

Application: STAMPP-HTN

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2023 Bernard J. Tyson National Award for Excellence in Pursuit of Healthcare Equity

Summary

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Application Form

Completed - May 13 2023

Application Contact Information

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Tyson Award Initiative Details

Completed - May 13 2023

Initiative Details

Name/Title of Initiative

If selected as an award winner, this will be used in press material; Do not include name of the organization submitting award within title.

(limit 250 characters, including spaces)

STAMPP-HTN: SYSTEMATIC TREATMENT AND MANAGEMENT OF POSTPARTUM HYPERTENSION- Effective in Controlling Blood Pressure and Eliminating Racial Disparities in the Care of Postpartum Women

Executive Summary of Initiative

(2,500 character limit, including spaces; approximately 1 single-spaced page)

Provide a short summary of the initiative's equity-related achievements and the importance of these achievements, including their specific impact to reduce healthcare disparities, improve health equity, and improve health care outcomes.

Please note – if your submission is selected, this excerpt might be used in publications. **This section should be written similar to a journal abstract** with a few sentences addressing key concepts related to the project such as:

- Describe the problem identified;
- Explain the improvement need/performance gap identified;
- Describe the intervention/solution implementation;
- Quantify the improvement, and
- Describe how the improvement was sustained.
- If the intervention/solution was replicated after the initial project (e.g., in other locations, for other performance gaps identified), please explain.

Hypertensive disorders of pregnancy (HDP) affect approximately 10% of all pregnant women and are among the leading causes of maternal and fetal morbidity and mortality, especially among Black women. Controlling blood pressure in the postpartum (PP) period is critical and reduces cardiovascular disease among women. Unfortunately, follow-up compliance is often poor; historically, up to 70% of women will not attend a PP visit. To address this issue, we established a quality improvement initiative called the Systematic Treatment and Management of Postpartum Hypertension (STAMPP-HTN) Program, which was implemented as a series of interventions to improve PP care for women with HDPs at the University of Chicago, a tertiary urban care center with a predominantly Black and publicly insured population. The program included education to all patients and care providers, updated clinic protocols for patients, distribution of a STAMPP-HTN kit (included a blood pressure monitor, instructions, warning signs, and a preeclampsia alert wrist bracelet) to all postpartum patients with an HDP, consistent scheduling of follow-up appointments before discharge and standardized protocols and workflows for the management of patients after hospital discharge.

Postpartum hypertension visits adherence improved from the preintervention period compared with the full implementation period (33.5% vs 59.4%, $P < .001$). After implementation, fewer patients experienced a blood pressure of 140/90 mm Hg or higher at the first postpartum blood pressure check when compared with preintervention (39.1% vs 18.5%, $P < .004$). The effect size did not differ by race. Furthermore, the transition to telehealth in the setting of this existing quality improvement initiative led to an overall improvement in PP blood pressure follow-up rates from 30% to 76% among black women and eliminated the disparity. To further enhance the STAMPP-HTN bundle, Dr. Rana collaborated with the Department of Digital Health and Health Recovery

Solutions to start the remote patient monitoring (RPM) program for all patients enrolled in STAMPP-HTN. The RPM program began in July 2021. Attendance at PPHTN visits further improved to 83.1% attending a visit after RPM was implemented, with similar rates among Black and white patients. In December 2020, STAMPP-HTN was launched at the University of Mississippi Medical Center (UMMC) under the leadership of Dr. Kedra Wallace.

Describe the healthcare disparity that was the target for the improvement initiative and the importance of this target for the population your organization serves.

Articulate the health equity problem/opportunity addressed and its importance. (2,500 character limit, including spaces; approximately 1 single spaced page)

Maternal mortality in the United States (US) has become a major public health concern. Considerable racial and ethnic disparities in pregnancy-related mortality exist with black women dying at a disproportionately higher rate (42.4 deaths per 100,000 live births for black non-Hispanic women compared to 13.0 deaths per 100,000 live births for white non-Hispanic women). More importantly, in Illinois, non-Hispanic Black women are six times more likely to die of a pregnancy-related condition as compared with non-Hispanic white women, and a large proportion of deaths occur within the first six weeks of delivery (Figure. 1). Hypertension during pregnancy is a significant cause of maternal morbidity and mortality. It can extend into the postpartum (PP) period. There is a paucity of data and specific recommendations for managing hypertension throughout the PP period. While control of blood pressure in the postpartum period is associated with reduced cardiovascular disease among women, follow-up compliance is poor. No specific strategies have been proposed to target this gap between knowledge and practice. In fact, up to 70% of women will not attend a postpartum visit. Significant racial disparities exist in postpartum follow-up, with Black women having an even lower likelihood of a postpartum follow-up than White women. Data from our institution showed that, without intervention, less than 30% of patients visited PPHTN appointments at the University of Chicago. At our institution, we recognized problems at several levels:

Ø At the time of admission and discharge

- General lack of knowledge among patients about long-term effects of preeclampsia
- No organized effort for education to patients
- Discharge instructions not universally given
- No dedicated postpartum clinic for easy access to care

Ø Problems with readmissions in the Emergency Department (ED)

- Identifying postpartum patients
- Incorrect treatment of PPHTN
- Poor knowledge about the definition of severe for PPHTN
- Calling medicine or cardiology instead of obstetrics (OB)
- Delayed transfer to labor and delivery (L/D)
- Delay in recognition and treatment of severe PPHTN

Ø No standardized management for readmissions for PPHTN

STAMPP HTN program was developed to target these gaps and is a bundled initiative to improve maternal postpartum outcomes, including blood pressure control and adherence to postpartum follow-up among Black women.

Describe how the healthcare disparity was identified at your organization and your baseline measurement of the disparity.

Be sure to provide baseline data demonstrating the healthcare disparity in the targeted population.

(1,250 character limit, including spaces; approximately 1/2 single spaced page)

The University of Chicago is a tertiary urban care center with a predominantly Black and publicly insured obstetrical population and a high prevalence of hypertensive disorders of pregnancy. We identified rates of postpartum follow-up for blood pressure (BP) as the measure of disparity. Data suggests that uncontrolled BP in the postpartum period has been directly linked to poor outcomes. In contrast, postpartum follow-up is associated with improved BP control and a lower risk of adverse outcomes. Despite this, follow-up rates remain low, especially among Black women. Specifically, up to 70% of Black postpartum people will not have a follow-up visit despite a high prevalence and morbidity from hypertension. There is also evidence of racial disparities in telehealth use, with one study reporting 40% lower odds of accessing care through telehealth among Black patients. These data combined suggest that early follow-up and BP control among Black postpartum people could decrease the racial disparities in postpartum hypertension (PPHTN) outcomes. At our institution, at baseline, before the program's initiation, the rate of PP follow-up within six weeks for a blood pressure check was 30% among black women and 53.5% among white women.

Explain what factors you identified as the causes of the disparity and possible targets for your intervention to reduce the disparity.

Specifically, describe the analysis of the causes of the disparity within the healthcare organization or in the community that you identified through literature review or, optimally, through an analysis of your healthcare organization data or data about the community you serve (e.g., access to care, communication barriers, unequal diagnostic testing or treatment, social determinants of health, implicit/subconscious bias, and/or institutional/structural racism)

(2,500 character limit, including spaces; approximately 1 single spaced page)

According to the Illinois Maternal Morbidity and Mortality Report released in October 2018, the state of Illinois has even higher rates of pregnancy-related maternal deaths compared to the average in the US, with rates even higher in the city of Chicago (Figure 1). More importantly, in Illinois, non-Hispanic Black women are six times more likely to die of a pregnancy-related condition than non-Hispanic white women and a large proportion of deaths occur within the first six weeks of delivery. The risk factors identified for maternal death in Illinois included race, poor education, living in Chicago, Medicaid and higher body mass index. Hypertensive disorders of pregnancy affect about 10% of all pregnant women, of which preeclampsia is most common and is the leading cause of maternal death, fetal death, and prematurity. Overall, Black women have a higher prevalence of hypertensive disorders and suffer more than their Caucasian counterparts, in which preeclampsia is a major contributor to this disparity. Several factors contribute to obstetrical disparities among black pregnant women with hypertension (Figure 2). More alarming is the suggestion that close to 63% of hypertension-related maternal deaths are preventable. Women who suffer from hypertension during pregnancy are at high risk of poor short-term and long-term outcomes. Importantly, studies have demonstrated that women with an HDP have 12- to 25-fold higher rates of postpartum hypertension (PPHTN) than women with a normotensive pregnancy in the first year after delivery. Additionally, PPHTN is a leading indication for hospital readmissions within the first six weeks after delivery. There is an urgent need to recognize the deficiency in postpartum hypertension management for Black women and implement evidence-based strategies to improve outcomes.

We identified several factors as causes of disparity in rates of postpartum follow-up at our institution, such as 1) lack of education among patients and providers about signs and symptoms of PPHTN, 2) lack of access to PPHTN clinics 3) lack of standardized protocols for readmissions 4) lack of protocols in the emergency room 5) lack of protocols for inpatient and outpatient management of PPHTN.

Describe team and stakeholder engagement throughout the initiative.

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Few studies on managing hypertensive disorders of pregnancy (HDP) have focused on system-level initiatives to improve postpartum care for women with HDP. To address this issue, UChicago Medicine developed and implemented a system-wide quality initiative to improve postpartum care of women with HDP through STAMPP HTN. We collaborated with Obstetrics providers, nurses, and staff to create the Systematic Treatment and Management of PostPartum HYPERTENSION (STAMPP-HTN) organization-level interprofessional decision-making group. The creation and maintenance of STAMPP-HTN involve an interprofessional team that actively participates in decision-making and action plans. These individuals include clinical and research nurses, primary and specialty care providers, physician assistants, clinical MFM fellows, residents, medical students, a Centralized Call Center, Nursing leadership, Informatics/a biostatistician, and Patient Care Technicians. The team is headed by Dr. Rana, MD, and Colleen Duncan, BSN, M.Ed, RN, clinical research nurse OB/GYN- Figure 3. The team met weekly for the first six months of the project and then transitioned to every other week. There is an active ongoing collaboration.

Describe the intervention/solution and its implementation.

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Specifically, describe details of the interventions/solutions implemented (e.g., improvement methodology and tools used, strategy adjustments, evidence-based best practices employed, change management strategy).

STAMPP-HTN's bundle was developed to improve the care of black women regarding the improvement of postpartum blood pressure follow-up and reduction of postpartum blood pressure. The bundle required obstetrics and postpartum patients to watch an educational video on recognizing and seeking prompt treatment for PPHTN. The viewing of this video was ensured through the implementation of a "Hard Stop" in the electronic medical record (EMR) that encouraged viewing this video before any other television in the Labor and delivery room. The bundle also included hiring a dedicated nurse educator for patient education about preeclampsia and postpartum follow-up, education for all care providers (nurses, residents, staff physicians, midwives, medical assistants) in labor and delivery and postpartum units, updated clinic protocols for patients with PPHTN, distribution of a STAMPP-HTN kit (included a blood pressure monitor, instructions, warning signs, and a preeclampsia alert wrist bracelet) to all postpartum patients with an HDP, consistent scheduling of follow-up appointments before discharge, standardized protocols and workflows for the management of patients with PPHTN who present at our emergency room, and creation of dedicated outpatient PPHTN clinics (Figure 4). Standardized protocols include images of algorithms/protocols established for inpatient HTN management before discharge, management of patients in the Physician Assistant (PA) PPHTN clinic, and readmission protocol. Of note, patients with HDPs were given appointments at the University of Chicago for PPHTN follow-up before discharge, regardless of the location of their primary obstetrician. All appointments are done through telehealth in specialized PP HTN clinics run by physician assistants in collaboration with MFM physicians (Figure 5 shows the timeline of STAMPP interventions). STAMPP-HTN protocols were created based on evidence-based guidelines and expert consensus of the University of Chicago Medicine maternal-fetal medicine group. The outpatient PPHTN protocol was developed in concert with cardiologists and included a referral to cardiology for counseling to mitigate the long-term impact of preeclampsia. The patient's journey through the program is shown in Figure 6.

Describe measurable improvement(s) in the targeted disparity.

This section should be supported with data in this section and in the supplemental upload document; meant to illustrate improvements in processes of care, health outcomes, and/or experience of care; i.e., results tables, statistical tests, run charts, and other quantitative methods.

(2,500 character limit, including spaces; approximately 1 single spaced page)

A total of 926 patients who delivered between September 2018 and November 2019 were analyzed. Overall, the median age of patients was 28 years of age, 65.7% were publicly insured, and 79.9% were Black. Adherence to postpartum hypertension visits significantly improved following full implementation of the intervention bundle compared with pre-intervention adherence rates (59.4% vs. 33.5%, respectively; $P < 0.0001$). Blood pressure (BP) in the first 24 hours postpartum also decreased with intervention when compared to baseline (systolic BP 137 vs. 149 mmHg; $P < 0.0001$). Fewer patients after full implementation experienced a BP $\geq 140/90$ mmHg at the first postpartum BP check compared to before implementation (18.5% vs. 39.1%; $P = 0.004$) (Figure 7,8,9). With the onset of the COVID-19 pandemic, we made several protocol changes to the postpartum care of our patients in this initiative. Specifically, all initial PPHTN visits were switched from in-person to telehealth visits, as all patients in the program already had a home blood pressure cuff. As was the case before the pandemic, these PPHTN visits were in a templated PPHTN clinic run by physician assistants, maternal-fetal medicine fellows, and maternal-fetal medicine attendings. Similarly, patients were still encouraged to follow up with our institution for their 7-10 day PPHTN telehealth visit. In contrast, the six-week general postpartum visit remained in person or via telehealth with our institution or the patient's primary OB provider. To analyze the impact of telehealth on PPHTN follow-up rates, patients who delivered between December 1, 2019, and February 14, 2020, represented the pre-telehealth cohort, and patients who delivered after March 15, 2020, represented the post-telehealth cohort. A total of 473 patients were included in this analysis. The median age of the study group was 29 years of age, 64.8% of patients were publicly insured, and 76.3% identified as non-Hispanic Black. Among all patients, adherence with at least one PPHTN visit increased significantly in the post-telehealth period compared to the pre-telehealth period (76.7% vs. 53.5%, respectively; $P < 0.0001$). During the post-telehealth period, visit adherence for non-Hispanic Black patients increased to 76.3% and for non-Hispanic White patients to 76.7%, leaving only a 0.4% racial disparity ($P = 0.97$). Thus STAMPP-telehealth led to improved rates of postpartum follow-up and elimination of racial disparity (Figure 10).

Describe whether the improvements seen were sustained and any processes put in place to monitor and ensure that the improvement will be sustained in the future.

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Home blood pressure telemonitoring (HBPT) combines at-home BP monitoring and telematic data transmission to the care provider, enabling real-time feedback on patient status. HBPT has been shown to improve blood pressure control and treatment compliance and may help optimize the patient's therapeutic regimen. HBPT interventions have shown high patient acceptance and improved quality of life. HBPT can also be an advantageous choice when a network of healthcare professionals (doctors and nurses) is needed to improve the screening and management of HTN. However, no data exist on whether HBPT effectively manages PPHTN, specifically among African American/Black women. To further enhance the STAMPP-HTN bundle, Dr. Rana (PI) collaborated with the University of Chicago Medicine Department of Digital Health and Health Recovery Solutions to start the remote patient monitoring (RPM) program for all patients enrolled in STAMPP-HTN (Figure 11). The RPM program started in July 2021. To analyze the extension of the program's success, we conducted a preliminary analysis of patients enrolled between October 2021-March 2022. During the study period, a total of 348 patients were enrolled in the RPM program. For the preliminary analysis, clinical data were collected and analyzed on 207 patients with a total of 4783 BP readings available across the six-week period. Patients had a median age of 31 years and were predominantly Black (64.7%). Attendance at PPHTN visits further improved to 83.1% attending a visit after RPM was implemented, with similar rates among Black and white patients. The incidence of hypertension was 14% at six weeks postpartum based on 227 patient readings in the RPM database (Figure 12), and 89.4% of patients had at least one BP reading recorded within six weeks postpartum. We found that adding the RPM program to the existing STAMPP-HTN initiative maintained a high attendance rate at postpartum BP follow-up visits and significantly reduced BP.

Currently, the STAMPP-HTN/RPM program is a standard of care at the University of Chicago Medicine. Every patient with hypertension in pregnancy who delivers at our hospital is enrolled in this program. Since January 2019, we have enrolled ~4500 patients in the STAMPP-HTN program. This sustainable quality improvement project continues to be supported by the University of Chicago Medicine (Department of Obstetrics and Gynecology and the Department of Digital Health) and Health Recovery Solutions.

If applicable, describe how the interventions/solutions were replicated (disseminated) to other parts of the organization or other care sites.

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In December 2020, STAMPP-HTN was launched at the University of Mississippi Medical Center (UMMC) under the leadership of Dr. Kedra Wallace. Women who delivered at UMMC received the same information regarding PPHTN and BP management, were telemonitored for six weeks, and were given the same questionnaires as participants at University of Chicago Medicine to compare their knowledge at the end of the telemonitoring period. At the time of analysis, 205 women were eligible to receive the survey, with 40% (n=83) of women completing both sets of questionnaires. At the end of the study, there were significant improvements in the number of women who were able to correctly state their diagnosis compared with the pre-education questionnaire (54.5% and 44.6%, respectively; $P = 0.02$), and who believed that HTN would spontaneously resolve following pregnancy compared with the pre-education questionnaire (16% and 33%, respectively; $P = 0.02$). At both testing time points, 94% of women knew that BP readings of 150/100 or higher needed to be repeated and/or managed, and there was an increase in the number of women who knew to only stop taking anti-hypertensive medication following a doctor's advice (10.2% increase; $P = 0.12$).

Describe innovative aspects of the work, including principles that are applicable to other disparities and/or any lessons learned that may be beneficial to other organizations.

(1,250 character limit, including spaces; approximately 1/2 single spaced page)

1. STAMPP-HTN bundle reduced inequality and inequity and eliminated health disparities in the management of PPHTN through telehealth.
2. No data exists on whether home blood pressure monitoring is effective in managing PPHTN, specifically among African American/Black women. We utilize remote patients monitoring and home blood pressure monitoring (HBPM) as part of the program and found it extremely successful in improving compliance with PPHTN appointments.
3. We contend that improved postpartum blood pressure control, as seen in our program, if applied at a larger scale to all women, will ultimately lead to decreased mortality and morbidity among women with HDP.
4. Results from our program demonstrate that a program like STAMPP HTN which is a bundle of clinical guidelines and protocols implemented as a hospital wide initiative for management of PPHTN led to improvement in patient adherence to follow up as well as blood pressure control and has the opportunity to significantly address racial disparities in PPHTN management.
5. We believe that such as a comprehensive strategy is very innovative and if applied across hospitals will lead to significant improvement of outcomes among women who suffer from hypertension in pregnancy.

Supplemental Documentation

Completed - May 13 2023

Upload Supplemental Document, exclusively containing Figures and/or Tables that illustrate baseline, improvement, and sustained results. Limit seven (7) pages total; content in excess of 7 pages will not be considered in evaluation. Combine all supplemental documentation within 1 PDF document.

[Bernard J](#)

Filename: Bernard_J_Tyson_Award_Supplement_05062023.pdf **Size:** 2.2 MB

Biosketch

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Provide a biosketch for the lead of the initiative. Uploaded PDF is limited to two pages; content in excess of 2 pages will not be considered in evaluation.

[Biosketch Rana](#)

Filename: Biosketch_Rana.pdf **Size:** 54.3 kB

STAMPP-HTN: SYSTEMATIC TREATMENT AND MANAGEMENT OF POSTPARTUM HYPERTENSION
Effective in Controlling Blood Pressure and Eliminating Racial Disparities in Care of Postpartum Women

A. DISPARITIES IN MATERNAL OUTCOMES AMONG BLACK WOMEN IN ILLINOIS

Maternal mortality in the United States (US) has become a major public health concern. Considerable racial and ethnic disparities in pregnancy-related mortality exist with black women dying at a disproportionately higher rates (42.4 deaths per 100,000 live births for black non-Hispanic women compared to 13.0 deaths per 100,000 live births for white non-Hispanic women) (1). According to the Illinois Maternal Morbidity and Mortality Report released in October 2018 (2), the state of Illinois has even higher rates of pregnancy related maternal deaths compared to the average in the US, with rates even higher in the city of Chicago. More importantly, in Illinois, non-Hispanic Black women are six times more likely to die of a pregnancy-related condition as compared with non-Hispanic white women, and a large proportion of deaths occur within the first six weeks of delivery (Figure. 1).

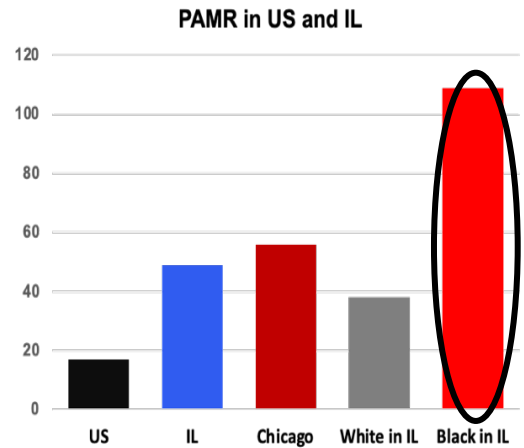


Figure 1. The Pregnancy related maternal mortality ratio (PAMR; the number of deaths that occurred for every 100,000 live births) is higher in Illinois compared to the US and is even higher among African American women in Illinois (IL).

B. CONTRIBUTORS TO RACIAL DISPARITY AMONG WOMEN WITH HYPERTENSION IN PREGNANCY

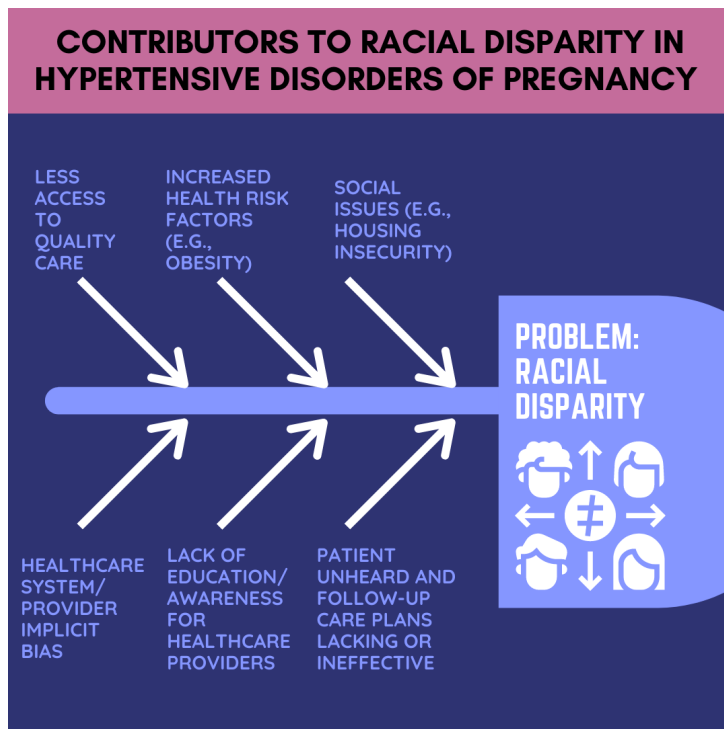


Figure 2. Multifactorial nature of disparities in hypertensive disorders of pregnancy.

C. CREATION OF AN INTERPROFESSIONAL, ORGANIZATIONAL-LEVEL DECISION-MAKING GROUP

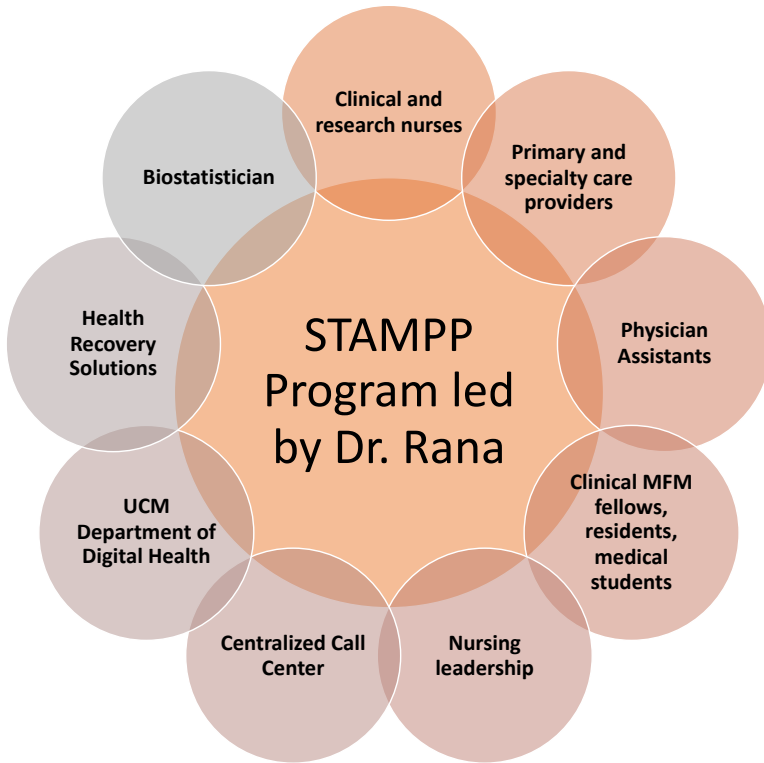


Figure 3 shows the Interprofessional, Organizational-Level Decision-Making Group created for STAMPP HTN program. Abbreviations- STAMPP-HTN- **S**ystematic **T**reatment **A**nd **M**anagement of **P**ost **P**artum **H**ypertension, UCM- University of Chicago Medicine, MFM- Maternal Fetal Medicine

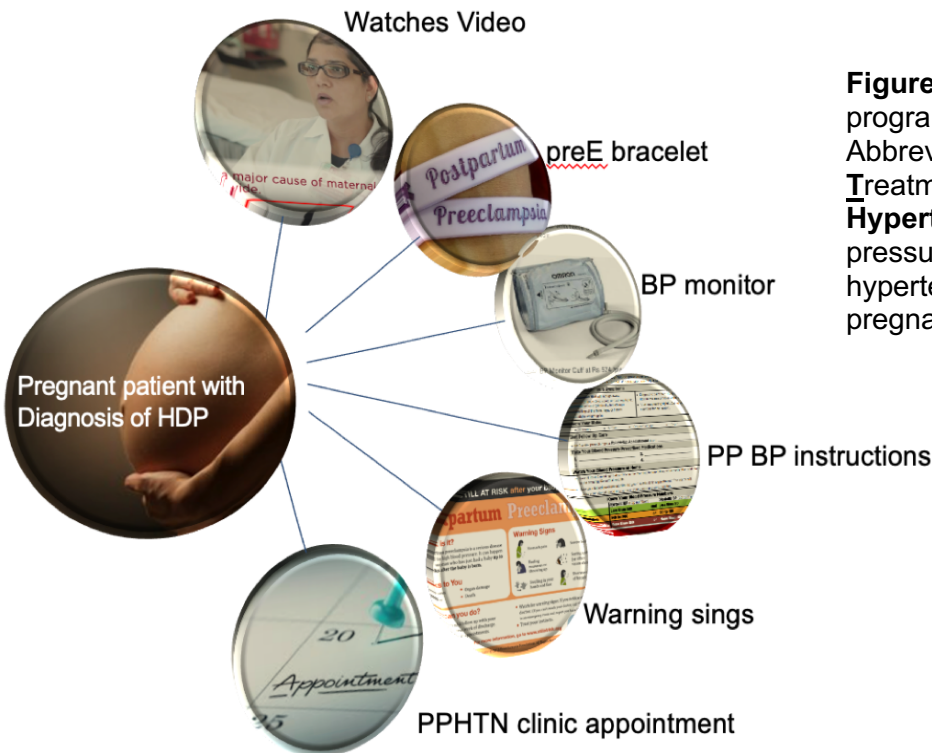


Figure 4. Components of STAMPP HTN program. Abbreviations- STAMPP-HTN- **S**ystematic **T**reatment **A**nd **M**anagement of **P**ost **P**artum **H**ypertension, preE- preeclampsia, BP- blood pressure, PP- Postpartum, PPHTN- postpartum hypertension, HDP- hypertensive disorder of pregnancy

D. TIMELINE OF STAMPP HTN BUNDLE

This bundle was created and then implemented as a series of interventions between January 2019 and September 2019 at the University of Chicago, a tertiary urban care center with a predominantly Black and publicly insured population and high prevalence of hypertensive disorders of pregnancy (**Figure 5**).



Figure 5 shows a timeline of STAMPP-HTN's development. It included a series of interventions from January 2019-September 2019.

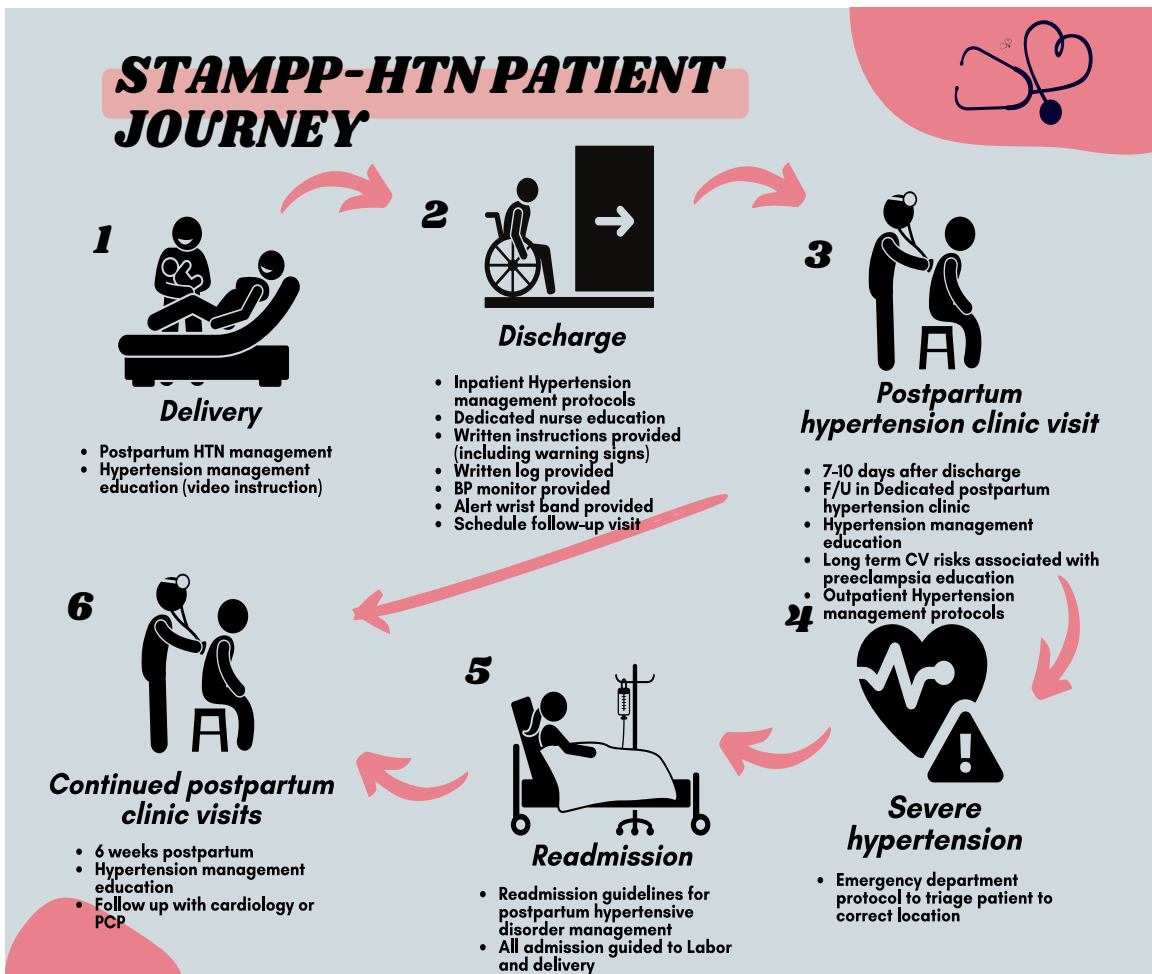


Figure 6. The patient experience and workflow adjustments during the pregnancy and postpartum period.

E. STAMPP-HTN BUNDLE SHOWED EFFECTIVENESS IN CONTROLLING BLOOD PRESSURE AND IMPROVED POSTPARTUM FOLLOW UP

These findings are published by our team (3).

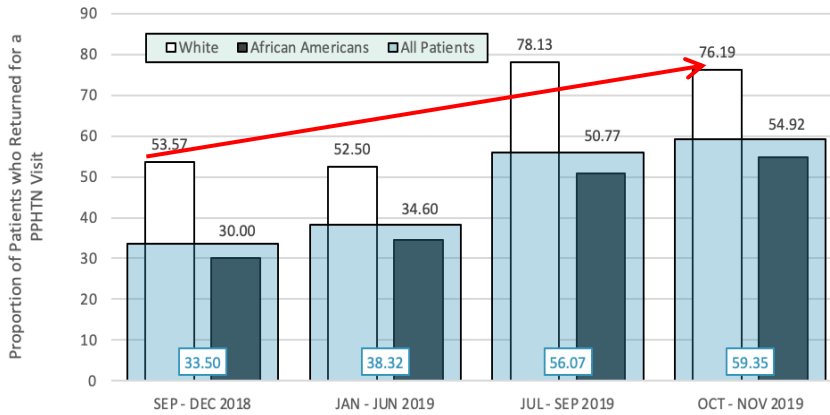


Figure 7. Improvement in follow up for PPHTN appointment after initiation of the STAMPP-HTN program. The proportion of patients who came back for a blood pressure check increased across time (59.35 % vs 33.50%, $p < 0.0001$).

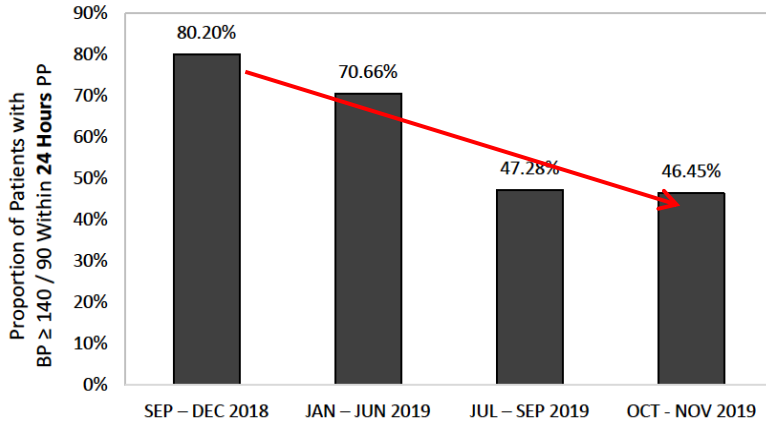


Figure 8. Across the intervention, the highest systolic blood pressures (SBP) in the first 24 hours were lower in the last period than prior to the intervention (median [IQR] 137 [131, 146] vs 149 [138, 159], $p < 0.0001$). Similarly, diastolic blood pressures (DBP) in the first 24 hours following delivery were lower in the last period than prior to intervention (84 [77, 90] vs 88 [78, 96], $p = 0.03$).

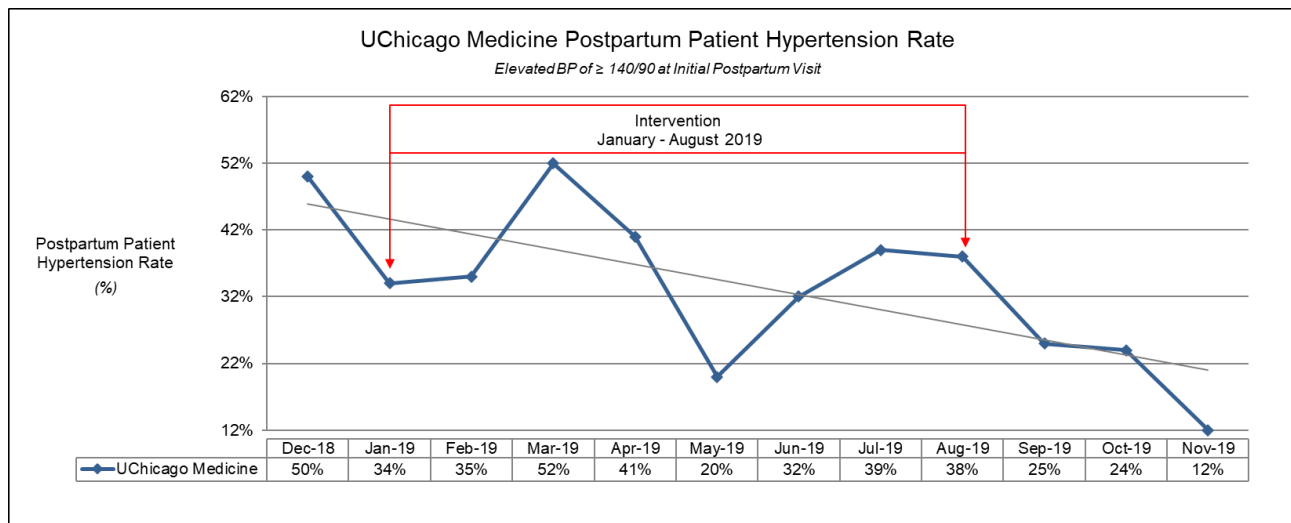


Figure 9. Significant reduction in the rates of hypertension at the postpartum hypertension visit after the implementation of STAMPP protocol.

F. STAMPP-HTN BUNDLE REDUCED INEQUALITY AND INEQUITY: ELIMINATING HEALTH DISPARITIES THROUGH TELEHEALTH findings we have published in peer-reviewed journals (4, 5).

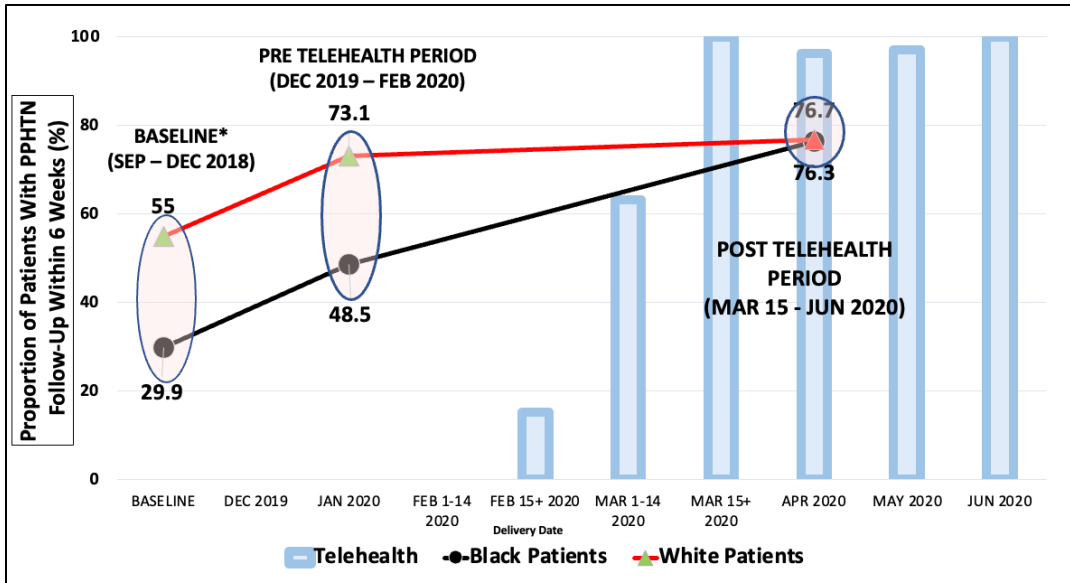


Figure 10. Transition to telehealth in the setting of an existing quality improvement initiative led to overall improvement in rates of PP blood pressure follow from 30% to 76% among black women. The dark black line is the rate of PP follow up among black women and the grey line is for white women. With telehealth, the two lines merge leading to elimination of racial disparity in PP follow up.

G. STAMPP-HTN DEMONSTRATES TO BE SUSTAINABLE AND VIABLE LONG-TERM: REMOTE PATIENT MONITORING (RPM) AS STANDARD OF CARE AT UCM

STAMPP-HTN: RPM Workflow

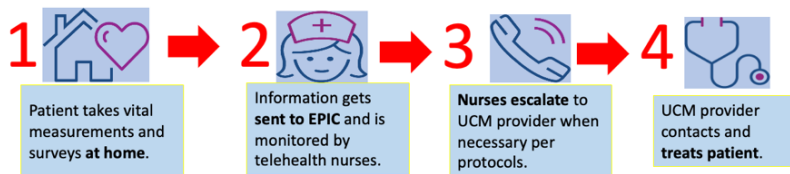


Figure 11. Workflow of Remote Patient Monitoring (RPM) program for management of PPHTN

Over lay of RPM on STAMPP HTN - our existing quality program

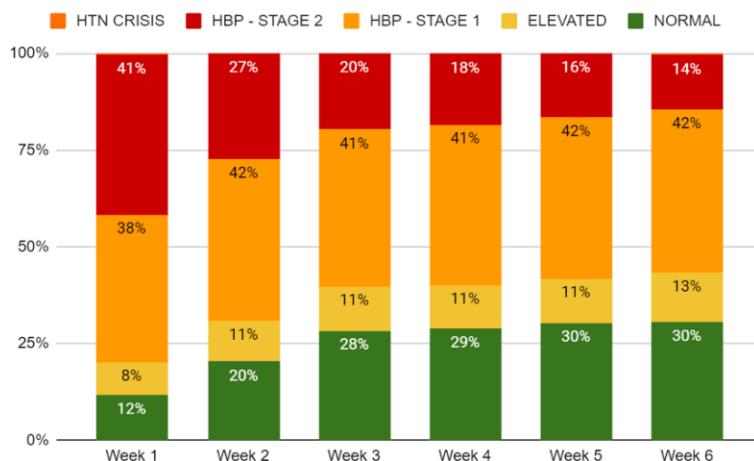


Figure 12. Data from 516 patients who have been enrolled for at least 3 weeks from 7/26/21 to 4/5/2022 showed 11,517 recordings. There was a significant reduction in HTN among patients enrolled in the STAMPP RPM program (BP >140/90 reduced from 41% at week 1 to 14% at week 6, p<0.001).

The success of the STAMPP-HTN Program has led to several high-impact publications in peer-reviewed journals (Green Journal 2021, Am J Obstetrics and Gynecology MFM 2022 and Reproductive Sciences 2022) (3,4,5), as well as invitations to various seminars and webinars for dissemination of knowledge and replication of the program nationally and internationally. The program was selected for "Nursing Excellence" by the American Nurses' Credentialing Center (ANCC) for 2022. The STAMPP-HTN Program was selected for phase I and II of the Hypertension Innovator Award Competition by the U.S. Department of Health and Human Services ("HHS"), Office on Women's Health (2021, 2022). Dr. Sarosh Rana (PI) received the University of Chicago Biological Sciences Division's Distinguished Leader in Program Innovation for her dedication and success to improve maternal health outcomes through the STAMPP-HTN program in 2022.

H. FUTURE OF STAMPP-HTN/RPM AT THE UNIVERSITY OF CHICAGO

We demonstrated that a bundled PPHTN initiative for women with a HDP improved several maternal outcomes, including decreased inpatient postpartum blood pressure, increased adherence to PPHTN visits, and fewer patients with elevated blood pressures at their PPHTN visit. More importantly this bundle eliminated disparity in postpartum care especially among Black women. STAMPP-HTN was originally implemented in January 2019; however, we have since incorporated telehealth and remote patient monitoring as part of this program. **Given its overwhelming popularity and evidence-based success, the program now serves as the standard of care at University of Chicago Medicine.** In the immediate future, we plan to evaluate the effects of the RPM program on rates of PPHTN follow up, readmissions, BP, and patient satisfaction. In addition, we are planning to collaborate with cardiologists to extend the STAMPP-HTN/RPM program period to one year postpartum to continue to care for these women beyond six weeks to mitigate the risk of long-term cardiovascular disease. In addition, we are incorporating community health workers into the program to further reduce barriers and increase access to care. Currently, Dr. Rana (PI) is working with the Illinois Department of Public Health to implement the STAMPP-HTN program at the state level as part of the Illinois Perinatal Quality Consortium's disparity reduction initiative to improve maternal and neonatal outcomes. Dr. Rana also serves as the obstetrics physician lead and a workgroup participant on the Provider Model Workstream for the South Side Healthy Community Organization in Chicago, in which the STAMPP-HTN bundle is included as a key program for improving maternal morbidity and mortality in participating hospitals in Illinois.

Currently, the STAMPP-HTN/RPM program is a standard of care at the University of Chicago Medicine and every patient with hypertension in pregnancy, who delivers at our hospital is enrolled in this program. Since January 2019 we have enrolled ~4500 patients in the STAMPP-HTN program. This quality improvement project continues to be supported by the University of Chicago Medicine (Department of Obstetrics and Gynecology and the Department of Digital Health) and Health Recovery Solutions.

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1. <https://www.cdc.gov/reproductivehealth/maternal-mortality/pregnancy-mortality-surveillance-system.htm>.
2. <http://www.dph.illinois.gov/news/illinois-releases-first-maternal-morbidity-and-mortality-report>.
3. Suresh SC, Duncan C, Kaur H, Mueller A, Tung A, Perdigao JL, et al. Postpartum Outcomes With Systematic Treatment and Management of Postpartum Hypertension. *Obstet Gynecol.* 2021;138(5):777-87.
4. Khosla K, Suresh S, Mueller A, Perdigao JL, Stewart K, Duncan C, et al. Elimination of racial disparities in postpartum hypertension follow-up after incorporation of telehealth into a quality bundle. *Am J Obstet Gynecol MFM.* 2022;4(3):100580.
5. Oladipo V, Dada T, Suresh SC, Mueller A, Khosla K, Lopes Perdigao J, et al. Racial Differences in Readmissions in Hypertensive Disorders of Pregnancy. *Reprod Sci.* 2022;29(7):2071-8.

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: Sarosh Rana

eRA COMMONS USER NAME (credential, e.g., agency login): SAROSHRANA

POSITION TITLE: Professor of Obstetrics and Gynecology, University of Chicago Pritzker School of Medicine

EDUCATION/TRAINING (*Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.*)

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
Aligarh University, Aligarh, India	M.B.B.S.	6/1995	Medicine
Aligarh University, Aligarh, India	MD	6/1999	Ob/Gyn Residency
Mayo Clinic, Rochester, MN	Internship	6/2001	General Surgery
The University of Chicago, Chicago, IL	Residency	6/2005	Ob/Gyn Residency
Brown University and Women & Infants Hospital of Rhode Island, Providence, RI	Fellowship	6/2008	Maternal- Fetal Medicine
Harvard T.H. Chan School of Public Health, Boston, MA	MPH	5/2015	Clinical Effectiveness

A. Personal Statement

I am a Professor of Obstetrics and Gynecology and the section chief of Maternal-Fetal Medicine at the University of Chicago. I am a clinician scientist and my work focuses on the prediction of adverse outcomes in women with preeclampsia, identifying disparity in obstetrical care of women, demonstrating the association of preeclampsia and long-term cardiovascular risks, identifying biomarkers to predict and strategies to mitigate long-term cardiovascular risk, and pioneering the use of the STAMPP- RPM program. While studying the role of two biomarkers (sFlt1 and PlGF) in differentiating between preeclampsia and other hypertensive disorders, I discovered that they are excellent predictors of adverse outcomes related to preeclampsia and, therefore, could be used for the risk stratification of high-risk patients (*Circulation* 2012, *HTN* 2019, *NEJM Evidence* 2022). Working with cardiologists, I also discovered that the environment of late pregnancy is anti-angiogenic and that preeclampsia is accompanied by subclinical cardiac dysfunction, the extent of which correlates with circulating levels of sFlt1 (*Nature*, 2012). This has had major clinical implications since women with preeclampsia are at high risk for future cardiovascular disease. To address the issue of postpartum hypertension and disparity in postpartum care among Black women, I established a quality improvement initiative called the Systematic Treatment and Management of Postpartum Hypertension (STAMPP-HTN) Program, which was implemented as a series of interventions at the University of Chicago. The success of the STAMPP-HTN Program has led to several high-impact publications in peer-reviewed journals (*Green Journal* 2021, *Am J Obstetrics and Gynecology* MFM 2022, and *Reproductive Sciences* 2022), as well as invitations to various seminars and webinars for dissemination of knowledge and replication of the program nationally and internationally. I have won the HHS innovator award (Phase I and II) for implementing the STAMPP program at the University of Chicago.

I have authored or co-authored 112 peer-reviewed publications. My research has been cited ~ 8900 times, and my H-index is 44. I have served on various national and international scientific organizations, such as the North American Society for the Study of Hypertension in Pregnancy, and the Medical Advisory Board of Preeclampsia Foundation, USA. I was appointed as Co-Chair, of the Global health committee and Secretary of the International society of study of hypertension in pregnancy, and Co-Chair of the Diversity, Equity, and Inclusion Committee for the Society for Reproductive Investigation. I was recently appointed to the editorial board of the journal *Hypertension*.

B. Positions and Honors

Positions and Employment

2017-	Professor and Section Chief, Maternal Fetal Medicine, Department of Obstetrics and Gynecology, University of Chicago Pritzker School of Medicine, Chicago
2014-17	Associate Professor and Section Chief, Maternal Fetal Medicine, Department of Obstetrics and Gynecology, University of Chicago Pritzker School of Medicine, Chicago
2011-14	Assistant Professor, Department of Obstetrics and Gynecology, Division of Maternal Fetal Medicine, Beth Israel Deaconess Medical Center, Boston, MA
2008-11	Instructor, Department of Obstetrics and Gynecology, Division of Maternal Fetal Medicine, Beth Israel Deaconess Medical Center, Boston, MA
2005-08	Clinical Maternal Medicine Fellow in Division of Maternal Fetal Medicine, Women & Infants Hospital of Rhode Island, Providence, RI
2001-05	Ob/Gyn Residency, University of Chicago, Chicago, IL
2000-01	Internship, General Surgery, Mayo Clinic, Rochester, MN

Selected Honors and Awards

2021-	America's Most Honored Doctor's- Top 1%
2022	Distinguished Leader in Program Innovation, University of Chicago Biological Sciences Division
2021-22	HHS Hypertension Innovator Award (Phase I and II)
2021	John D. Arnold, MD Mentor Award for sustained excellence in mentoring a Pritzker medical student
2019-	Castle Connolly's Exceptional Women in Medicine
2019	BSD Distinguished Faculty Awards, Michael Reese Lectureship, UCM, Chicago

C. Contribution to Science

The objective of my research is to better understand the biology of preeclampsia. My long-term goal is to reduce, if not eliminate, the terrible outcomes associated with this disease.

1. Reducing racial disparities during postpartum period through bundled quality initiatives

In Black women, hypertensive disorders of pregnancy (HDPs) are more common and result in greater morbidity and mortality. We have shown that black women are at a higher risk for inpatient mortality and stroke, which is particularly prevalent in Illinois (1). Controlling blood pressure in the postpartum period is critical and reduces cardiovascular disease among women. Unfortunately, follow-up compliance is often poor and historically up to 70% of women will not attend a postpartum visit. To address this issue, I established a quality improvement initiative called the Systematic Treatment and Management of Postpartum Hypertension (STAMPP-HTN) Program, which was implemented as a series of interventions from January 2019 to September 2019 to improve postpartum care for women with HDPs at the University of Chicago. Analysis of the first ~1000 patients revealed that this bundled approach led to a significant reduction of blood pressure in the postpartum period and significantly increased the rates of PP follow-up (2). We further evaluated racial disparities in readmission (3) and also showed that the inclusion of telehealth led to the elimination of disparity (4).

- 1) Shahul S, Mahmood E, Minhaj MM, Robb D, Kociol RD, Nizamuddin J, Wenger JB, Mueller A, Shaefi S, Scavone B, Tung A, Talmor D, Rana S. Racial Disparities in Maternal and Fetal Outcomes in Women with Preeclampsia/Eclampsia. *Hypertens Pregnancy*. 2015; 34(4):506-15. PMID: PMC4782921.
- 2) Suresh S, Duncan C, Kaur H, Mueller AM, Tung A, Perdigao JL, Khosla K, Dhir R, Stewart K, Wallace K, Ahn R, Rana S. Postpartum Outcomes with Systematic Treatment And Management of Postpartum Hypertension (STAMPP HTN). *Obstet Gynecol*. 2021 Nov 1;138(5):777-787. PMID: 34619718. PMC Journal - In Process. *Recipient of HHS Hypertension Innovator Award, Phase 1, 2021*.
- 3) Khosla K, Suresh S, Mueller A, Perdigao JL, Stewart K, Colleen Duncan, Oladipo V, Fess E, Hiemberger S, Rana S. Elimination of Racial Disparities in Postpartum Hypertension Follow-Up After Incorporation of Telehealth into a Quality Bundle. *Am J Obstet Gynecol MFM*. 2022 Feb 1. PMID: 35121193. PMC Journal - In Process.
- 4) Oladipo V, Dada T, Suresh S, Mueller A, Khosla K, Perdigao JL, Stewart K, Duncan C, Rana S. Racial Disparities in Readmissions in Hypertensive Disorders of Pregnancy. *Reprod Sci*. 2022 Mar 29. PMID: 35352328. PMC Journal - In Process.

Complete List of Published Work in MyBibliography:

<https://www.ncbi.nlm.nih.gov/myncbi/sarosh.rana.1/bibliography/public/>