Opportunity costs of postpartum care: A national survey of U.S. providers’ priorities and practice

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Abstract

Background: In the wake of new guidelines for improved postpartum care, we examined postpartum care providers' views to identify aspects of care that may be inefficient, as well as tradeoffs that may be being made between different types of critical care, given a provider's limited time with each patient. Methods: We surveyed 600 randomly-sampled U.S. providers about postpartum care timing, the priority of specific aspects of care, and the frequency with which they are provided. Results: The survey response rate was 43% across medical specialties. More than 40% of providers reported a single 6-week visit (or more infrequent care) is optimal, regardless of new guidelines. Certain types of postpartum care critical to minimizing maternal mortality risk (e.g., depression screening), were highly valued and routinely performed. Other aspects of care (e.g., pelvic exam), were identified as systematic inefficiencies. Screening for intimate partner violence and addiction were performed less often than similarly-valued care. Certain types of care (e.g. transitioning to parenthood), were identified as crucial but were not currently addressed by national postpartum care practice guidelines. Approximately 25% of respondents regarded distance care as a feasible alternative to much of the postpartum care currently provided in-person. Conclusions: Critical opportunity costs in postpartum care delivery were identified that could have implications for maternal mortality risk. Clear guidelines on the highest value care for each visit, and which practitioner should provide that care, could diminish the burden faced by postpartum care providers, improving universal delivery of needed postpartum care. Complementary distance care (telemedicine or evidence-based apps) represents a novel and potentially equitable approach to implementing new care recommendations.

Background

The traditional practice of a single postpartum appointment 6 weeks after birth has lately been called into question. The American College of Obstetricians and Gynecologists (ACOG) published new guidelines in 2018 specifically recommending postpartum care “become an ongoing process, rather than a single encounter, with services and support tailored to each woman's individual needs.” The guidelines were, in part, published in response to the increasing U.S. maternal mortality rate, which stand in contrast to global maternal mortality patterns. Maternal mortality review committees report that over 60% of U.S. maternal deaths may have been prevented with more timely diagnoses and effective treatment for postpartum onset conditions, as well as improved patient knowledge of warning signs. Furthermore, research has demonstrated the majority of maternal deaths occur in the 42 days following birth, with approximately 25% occurring after women are discharged from the hospital following pregnancies and deliveries that appear uncomplicated. Pregnancy-related deaths are highest among non-Hispanic black women, women at older ages, and those with public health insurance. Thus, traditional practices may result in a lack of care during a critical time, particularly for those women at baseline higher risk of maternal mortality.
Yet the ways in which postpartum care should be prioritized and structured for each individual woman remains an open question. Existing guidelines for postpartum appointment care provision vary significantly in their scope and detail. This could make it particularly challenging for U.S. providers to know how fellow care providers with different clinical specialties are meeting the postpartum needs of shared patients or how to prioritize their own postpartum care provision, particularly under a mandate of earlier, more frequent, and more personalized care. Specifically, providers will need to determine what aspects of care to deliver at each postpartum care visit, how many visits are appropriate, and how to tailor that care to the individual patient's needs at each of those visits. To date, however, there is limited evidence even on postpartum care provider priorities overall.

This study seeks to examine the priorities and actual practices for postpartum care among a national sample of postpartum healthcare providers in the context of practically implementing new care recommendations. We analyze the tradeoffs that providers may make with limited appointment time and competing priorities for care, exploring digital complements to routine postpartum care delivery.

Methods

The mailing addresses of 6,000 active obstetrician-gynecologist (OB-GYN) physicians, 3,000 active family medicine physicians and 6,542 active nurse-midwives were acquired from the official databases of three professional organizations: The American Medical Association (AMA), The American Academy of Family Physicians (AAFP) and The American College of Nurse-Midwives (ACNM). From each database sample, 200 healthcare providers were randomly selected to receive a mailed survey directly from the researchers.

Our survey presented questions in a number of formats (binary choice, multiple choice, Likert-scale ratings, and open-ended) about specific categories of priority items for postpartum care that were identified from three national professional organizations, HEDIS, and WHO guidelines. Providers were asked about the optimal timing for postpartum care (multiple choice with optional open-ended response), the main reasons a patient should attend a routine postpartum appointment (open-ended), characterization of their care provision relationship (multiple choice), and average amount of time spent providing care (in minutes). Before distributing the survey, semi-structured phone and in-person cognitive interviews were completed with 8 postpartum healthcare providers to refine all questions and survey content.

Respondents rated, on a 5-point Likert-scale, their priorities for postpartum care (How important is it to address each of the following at an in-office 6-week postpartum visit?), as well as the frequency of practice of the same items (How often do you address each of the following at an in-office 6-week postpartum visit?). Categories included: Clinical Items (vaginal birth complications; C-section complications; physical/pelvic exam; pregnancy onset complications (e.g., hypertension); nonpregnancy related chronic conditions (e.g., cardiovascular disease); and transitioning to primary care), Family
Planning (contraceptive counseling and family planning, contraceptive provision, and resuming sexual activities), Behavioral Health (postpartum depression and other mental health issues, intimate partner violence and other safety issues, healthy maternal sleep, weight trajectory and diet information, smoking, and opioid and other substance abuse) and Infant Care (breastfeeding and other infant feeding issues and safe sleep). Respondents could also add their own priority items and ratings in an open-ended response option.

Providers also reported on the feasibility of performing telemedicine in their current practice immediately or at some point in the future (multiple-choice) and whether aspects of the postpartum visit could be assessed as effectively by telemedicine as by an in-person visit (yes/no and open-ended explanation).

Professional mailing addresses were verified with a Google search. Paper surveys were mailed in March 2018-May 2018. Each mailing contained a paper survey and prepaid return envelope, a cover letter with a $10 bill for participation, and a QR code for optional online survey completion. Surveys were formatted following Dillman's Total Design Method to improve validity and response rate. Formatting included hand writing the mailed envelopes, using individual stamps rather than prepaid envelopes, personalizing the cover letters with the clinician's title, and providing multiple options for completing the survey (online and paper). Three weeks after the initial contact was sent, a short letter was mailed reminding clinicians to complete the survey. Participants whose mail was returned to sender or who returned an uncompleted survey were not included in the follow-up mailing.

Statistical analysis

All paper survey responses were double-entered. All demographic variables and questionnaire responses were summarized by medical specialty (OB-GYN, Family Medicine, and Nurse Midwives) using descriptive statistics (mean and standard deviation for continuous measures; count and percent for categorical measures). We compared differences between practitioner groups using t-tests, ANOVA, and Chi-squared tests. All open-ended responses were coded by two independent coders for thematic content and a Cohen's kappa was calculated to measure inter-rater reliability.

To quantify mismatches in care priorities and actual practice, the effect size (Cohen's d) was calculated for differences in ratings. To ensure that effects were not attributable to different use of the two scales (importance and frequency), both scales were normalized for analysis. Items for which frequency had a higher mean score than importance, or vice versa, were considered to be ‘inefficiencies.’ Items with comparable importance scores, but differences in frequency, were considered instances in which providers may potentially be forced to make ‘tradeoffs’ in care.

The statistical software package SPSS 25.0 (SPSS Inc., Chicago, IL) was used for all data analyses.

Consent to participate
This study was approved by the University of Pittsburgh Institutional Review Board in November 2017 under the protocol number 17100584. The need for consent was waived for this study by the University of Pittsburgh Institutional Review Board.

## Results

### Respondents

Of the 600 surveys sent to providers (200 per specialty subgroup), 50 were excluded from analysis (twenty-nine surveys were returned to sender as an undeliverable address and twenty-one recipients returned an uncompleted survey due to being retired or having a non-relevant specialty). A total of 20 surveys were returned with no explanation. These 20 surveys were categorized as refusals and were not excluded.

Based on eligible responses, the overall response was rate 43% (236/550). The majority - 72% (170/236) - returned the survey by mail. Table 1 provides respondents’ demographic data and their characterization of their patient population by provider specialty. Region was determined from the respondent’s reported primary practice zip code.

### Table 1. Provider Respondent Characteristics and Patient Population
| Characteristics                          | All respondents (n = 236) | Nurse-Midwives (n=106) | Family Medicine (n=63) | OB-GYN (n=62) |
|-----------------------------------------|---------------------------|------------------------|------------------------|---------------|
| Mean years in practice                  | 25.0 ± 11.8               | 22.8 ± 12.7            | 28.8 ± 9.7             | 24.1 ± 11.2   |
| Actively treating postpartum patients   | 214 (90.7%)               | 98 (92.5%)             | 52 (82.5%)             | 60 (96.8%)    |
| Gender                                  |                           |                        |                        |               |
| Female                                  | 159 (67.4%)               | 104 (98.1%)            | 28 (44.4%)             | 26 (41.9%)    |
| Male                                    | 75 (31.8%)                | 1 (0.9%)               | 34 (54.0%)             | 36 (58.1%)    |
| Race                                    |                           |                        |                        |               |
| Asian                                   | 12 (5.1%)                 | 1 (0.9%)               | 4 (6.3%)               | 6 (9.7%)      |
| Black / African American                | 11 (4.7%)                 | 5 (4.7%)               | 1 (1.6%)               | 5 (8.1%)      |
| Hispanic / Latino(a)                    | 8 (3.4%)                  | 2 (1.9%)               | 2 (3.2%)               | 4 (6.5%)      |
| Native American                         | 0 (0%)                    | 0 (0%)                 | 0 (0%)                 | 0 (0%)        |
| Mixed race, Other                       | 5 (2.1%)                  | 0 (0%)                 | 3 (4.8%)               | 2 (3.2%)      |
| White / Caucasian                       | 197 (83.5%)               | 97 (91.5%)             | 51 (81.0%)             | 45 (72.6%)    |
| Did not respond                         | 3 (1.3%)                  | 1 (0.9%)               | 2 (3.2%)               | 0 (0%)        |
| Region of Practice                      |                           |                        |                        |               |
| Northeast                               | 39 (16.5%)                | 26 (24.5%)             | 3 (4.8%)               | 10 (16.1%)    |
| Midwest                                 | 72 (30.5%)                | 23 (21.7%)             | 29 (46.0%)             | 17 (27.4%)    |
| South                                   | 68 (28.8%)                | 33 (31.1%)             | 13 (20.6%)             | 21 (33.9%)    |
| West                                    | 53 (22.5%)                | 21 (19.8%)             | 17 (27.0%)             | 14 (22.6%)    |
| Proportion of patients on Medicaid      | 42.9 ± 29.4               | 50.9 ± 30.1            | 37.7 ± 28.0            | 35.7 ± 27.5   |
| Postpartum care attendance              |                           |                        |                        |               |
| Schedule care                           | 90.4 ± 14.1               | 90.1 ± 13.2            | 87.7 ± 20.4            | 93.0 ± 8.6    |
| Attend care                             | 79.4 ± 18.8               | 79.1 ± 18.4            | 75.6 ± 23.7            | 82.2 ± 14.9   |

**Characterization of Care**
Providers largely favored earlier care with 37.7% preferring a single visit within 1 to 3 weeks postpartum and 19.5% wanting both earlier and more frequent care. Many (31.4%) responded that the traditional 6-week postpartum visit was most effective. Only a small percentage specified that a later than 6-week visit would be most effective (8.9%) or indicated a postpartum visit only be required if specific concerns needed to be addressed (2.1%).

Providers reported an average of 24.4 ± 11.7 minutes spent with each patient at their postpartum visit. An ANOVA identified significant differences in time allotted depending on specialty; Nurse-Midwives (28.1 ± 12.7 minutes) and Family Medicine providers (25.1 ± 10.9 minutes) reported more time than OB-GYNs (17.6 ± 6.9 minutes), F(2, 216) = 17.51, P < .001.

A chi-squared analysis identified that the nature of care provision differed significantly by provider type, according to reports from each, X²(8, N = 224) = 19.89, p = .002. Almost all respondents actively provided postpartum care (>90%). Nearly half of OB-GYNs saw those patients routinely throughout their pregnancy (46.8%); more than half of Family Medicine providers had an ongoing (primary care and obstetric care) relationship with their pregnant patients (58.6%); whereas about one third of nurse-midwives provided routine pregnancy care only (37.5%), with the same number providing ongoing gynecologic care in addition to pregnancy care (36.5%).

Priorities for care

Table 2 shows the mean Likert-scale–rated priorities for each postpartum care item compared with mean reported frequency of practice of that item across provider types. It also shows the effect size of the difference in priority and practice (Cohen's d), which appropriately adjusts for non-normal distribution.

Table 2. Cohen's d of Importance-Rank Difference for Postpartum Care Categories
| Categories                          | Importance Mean (SD)* | Frequency Mean (SD)† | Cohen's d‡ |
|------------------------------------|-----------------------|---------------------|------------|
| **Clinical Items**                 |                       |                     |            |
| C-section birth complications      | 4.51 (.73)            | 4.70 (.68)          | 0          |
| Vaginal birth complications        | 4.47 (.77)            | 4.74 (.64)          | 0          |
| Pregnancy-related complications    | 4.32 (.80)            | 4.57 (.75)          | .1         |
| Chronic health conditions          | 3.76 (.91)            | 3.98 (.93)          | .1         |
| Transitioning to primary care      | 3.39 (1.17)           | 3.33 (1.35)         | .1         |
| Physical/pelvic exam               | 3.28 (1.10)           | 4.08 (1.05)         | .7§        |
| **Behavioral**                     |                       |                     |            |
| Depression                         | 4.78 (.41)            | 4.90 (.46)          | .1         |
| Intimate partner violence          | 4.32 (.78)            | 3.90 (1.05)         | .6         |
| Substance use                      | 4.19 (.88)            | 3.78 (1.17)         | .5         |
| Smoking                            | 4.13 (.85)            | 4.01 (1.11)         | .2         |
| Maternal sleep                     | 3.98 (.81)            | 3.92 (0.99)         | .2         |
| Diet and weight trajectory         | 3.53 (.92)            | 3.62 (.97)          | 0          |
| **Family planning**                |                       |                     |            |
| Family planning counsel            | 4.63 (.61)            | 4.89 (0.49)         | .2         |
| Contraceptive provision            | 4.52 (.68)            | 4.59 (0.81)         | .1         |
| Resuming sexual activity           | 3.96 (.85)            | 4.70 (0.65)         | .8§        |
| **Infant Health**                  |                       |                     |            |
| Breast health, breastfeeding and other infant feeding issues | 4.45 (.71) | 4.66 (0.66) | .1 |
| Infant safe sleep                  | 3.70 (1.10)           | 3.38 (1.30)         | .3         |

**Notes**

* Importance scale ranged from “1 = not at all” to “5 = extremely,” with a midpoint of “3 = moderately.”

† Frequency scale ranged from “1 = never” to “5 = always,” with a midpoint of “3 = sometimes.”
Cohen's d calculations were performed on differences between importance and frequency on normalized scales. Medium (Cohen's d values > .5) or Large (Cohen's d values > .8) differences highlighted in bold.

- Indicates item is performed more frequently than it is valued.

In terms of specific aspects of care, there was generally high correspondence between valued and performed care. For example, depression screening was an item that was both highly valued and frequently performed, as was birth-related and pregnancy-onset complications. There were, however, a few large inefficiencies in care: the pelvic exam, counseling regarding resumption of sexual activity, and intimate partner violence screening. The first two items were performed more frequently than the level at which they are valued. Intimate partner violence screening, on the other hand, was performed less often than would be expected considering its value.

There were also some consistent differences in care provision and valued care by provider type. Several items were valued and performed differently depending on provider type. For example, an ANOVA identified that, on a 5-point Likert scale, Family Medicine physicians and Nurse-Midwives both valued infant safe sleep care provision (4.07 ± 0.96 and 3.79 ± 1.10, respectively) more highly than OB-GYNs (3.31 ± 1.05), \( F(2, 224) = 8.03, P < .001 \), and performed it more frequently, \( F(2, 224) = 20.23, P < .001 \).

While there were no significant differences in the high value placed on opioid and other substance use counseling across provider types, it was more routinely provided by Family Medicine physicians (4.17 ± 1.02), than by Nurse-Midwives (3.77 ± 1.18) or OB-GYNs (3.5 ± 1.19), \( F(2, 209) = 5.18, P < .01 \).

Figure 1 illustrates Likert-scale–rated priorities for postpartum care compared with reported frequency of practice broken down by provider type for (a) OB-GYN (b) Family Medicine and (c) Nurse-Midwife respondents.

Items that show equivalent values for importance but differ in performed frequency can be conceptualized as opportunity costs under time constraints, whereby some aspects of care are routinely “traded-off” against other forms of care. Identifying such tradeoff items can lend insight into prioritization and distribution of postpartum care. As mentioned above, counseling regarding the resumption of sexual activity can be broadly considered inefficient. For Nurse-Midwives, it was performed more frequently than equivalently valued maternal sleep assessment and smoking cessation counseling. For OB-GYNs, on the other hand, it was performed more frequently than equivalently valued smoking cessation counseling, opioid and other substance use assessment, and intimate partner violence screening. In the case of Family Medicine physicians, it was performed more frequently than equivalently valued discussions about transitioning to primary care and discussion of chronic health conditions. By the same token, screening for intimate partner violence was consistently underperformed relative to its value. For both Family Medicine physicians and Nurse-Midwives, this was specifically in contrast with vaginal birth and C-section complications, which were both performed more frequently.
Additional postpartum care items that were seen as important by all provider types (based on coding of open-ended text reports of care) largely fell into a category that could be called, “Transition to Parenthood.” This included certain aspects involved in evaluating the social, emotional, and tangible support available to patients as they transition to motherhood, including family relationships and their work environment. Providers also identified items such as infant bonding and vaccine schedules, as well as reviewing a woman’s birth experience and planning for future pregnancies. Inter-rater reliability analysis found moderate agreement between the two raters after the first round of coding for this open-ended response (Kappa= 0.79, P <.001).

The mean appointment attendance rate was 75% for patients of providers who supported telemedicine approaches, and 81% for patients of providers who did not, (t(198) = 1.97, P = .05), illustrating that those with lower postpartum attendance rates, tend to report higher support for telemedicine. As one provider noted, “There is benefit to human touch and contact. There are also many nonverbal cues that could be missed when not viewing the total person. However, telemedicine beats no visit at all.”

**Discussion**

Several excellent guidelines for postpartum care exist, yet even for non-risky pregnancies and deliveries, providing comprehensive care in a limited visit time is challenging. While our survey showed support for more frequent and earlier care, more than 40% of providers responded that a single 6-week visit (or less care) is optimal, in spite of new guidelines. If we view the contrast of valued care with the frequency by which that care is performed, we can identify opportunity costs that occur under provider time constraints, allowing us to identify which types of care are being systematically discounted for other types of care, as well as what types of care may be better delivered through complementary methods. For example, as noted above, intimate partner violence screening, which was highly valued by all specialties, was consistently underperformed compared to other highly valued clinical care (e.g., assessing C-section incision healing). These ‘tradeoffs’ in care under time constraints may be the result of professional norms, personal comfort level or experience, or heuristics for prioritizing clinically pressing care which is more concrete to address. The fact that our open-ended questions identified an additional category of priority care provision (transitioning to parenthood) that was not covered by existing guidelines, further highlights the constraints of providing all desirable aspects of care during a single appointment. For providers who feel that a single 6-week appointment is the most postpartum care needed may not have or take the opportunity to probe into these risks.

Provision of transportation and home-visits were popular suggested solutions to care access barriers. While transportation assistance has had mixed documented effectiveness on appointment attendance, in-home visits are generally successful for assessing and reducing postpartum depression. However, they are also expensive to scale. Telemedicine may present a cost-efficient alternative for providing postpartum psychosocial care for those practices where telemedicine is feasible. While was notably absent from open-ended responses about overcoming care access barriers, when prompted to think
about it, telemedicine was supported as a replacement for postpartum care by almost a quarter of respondents.

Many respondents reported caveats to telemedicine support in open-ended text responses. While it was suggested that most aspects of a physical exam (e.g., pelvic exam or some contraceptive method provision) require in-person care, many of the highly valued psychosocial assessments could be performed virtually, either through telephone or videoconferencing. Therefore, guidelines that specify which types of postpartum care provision are best suited to an in-person versus a telemedicine visit could address some of these concerns. For example, an early telemedicine visit could be used to assess behavioral health and ask about physical symptoms. An in-person physical exam could then be scheduled for those women who report concerning physical symptoms or require further in-person counseling. Some providers voiced concern that telemedicine could negatively impact patient’s comfort with disclosure or the provider’s ability to detect subtle signs of psychosocial risk factors, such as depression. Given the time and effort required to coordinate video conferencing between patient and provider (as opposed to telephone contact), further investigation is warranted into both cost effectiveness and the relative rates of disclosure with telemedicine and other forms of distance care.

An important consideration for distance care is existing health inequities. Women with public insurance and African-American women are at considerably higher risk of severe postpartum maternal morbidity and mortality. Results showing that postpartum visit attendance is less common among women with public insurance were replicated here in providers’ self-reports.

Given that internet access is also lower among this population, telemedicine may not be a feasible across-the-board solution to more frequent care provision. Currently, 94% of reproductively-aged women own a smartphone across sociodemographic groups and early research suggests that African-American women may actually be more reliant on digital sources for accessing health information. As such, evidence-based mobile apps, with provider-oversight, may be the most promising alternative for engaging and monitoring postpartum risk among a diverse population of peripartum women and could even help bypassing structural racism or care access inequities.

Our findings also suggest that care provision could and perhaps should be delineated and coordinated among trained professionals. Family Medicine providers, for example, reported asking about substance use more frequently at postpartum care appointments than other specialties. This may be because Family Medicine physicians are more likely to have ongoing primary care relationships with their patients and feel more comfortable asking about socially stigmatized issues or have greater familiarity with their patient’s contextual circumstances.

Similarly, OB-GYNs do not prioritize or practice safe infant sleep counseling to the same degree as Family Medicine physicians or Nurse-Midwives, possibly because their practice is traditionally focused on maternal well-being. Establishing explicit norms about which providers will conduct what type of care and at what timepoint may be an important way to ensure comprehensive postpartum care is received.
Limitations

Our sample was small and, although respondents were randomly sampled from national lists, the generalizability of our findings is limited. While the consistency in both value and realized practice across specialties in our sample could reflect a consensus among practitioners, it is also possible that our sample is biased towards those with strong opinions regarding postpartum care practices; therefore, caution should be exercised in considering any differences by specialty. From the detail provided in our open-ended responses, we assume that considerable time and thought went into the majority of responses we received.

Conclusion

Surveying providers about postpartum care priorities and practice offered novel insight into the feasibility of increased and more frequent postpartum care. With new ACOG recommendations, health care providers must determine how to prioritize care delivery and engage patients in postpartum care attendance. Such guidelines can be helpful if they are clear and unanimous, but risk causing confusion if they are not. Results from this survey suggest that providers largely provide the care that they value most. However, given that the reported mean time spent with a patient in a postpartum care visit is less than 30 minutes, time constraints may be a considerable barrier to providing all the care that they value, presenting opportunity costs in care provision. Our findings provide insight into what possible opportunity cost care tradeoffs might be and how they may differ by postpartum provider type. Additionally, our findings suggest that telemedicine could be a useful complement to, but not complete substitute for, in-person postpartum care, particularly for certain types of postpartum care and for those patients who may face logistic barriers to care attendance. More frequent and earlier virtual care combined with targeted in-person physical assessments could help capture some of the risks that may be missed among those with poor in-person attendance. We suggest that concise and transparent guidelines for how postpartum care is prioritized and distributed across visits and by provider type would allow for clear distribution of responsibilities, and would minimize opportunity costs of providing critical postpartum care services.

List Of Abbreviations

ACOG - The American College of Obstetricians and Gynecologists

OB-GYN – obstetrician-gynecologist

Declarations

Ethics approval and consent to participate

This study was approved by the University of Pittsburgh Institutional Review Board in November 2017 under the protocol number 17100584.
Consent for publication

Not Applicable

Availability of data and materials

The datasets created during the current study is available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

TK conceptualized the work, designed the survey, analyzed and interpreted the data, and drafted the manuscript. HS designed the survey and revised the manuscript. SB designed the survey and revised the manuscript. All authors read and approved the final manuscript.

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References

1. ACOG Committee Opinion Number 736. Optimizing Postpartum Care. Washington, DC: American College of Obstetricians and Gynecologists; 2018.
2. MacDorman MF, Declercq E, Cabral H, Morton C. Is the United States Maternal Mortality Rate Increasing? Disentangling trends from measurement issues Short title: US Maternal Mortality Trends. Obstetrics and gynecology. 2016 Sep;128(3):447.
3. Alkema L, Chou D, Hogan D, Zhang S, Moller AB, Gemmill A, Fat DM, Boerma T, Temmerman M, Mathers C, Say L. Global, regional, and national levels and trends in maternal mortality between 1990 and 2015, with scenario-based projections to 2030: a systematic analysis by the UN Maternal Mortality Estimation Inter-Agency Group. The Lancet. 2016 Jan 30;387(10017):462-74.
4. Zaharatos J, St. Pierre A, Cornell A, Pasalic E, Goodman D. Building US Capacity to Review and Prevent Maternal Deaths. Journal of Women's Health. 2018 Jan 1;27(1):1-5.

5. Creanga AA, Berg CJ, Syverson C, Seed K, Bruce FC, Callaghan WM. Pregnancy-related mortality in the United States, 2006–2010. Obstetrics & Gynecology. 2015 Jan 1;125(1):5-12.

6. MacDorman MF, Declercq E, Thoma ME. Trends in Maternal Mortality by Socio-Demographic Characteristics and Cause of Death in 27 States and the District of Columbia. Obstetrics and Gynecology. 2017 May;129(5):811.

7. Nannini A, Weiss J, Goldstein R, Fogerty S. Pregnancy-associated mortality at the end of the twentieth century: Massachusetts, 1990-1999. Journal of the American Medical Women's Association (1972). 2002;57(3):140-3.

8. Haran C, Van Driel M, Mitchell BL, Brodribb WE. Clinical guidelines for postpartum women and infants in primary care—a systematic review. BMC Pregnancy and Childbirth. 2014 Dec;14(1):51.

9. Chen MJ, Hsia JK, Hou MY, Wilson MD, Creinin MD. Comparing Postpartum Visit Attendance with a Scheduled 2-to 3-Week or 6-Week Visit after Delivery. American journal of perinatology. 2019 Jul;36(09):936-42.

10. Declercq ER, Sakala C, Corny MP, Applebaum S, Herrlich A. Major Survey Findings of Listening to Mothers III: New Mothers Speak Out: Report of National Surveys of Women's Childbearing Experiences Conducted October–December 2012 and January–April 2013. The Journal of perinatal education. 2014;23(1):17.

11. Centers for Disease Control and Prevention (CDC). Postpartum care visits–11 states and New York City, 2004. MMWR. Morbidity and mortality weekly report. 2007 Dec 21;56(50):1312.

12. Russell MA, Phipps MG, Olson CL, Welch HG, Carpenter MW. Rates of postpartum glucose testing after gestational diabetes mellitus. Obstetrics & Gynecology. 2006 Dec 1;108(6):1456-62.

13. Rana AI, Gillani FS, Flanigan TP, Nash BT, Beckwith CG. Follow-up care among HIV-infected pregnant women in Mississippi. Journal of women's health. 2010 Oct 1;19(10):1863-7.

14. Swain CA, Smith LC, Nash D, Pulver WP, Lazariu V, Anderson BJ, Warren BL, Birkhead GS, McNutt LA. Postpartum loss to HIV care and HIV viral suppression among previously diagnosed HIV-Infected women with a live birth in New York State. PloS one. 2016 Aug 11;11(8):e0160775.

15. Lu MC, Prentice J. The postpartum visit: risk factors for nonuse and association with breast-feeding. American journal of obstetrics and gynecology. 2002 Nov 1;187(5):1329-36.

16. Illinois Department of Healthcare and Family Services. Report to the General Assembly. 2014; PA 93-0536.

17. DiBari JN, Yu SM, Chao SM, Lu MC. Use of postpartum care: predictors and barriers. Journal of pregnancy. 2014;2014.

18. Bryant AS, Haas JS, McElrath TF, McCormick MC. Predictors of compliance with the postpartum visit among women living in healthy start project areas. Maternal and child health journal. 2006 Nov 1;10(6):511-6.
19. Bennett WL, Ennen CS, Carrese JA, Hill-Briggs F, Levine DM, Nicholson WK, Clark JM. Barriers to and facilitators of postpartum follow-up care in women with recent gestational diabetes mellitus: A qualitative study. Journal of Women's Health. 2011 Feb 1;20(2):239-45.

20. Henderson V, Stumbras K, Caskey R, Haider S, Rankin K, Handler A. Understanding factors associated with postpartum visit attendance and contraception choices: listening to low-income postpartum women and health care providers. Maternal and child health journal. 2016 Nov 1;20(1):132-43.

21. American College of Obstetricians and Gynecologists. Guidelines for perinatal care. American Academy of Pediatrics; 2017.

22. Blenning CE, Paladine H. An approach to the postpartum office visit. Am Fam Physician. 2005 Dec 15;72(12):2491-6

23. National Committee for Quality Assurance. The state of health care quality; 2016.

24. World Health Organization, UNICEF. Pregnancy, childbirth, postpartum and newborn care: a guide for essential practice; 2015.

25. Dillman DA. The design and administration of mail surveys. Annual review of sociology. 1991 Aug;17(1):225-49.

26. Kilpatrick SJ, Papile LA, Macones GA. Guidelines for perinatal care. American Academy of Pediatrics; 2017 Sep 17.

27. Chaiyachati KH, Hubbard RA, Yeager A, Mugo B, Shea JA, Rosin R, Grande D. Rideshare-based medical transportation for Medicaid patients and primary care show rates: a difference-in-difference analysis of a pilot program. Journal of general internal medicine. 2018 Jun 1;33(6):863-8.

28. Chaiyachati KH, Hubbard RA, Yeager A, Mugo B, Lopez S, Asch E, Shi C, Shea JA, Rosin R, Grande D. Association of rideshare-based transportation services and missed primary care appointments: a clinical trial. JAMA internal medicine. 2018 Mar 1;178(3):383-9.

29. Krishnamurti T, Davis AL, Wong-Parodi G, Fischhoff B, Sadovsky Y, Simhan HN. Development and testing of the Myhealthypregnancy app: a behavioral decision research-based tool for assessing and communicating pregnancy risk. JMIR mHealth and uHealth. 2017 Apr;5(4).

30. Shaw E, Levitt C, Wong S, Kaczorowski J, McMaster University Postpartum Research Group. Systematic review of the literature on postpartum care: effectiveness of postpartum support to improve maternal parenting, mental health, quality of life, and physical health. Birth. 2006 Sep;33(3):210-20.

31. The Smartphone Difference. pewinternet.org. http://www.pewinternet.org/2015/04/01/us-smartphone-use-in-2015/. Published 2015.14;2

32. Cline RJ, Haynes KM. Consumer health information seeking on the Internet: the state of the art. Health education research. 2001 Dec 1;16(6):671-92.

Table 3

Table 3. Providers’ perceived barriers to postpartum care attendance for their patients
| Barrier Type                      | Frequency (%) |
|----------------------------------|---------------|
| **Logistical barriers**          |               |
| Scheduling/schedule conflicts    | 40.3%         |
| Transportation                   | 44.1%         |
| Cost/Lack of insurance           | 27.1%         |
| Inability to take time off work  | 12.7%         |
| Childcare constraints            | 27.5%         |
| General lack of support          | 5.5%          |
| Relocation                       | 4.7%          |
| **Appointment scheduling**       |               |
| No appointment                   | 5.5%          |
| Forgot scheduled appointment     | 11.0%         |
| **Psychosocial barriers**        |               |
| Feeling overwhelmed              | 4.4%          |
| Depression                       | 6.4%          |
| Embarrassment                    | 1.1%          |
| Drug and Alcohol Use             | 1.7%          |
| Intimate Partner Violence        | 1.5%          |
| Homelessness                     | 0.4%          |
| **Symptom barriers**             |               |
| Pain                             | 0.8%          |
| Fatigue                          | 5.1%          |
| **Needs-based barriers**         |               |
| Feeling fine                     | 19.5%         |
| Does not understand importance   | 15.7%         |
| Does not need birth control      | 4.0%          |
| Prioritizing the infant’s needs  | 4.4%          |
| Cultural barriers                | 4.4%          |
| Generally non-compliant          | 3.6%          |
| **Poor relationship with provider** |           |
| Traumatic birth experience | 6.1% |
|----------------------------|------|
| Poor relationship with provider | 7.2% |
| Fear of postpartum procedures | 2.8% |

**Figures**

- OBGYN
- Family Medicine
- Nurse-Midwives
Figure 1

1a. Likert-scale rated priorities for postpartum care contrasted against reported frequency of practice for OB-GYN respondents 1b. Likert-scale rated priorities for postpartum care contrasted against reported frequency of practice for Family Medicine respondents 1c. Likert-scale rated priorities for postpartum care contrasted against reported frequency of practice for Nurse-Midwife respondents