

An Economic Model of the Benefits of Professional Doula Labor Support in Wisconsin Births

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ABSTRACT

Introduction: The purpose of this study is to estimate the immediate cost savings per delivery with in-hospital professional doula labor support in Wisconsin. This is the first study that calculates the estimated cost savings of professional doula labor support specific to Wisconsin.

Methods: This analysis used results presented in and derived from the Cochrane Review of continuous labor support to estimate procedure reduction and cost savings in Wisconsin using birth statistics from 2010. The delivery outcomes included were cesarean deliveries, instrumental deliveries, and regional analgesia use. To accurately reflect published studies on labor support, only low-risk deliveries were used for intervention reduction calculations.

Results: For 2010 data, estimated savings of \$28,997,754.80 could have been achieved if every low-risk birth were attended in-hospital by a professional doula. A professional doula providing only in-hospital labor support would yield an estimated cost savings of \$424.14 per delivery or \$530.89 per low-risk delivery.

Conclusion: A system-based change in how laboring mothers are supported would be an innovative step that would put Wisconsin at the forefront of cost-effective health care, reducing interventions while improving outcomes. It is recommended that Wisconsin insurers consider reimbursing for professional doula labor support. It is also recommended that pilot programs be implemented in Wisconsin that can better assess the implementation of professional doula labor support services.

INTRODUCTION

Labor support is defined as offering a woman comfort and encouragement during the active phase of labor, birth, and the immediate postpartum period. A doula is “a woman who provides physical, emotional, and informational support to the laboring mother throughout her entire labor.”¹ The emotional

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support skills of doulas have been shown to be a sophisticated mix of counseling skills and have not been duplicated in studies of nursing support.² Informational support refers to repeating medical information in terms the mother in labor can understand, assisting in communication with medical care providers, and explaining the reasons for using certain physical support strategies or pain coping techniques. Doulas also are experts in positioning to enhance fetal descent and lessen maternal discomfort. Individualizing comfort measures appropriately for each woman is a part of the doula's support role.³

In the United States and Canada, the common practice is for a doula to join the mother and her partner (or other friends or relatives) at the beginning of active labor and remain with her until several hours after the baby is born.¹

Research has shown doula support to be associated with a wide range of positive effects on birth outcomes, maternal emotions, and self-esteem during the postpartum period. One of the key components of the effectiveness of labor support is the continuous uninterrupted care of the mother by 1 doula.⁴ Except for toileting, the doula does not leave the mother no matter how long or short the labor. This is made exceptionally clear in a meta-analysis of 11 published clinical trials.⁴ Continuous labor support was significantly associated with shorter labors, and decreased need for the use of any analgesia, oxytocin, forceps, and cesarean sections. Intermittent support was not significantly associated with any of these outcomes. While several hypotheses have been proposed to explain the reason for the doula effect on obstetrical and neonatal outcomes,³ a specific mechanism has not been identified.

In North America, a professional doula refers to a woman who is trained and experienced in meeting the emotional needs of women and their families during the perinatal period. Almost all

professional doulas have an independent practice (IP) where they conduct 1 to 3 prenatal visits and 1 postpartum visit, usually of 2 hours duration.³ Based on personal correspondence with practicing doulas, IP doulas in Wisconsin may charge \$200 as novice doulas to \$900 for those who have attended 100 or more births.

In 2012 Hodnett et al updated the Cochrane Review that analyzed 22 trials and 15,288 women regarding continuous labor support.⁵ In the majority of randomized trials concerning labor support, the doula or caregiver meets the patient for the first time at the start of labor in the hospital, rather than building a relationship with the patient before labor begins. In addition, most studies included only full-term, singleton, and low-risk births. The review also noted that no adverse effects have been identified from the use of doula support during labor. The Cochrane Review included studies with interventions ranging from untrained companions, trained doulas, nurses, and midwives as labor support providers. With this in mind, the review's results showed that labor support is an effective option for improving many outcomes (Table 1). Most studies concerning labor support have been done outside the United States within nonwhite and low-income populations,⁵ which does not reflect the American middle class. A 2008 study⁶ addressed the concern of generalizability with a randomized study on labor support in Cleveland, Ohio. This study showed a 46.4% reduction in cesarean delivery rates and a significant decrease of epidural analgesia use in the doula group, demonstrating that the benefits of doula support for laboring women are present across countries, ethnicity, and socioeconomic status. More notably, it showed the benefits of doula support for women who also had paternal labor support.

The purpose of this cost-effectiveness analysis is to estimate the immediate cost savings per delivery in Wisconsin with professional doula labor support, compared to delivery without such support. The results may be used to guide insurance reimbursement policies to include cost-saving strategies that improve birth outcomes and patient satisfaction. The researchers hypothesize that insurance reimbursement toward the cost of professional doula support would increase access, lower cost, and improve outcomes.

METHODS

To accurately reflect the inclusion criteria of studies on labor support, high-risk births were excluded from the total number of births in Wisconsin for 2010 before calculating cost savings. The remaining low-risk births were defined as singleton and full-term births. In addition, low-risk cesarean births included adjustments for the excess risk of the interventions from gestational diabetes (high blood glucose or diabetes during pregnancy), gestational hypertension (high blood pressure during pregnancy), vaginal birth after cesarean (VBAC) success rates and fetopelvic disproportion disorder. Then, the estimated reduction in delivery

| Outcomes Included in This Analysis | | |
|--|-----------------------------|---------------------------|
| Variable | Relative Risk | 95% CI |
| Regional analgesia | 0.86 ^a | 0.80 to 0.92 ^a |
| Instrumental vaginal birth | 0.90 | 0.84 to 0.96 |
| Cesarean delivery | 0.69 ^a | 0.56 to 0.83 ^a |
| Outcomes Not Included in This Analysis | | |
| Variable | Relative Risk | 95% CI |
| Patient satisfaction | 0.69 | 0.59 to 0.79 |
| Shorter labor | Mean difference -0.58 hours | -0.31 to -0.85 |
| Intrapartum analgesia | 0.90 | 0.84 to 0.96 |
| Spontaneous vaginal birth | 1.08 | 1.04 to 1.12 |
| Low 5 minute Apgar Score | 0.69 | 0.50 to 0.95 |

^aRR and CI presented are from Table 2. (See page 60.)

interventions with professional doula care was calculated from low-risk births based on risk reduction presented in and derived from the updated 2012 Cochrane Review on continuous labor support.⁵ Finally, the cost of the interventions was applied to the number of reduced interventions to give an estimated cost savings of professional doula labor support.

The total estimated cost savings was divided among all deliveries in Wisconsin for 2010 to give the average cost savings per delivery. The total cost savings also was divided among the low-risk deliveries to give the cost savings if only low-risk deliveries were covered. Thus, the analysis presents the cost savings of professional doula labor support for in-hospital deliveries, and in-hospital low-risk deliveries. Confidence intervals (CI) were calculated in the same way using the 95% CI from Table 1 for each of the birth outcomes.

Delivery Outcomes

The main delivery outcomes included were regional analgesia use (epidural injection), cesarean delivery, and instrumental vaginal birth (Table 1). The relative risks (RR) for cesarean delivery and regional analgesia reported in the Cochrane Review were not used in this study (RR=.78 and .93 respectively) because the Cochrane Review combined studies using professional doulas and studies using non-professional labor support. When these studies were separated the outcomes were substantially different. The risk reductions reported in our study were recalculated from studies included in the Cochrane Review that utilized professional doula care. Thus, the derived relative risk of cesarean delivery (RR=.69 or a 31% reduction) and the derived relative risk of regional analgesia use (RR=.86, or a 14% reduction) were used in this analysis (Table 2).

Some outcomes from the Cochrane Review were not used in this analysis because of the difficulty in applying a direct measurable cost or measuring its prevalence (Table 1).⁵ While these measures did not have an assigned monetary value in this analysis,

Table 2. Cesarean Delivery Rates and Regional Analgesia Use in Studies Using Professional Doula Labor Support from Cochrane Systematic Review⁵

| Studies | Cesarean Delivery | | Regional Anesthesia ^a | | Participant Description ⁵ |
|---------------------------|--|----------------------|--|---------------------|---|
| | Doula Care | Control | Doula Care | Control | |
| Kennel 1991 ⁷ | 17/212 | 26/200 | 47/212 | 94/200 | At Jefferson Davis Hospital in Houston, Texas. Nulliparous women age 13-34, single gestation, term, noncomplicated pregnancies in active labor. Excluded were women with breech presentation, hypertension, history of alcohol or drug abuse, gestational diabetes, or other complications. |
| Klaus 1986 ⁸ | 12/168 | 46/249 | | | At the Social Security Hospital in Guatemala, full-term healthy primigravitus women in early labour who had a cervical dilatation of 3 cm or less and were without medical problems. |
| Langer 1998 ⁹ | 85/357 | 97/356 | 295/335 | 302/346 | In Mexico City, singleton fetus, no previous vaginal delivery, <6 cm cervical dilatation, and no indications for an elective caesarean delivery. |
| McGrath 2008 ⁶ | 30/224 | 49/196 | 145/224 | 149/196 | Nulliparous women between the ages of 18 and 41 years in the 3 rd trimester of an uncomplicated pregnancy who expected to be accompanied during labor by their male partner and planned to deliver at University Hospitals in Cleveland, Ohio. |
| Total | 144/961 (14.98%) | 218/1001 (21.77%) | 487/771 (63.16%) | 545/742 (73.45%) | |
| Relative risk | RR: 0.69 (95% CI: 0.56-0.83) P-value <0.001 | | RR: 0.86 (95% CI: 0.80-0.92) P-value <0.001 | | |

^a Empty cells indicate areas without data.

they influence other health and economic outcome factors and should be included in discussions of doula labor support or when interpreting results from this study. Quality of life measurements also were not considered in this analysis.

Criteria for the Inclusion of Low-Risk Cesarean Deliveries

First, high-risk cesarean deliveries must be excluded and adjustments made for VBAC success rate, gestational diabetes, gestational hypertension and fetopelvic disproportion disorder. The number of cesarean deliveries among women with full-term singleton births was calculated using Wisconsin Interactive Statistics on Health database (WISH) for 2010.¹⁰ The number of repeated cesarean births available for intervention reduction from doula labor support was decreased due to a 74% estimated VBAC success rate.¹¹ This VBAC success rate, with a sample size of 9437 deliveries, was reported in a secondary analysis of a retrospective cohort study conducted in 16 community and university hospitals. While other studies have reported VBAC success rates similar to the one used in this analysis,¹² a large sample size and the high quality of the study warranted its inclusion.

The number of deliveries in Wisconsin for 2010 with the primary diagnoses of gestational hypertension, gestational diabetes, and fetopelvic disproportion obstruction was obtained from the US Department of Health and Human Services' Healthcare Cost and Utilization Project (HCUP) online query system¹³ (3746, 1289, and 1186 respectively). The risk of cesarean delivery for these conditions was applied to the HCUP data. The relative risk of cesarean delivery for these variables was 2.23¹⁴ and 1.16¹⁵ respectively, with none of the fetopelvic disproportion cases considered low-risk (Figure 1).

Calculating Low-Risk Births for Instrumental Deliveries

HCUP reported 2987¹³ instrumental births (forceps, vacuum-assisted and breech deliveries) in Wisconsin for 2010. HCUP did not have data on instrumental deliveries among singleton full-term births and WISH did not include instrumental deliveries other than forceps deliveries. The reduction in forceps deliveries among singleton full-term deliveries compared to all forceps deliveries reported by WISH was used to estimate the number of singleton full-term instrumental births if they had been reported by HCUP. WISH reported 543 forceps deliveries and 487 (10.31% less) forceps deliveries among singleton full-term births in Wisconsin for 2010.¹⁰ The estimated number of instrumental births among singleton full-term births was 89.69% of 2987 births, or 2697 births.

Calculating Low-Risk Births for Regional Analgesia

Regional analgesia (epidural injection) use was not reported in WISH or HCUP and was estimated using a 2008 National Vital Statistics report¹⁶ of the epidural rate for over 1.8 million singleton vaginal deliveries among women of white, black, Hispanic and Native American ethnicities in 27 states. While Wisconsin was not included in the analysis and the rates varied by state, the application of rates by ethnicity provides a close estimate. The rates per ethnicity were applied to the WISH statistics by ethnicity for singleton full-term vaginal births in Wisconsin for 2010. It was estimated that 28,082 total epidural injections were administered.

Cost Estimates

The mean hospital charge for vaginal and cesarean delivery was taken from Wisconsin Price Point System, which presented data

Figure 1. Calculating Low-Risk Cesarean Deliveries

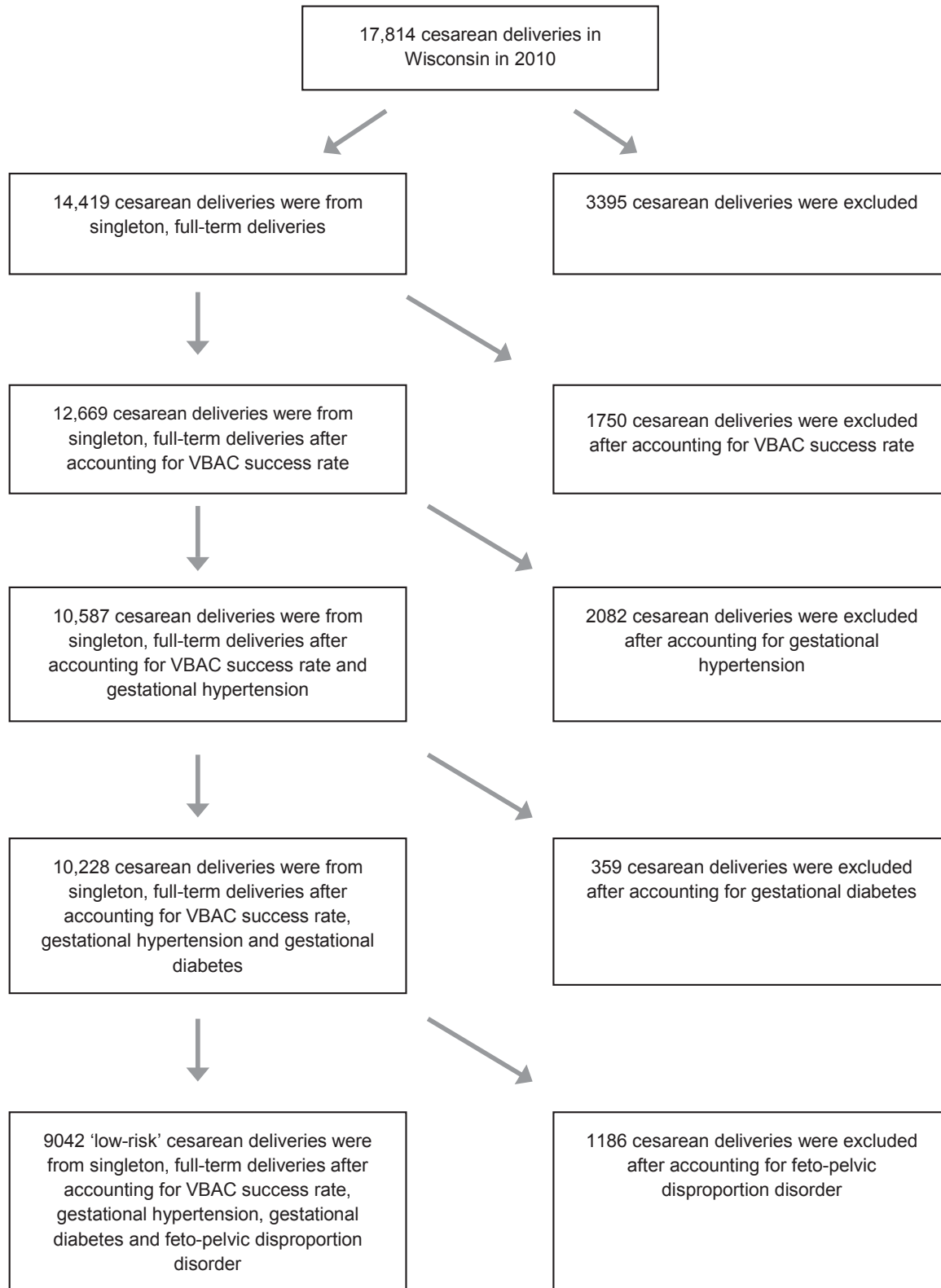


Table 3. Cost Savings if Professional Doula Labor Support Were Used in Wisconsin (2010)

| | Difference in the Number of Interventions (95% CI) | Excess cost per Intervention. In US Dollars, FY 2010 | Total Savings for In-hospital Service Only In US Dollars, FY 2010 (95% CI) | |
|--|--|--|--|---------------------------------|
| Cesarean deliveries | 2803 (1537-3978) | \$9337 | \$26,171,611 | (\$14,350,969–\$37,142,586) |
| Instrumental deliveries | 286 (107-431) | \$711 | \$203,346 | (\$76,077–\$306,441) |
| Epidural use | 3934 (2246-5616) | \$666.7 | \$2,622,797.80 | (\$1,497,408.2–\$3,744,187.2) |
| Total savings | | | \$28,997,754.80 | (\$16,051,723.2–\$41,193,214.2) |
| Savings per delivery (68,367 ¹⁰) | | | \$424.14 per delivery | (\$234.78–\$602.53) |
| Savings per low-risk delivery (54,621) | | | \$530.89 per delivery | (\$293.87–\$754.16) |

from October 2010 through September 2011.¹⁷ The mean hospital charge in Wisconsin for a cesarean delivery was \$16,048. The mean hospital charge for a vaginal delivery was \$7907. The physician fees were taken from Healthcare Blue Book.¹⁸ The physician fee for vaginal birth was \$1634. The physician fee for a cesarean delivery was \$2014 plus an anesthesiologist fee of \$816. There was a cost savings of \$9337 for vaginal deliveries compared to cesarean deliveries. Estimated costs of instrumental deliveries for Wisconsin in 2010 were obtained from the HCUP online query system.¹³ The mean hospital charge for an instrumental delivery was \$8618, or \$711 more than a vaginal delivery.

Epidural analgesia injection costs were estimated at \$325 per patient for intermittent anesthesiologist staffing and \$728 for around-the-clock anesthesiologist staffing in the year 2000.¹⁹ The average of \$526.50 in 2000 yielded the equivalent of \$666.70 in 2010 via the US Department of Labor's Consumer Price Index inflation calculator.²⁰

Based on personal correspondence with practicing doulas in Wisconsin, the cost of doula services ranges from \$200 to \$900 per birth. This fee most often includes 3 prenatal visits and 1 postpartum visit. Each visit lasts about 90 minutes to 2 hours. Labor support begins when the mother desires the doula's presence, usually at the onset of active labor or the initiation of an induction.

Ethics Statement

Institutional review board approval was not needed since this study used only aggregated, unidentifiable published data.

RESULTS

Studies included in the Cochrane Review that utilized the intervention of a professional doula for labor support were applied to eligible Wisconsin births in 2010. There were large estimated reductions in the number of cesarean deliveries, use of regional anesthesia and instrumental deliveries. In addition, there were extensive cost savings related to the lowered rate of these birth outcomes (Table 3).

In-hospital only professional doula labor support for all deliveries had a cost savings of \$424.14 per delivery (95% CI: \$234.78-\$602.53). The cost effectiveness ratios increased in a

linear trend with the cost for hiring professional doula labor support. For instance, the estimated cost effectiveness ratio was 0.47 (95% CI 0.33-0.85) if the cost for hiring professional doula labor support was \$200; it increased to 1.17 (95% CI: 0.83-2.13) if the cost for hiring professional doula labor support increased to \$500, and it further increased to 2.12 (95% CI: 1.49-3.83) with a cost of \$900 for hiring professional doula labor support.

Similarly, in-hospital only professional doula labor support for low-risk deliveries had a cost savings of \$530.89 per delivery (95% CI \$293.87-\$754.16). There was a linear trend in cost effectiveness ratios as the cost for hiring professional doula labor support increased. The estimated cost effectiveness ratio was 0.37 (95% CI: 0.26-0.68) if the cost for hiring professional doula labor support was \$200, and it increased to 0.94 (95% CI: 0.66-1.70) if the cost for hiring professional doula labor support increased to \$500, and it further increased to 1.69 (95% CI: 1.19-3.06) with a cost of \$900 for hiring professional doula labor support.

DISCUSSION

Cost savings were calculated from low-risk deliveries and applied to all births in Wisconsin. This method was used on the basis that every woman may desire doula labor support. However, this assumes that there is no cost benefit of labor support for births that are not full-term, singleton, and low-risk. In addition, the birth outcomes that were not included in this study (Table 1) would likely raise cost savings and patient satisfaction with the birthing experience (and presumably satisfaction with the insurer and hospital). Furthermore, the studies on labor support largely assign a doula after labor has started and professional doulas in Wisconsin often give care before, during, and after labor. No studies have evaluated whether this difference in care increases the effectiveness of professional doula labor support to reduce delivery interventions. If it does have a positive effect on outcomes, then the cost savings would be greater than projected in this study.

Another limitation of this study is that it is time sensitive. Doula labor support and obstetrics care and procedures are constantly improving. However, the Cochrane Review has illustrated the effectiveness of labor support during delivery since its first analysis in 1995, and there are many randomized trials show-

ing the continued effectiveness of doula labor support. Hospital charges, insurance reimbursements, and physician fees also constantly change. This study aims to set a monetary starting point that can be adjusted in the future.

Many statistics used in this study were easily accessible, such as singleton full-term cesarean and vaginal births, singleton full-term vaginal births per ethnicity, and instrumental births. However, other factors such as possible VBAC success, low-risk instrumental births, epidural rates, cesarean deliveries with gestational hypertension, and cesarean deliveries with gestational diabetes were estimates from the literature. To address the problem of having more than one possible source for many of these estimates, they were taken from studies with consideration of 3 criteria: how closely the studies matched Wisconsin's population, how recently the studies were published, and sample size. In addition, high-risk deliveries beyond singleton and full-term births were not accounted for in regional analgesia and instrumental births calculations. This study also assumed that the effect of doula care is the same for vacuum-assisted delivery as for forceps delivery, which has not been studied. Finally, the cost estimates reflect average costs and may vary by location, hospital, and time.

Implementation

A concern for any program that tries to apply evidence-based medicine to real life situations is the disconnection between the sterile research environment and health care settings. However, labor support studies were completed in hospital settings in randomized clinical trials where mothers in labor were given regular care vs labor support.⁵ Furthermore, studies addressed the external validity of labor support by showing similar results within different ethnic and demographic makeups, some of which are similar to Wisconsin.^{5,6} Therefore, it is likely these results would easily translate to Wisconsin health care settings.

Another concern when implementing evidence-based medicine is the differential use of the intervention. Would those women who are less likely to use regional analgesia and less likely to be at risk for a cesarean delivery be more likely to use doula labor support? Would those women who are more likely to use analgesia and have a higher risk of cesarean delivery be less likely to use doula labor support even if it is covered through insurance? These are important questions that would likely depend on the implementation and availability of doula care. If professional doula care were promoted by insurance companies and obstetrical health care providers, then this could greatly increase the use of doula labor support, positive outcomes, and cost savings. Furthermore, the professional doula can have an important role in the era of shared cost savings and health care teams. This would eliminate revenue struggles and keep the focus on overall savings to the health care system.

An important consideration is the cost of doula care in

Wisconsin. Would the insurance reimbursement be enough? If reimbursement is too low then usage also would be very low and the benefits might be hard to identify. Currently, doula care is generally provided in at least 3 separate visits: before birth, during labor, and postpartum. Could hospitals provide staff doulas that provide care to birthing mothers in labor at insurance reimbursement cost for those who cannot pay beyond the reimbursement? Columbia Center in Mequon, Wisconsin has doulas that work for the birthing center, which pays 75% of the \$300 fee for the doula.²¹ Hennepin County Medical Center in Minnesota offers doula labor support from staff doulas at no cost to all birthing patients.²² Providing doula care is an ongoing cost and there are many payment models that exist. These are important considerations for administrators and doulas in Wisconsin. Finally, questions about quality assurance and doula training capacity in Wisconsin must be addressed but are outside the scope of this article.

Clinical Implications and Recommendations

It is recommended that Wisconsin insurers consider reimbursing professional doula labor support, which has an estimated cost savings of \$424.14 per delivery for in-hospital only professional doula labor support without prenatal and postpartum visits (\$530.89 per low-risk delivery). In regard to doula pilot programs, the majority throughout the country have been focused on high-risk groups, minority populations, or the use of nonprofessional volunteer doulas. There are no pilot program results that have been published that could capture the effects of a system-based change of professional doula labor support use in Wisconsin. Thus, it is recommended that a pilot program be designed to assess implementation in Wisconsin. Future studies on the cost-effectiveness of doula labor support should also include quality of life measurements.

CONCLUSION

Professional doula labor support is a safe option to improve birth outcomes and decrease medical expenses for the US health care system. Large-scale insurance coverage for doula labor support has not been implemented in the United States despite a wealth of evidence that supports its benefits. A system-based change in how laboring mothers are supported is very much needed in modern health care. Implementing this change would be an innovative step that would put Wisconsin at the forefront of cost-effective health care: reducing interventions while improving outcomes.

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