preconception and interconception health status of women who recently gave birth to a live-born infant-Pregnancy Risk Assessment Monitoring System (PRAMS), United States, 26 reporting areas, 2004. *MMWR Surveill Summ*. 2007;56(10):1-35.
13. Hillemeier MM, Weisman CS, Chase GA, Dyer AM, Shaffer ML. Women's preconceptional health and use of health services: implications for preconception care. *Health Serv Res*. 2008;43(1Pt1):54-75.
14. Rosenbach M, O'Neil S, Cook B, Trebino L, Walker DK. Characteristics, access, utilization, satisfaction and outcomes of healthy start participants in eight sites. *Matern Child Health J*. 2010;14(5):666-679.

© 2014 Coonrod et al.; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/3.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:

The peer review history for this paper can be accessed here:
<http://www.sciencedomain.org/review-history.php?iid=516&id=12&aid=4499>