EXECUTIVE SUMMARY

Hypertensive disorders of pregnancy are among the most common medical concerns expectant mothers face, with hypertension occurring in upwards of 22 percent of cases. More concerning, approximately 17 percent of maternal mortality in the U.S. is due to hypertensive disorders of pregnancy.

Community Health Network (CHNw) is a leading provider in Central Indiana and one of the nation’s foremost providers of maternity healthcare services. To standardize and improve the way maternal hypertension (HTN) is managed, CHNw adopted an analytics solution from Health Catalyst®. By using analytics, CHNw better understood—and could act on—opportunities to improve outcomes of maternal HTN.

RESULTS

- 79.7 percent relative reduction in OB ICU admission rate.
- 50.4 percent relative reduction in maternal readmission rate.
- 33 percent relative improvement in maternal HTN rate, per 1,000 deliveries (see Figure 2).

Maternal Hypertension: A Potential Medical Emergency

Hypertensive disorders occur in 12 to 22 percent of all pregnancies. In a widely cited estimate of the incidence of maternal mortality in the United States, approximately 17 percent are associated with maternal HTN. This number may be even higher, as rates of morbidity are believed to be underreported. Further, patients who see significant long-term effects associated with HTN are also believed to be higher than current statistics suggest.¹

For pregnant women, and those who have recently given birth, the most common reasons for an ICU admission are postpartum hemorrhage and hypertensive disorders, with patient ICU admission for HTN ranging between 0.7 to 13.5 percent, per every 1,000 deliveries.²
Given these risks, providers such as CHNw in Central Indiana, an integrated healthcare system with one of the nation’s largest maternity programs, are working to improve outcomes for expectant and new mothers. Indeed, this is a top priority at CHNw hospitals, where more than 7,800 births took place last year alone.³

**Good Data Needed to Improve Outcomes**

As experts in maternal care, the clinical leadership at CHNw were well aware of the problems hypertensive disorders create for pregnant women. Clinicians at CHNw also understood HTN during pregnancy to be a primary contributor to patient readmission after discharge, and an additional contributor to ICU admissions.

When maternal HTN rates became particularly high at one of the health system’s hospitals, Community Hospital East (CHE), an opportunity for improvement was evident. First, however, CHE leaders would need the means to better view and analyze data regarding maternal HTN rates and the impact HTN had on patient outcomes. This task was both time-consuming and expensive and final reports often lacked required detail.

CHE leadership also recognized that treatment for maternal HTN was not standardized among providers, a scenario that could potentially delay effective treatment. Further, over the years, clinicians and registered nurses at CHE had operated under the direction that the most effective treatment for HTN during pregnancy is the safe delivery of the fetus and a healthy placenta. In other words, clinical staff held a common belief that “delivery is a cure.” While it is true that birth is often a cure for maternal HTN, more recent literature has illustrated the positive impact that timely administered antihypertensive agents have on outcomes. There is also now a greater understanding of the need for continued evaluation and management during the post-partum period.

Leaders and clinicians wanted to assure these and other best practices were part of how maternal HTN was managed at CHE. They also sought a way to use data to determine where improvement efforts were most needed and to analyze and measure the impact of potential improvement efforts.

**New Insights Facilitate Improvement Projects**

To access and leverage the right data, CHNw implemented an analytics platform built using a Late-Binding™ Enterprise Data Warehouse (EDW). The EDW integrates clinical, financial, and operational data from across the enterprise, which was fed into a Cohort Builder analytics application.
Drilling down into the data. Clinicians, clinical analysts, and improvement project leads use Cohort Builder to view meaningful data and uncover newfound insights into patient populations and outcomes of care. At any time, users can identify and analyze patient populations at multiple levels of granularity, including patient-centric data, such as demographic information, medical conditions, a list of the patient’s medications, lab results, care instructions, and more. Episode-centric data—or data related to a specific patient encounter, such as HTN, hemorrhage, or stroke—can be viewed independently, while billing information associated with a specific patient encounter is also easy to access (see Figure 1). With the implementation of the analytics platform, leaders and clinicians at CHE were able to analyze their performance and identify opportunities for improving the identification and management of maternal HTN.

Uncovering opportunities for improvement. By using analytics, CHE better understood the improvement opportunity for maternal HTN, identifying, for the first time, the overall rate of HTN among pregnant women receiving care from CHE. Analytics also provided new insights. Initially, for example, CHE had selected readmissions as the outcome measure for improvement, until a close review of the data prompted leaders to aim for decreasing overall rates of HTN and associated ICU admissions. Essentially, the data indicated both a high volume of patients presenting to CHE with maternal HTN and variation in their care. This information strongly supported the case for change.

![Figure 1. Sample patient data as seen from Cohort Builder](image)
Reducing unwanted variation through data-driven best practices. The inter-professional care team at CHE, made up of a physician champion, nursing leaders, registered nurses, and other clinical team members, was responsible for improving care processes and outcomes for patients with maternal HTN. Following a review of recent medical literature and the hospital’s current practices, the team chose to standardize care processes via the California Maternal Quality Care Collaborative Preeclampsia Toolkit. Using this evidence-based toolkit required CHE to make substantial changes across the continuum of care, including:

- **Standardization for when and how blood pressures are obtained.** This would assure accurate, consistent measurement in every care setting, including the clinic, emergency department, and inpatient unit.

- **Standardized workflows for evaluation and treatment of antepartum and postpartum HTN in the emergency department.** Here the team included algorithms for rapid transfer to the labor and delivery unit.

- **Standardized assessments, evaluation, and treatment of antepartum and postpartum preeclampsia.** These included standardized order sets, protocols, policies, procedures, and algorithms.

- **Standardization of antihypertensive agents.** This measure would make sure that patients within the same population received similar interventions.

- **Standardization of a medication toolbox.** Now medications and supplies would match HTN best practice protocols.

### Ensuring adoption of new care processes

After reviewing all data and devising new standards for the management of maternal HTN, the team developed a multidimensional strategy to fuel the adoption of the new care processes. The physician champion spearheaded physician education and implementation efforts, presenting the evidence at department meetings in addition to one-on-one conversations with other clinicians.

To prepare nursing and other clinical staff for subsequent improvements, education was provided with detailed information on how the specific changes would work within the care setting. Staff education was designed to meet the distinct and varied needs of each specific clinical role, and each department received a unique education into how these new policies would alter care processes in the clinic, emergency department, inpatient unit, and elsewhere.

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Cohort Builder provides me easy access to data that I have not had before. It’s easy to drill down to the patient level detail and see who was readmitted for hypertension, if we’re sustaining our performance, or if additional reinforcement and communication is needed.

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Perinatal Clinical Nurse Specialist

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The use of simulations was also effective—in fact, it was the key—to gaining widespread adoption of the new processes. As an example, team members from all over CHE practiced the management of severe HTN and eclamptic seizures in a controlled setting. This and other simulations provided the interdisciplinary team an opportunity to test new policies and procedures in a realistic environment, without potentially putting patients at risk.

Throughout the implementation and adoption of the new standards, analytics were used to monitor the impact on outcomes, providing evidence for the benefits brought about by improving workflow and developing new best practices. After reviewing all results, CHE was able to further enhance communication with patients and better coordinate effective treatments for maternal HTN, assuring the new standards were as positive as they could be for clinical staff and patients.

RESULTS

Fueled by meaningful data from the new analytics platform, standardized best practices were adopted among all providers and nursing staff at CHE Maternity and the CHE Emergency Department. With a system in place to support sustained change, outcomes for pregnant women who suffer from HTN were substantially improved.

- 79.7 percent relative reduction in OB ICU admission rate.
- 50.4 percent relative reduction in maternal readmission rate.
- 33 percent relative improvement in maternal HTN rate, per 1,000 deliveries (see Figure 2).

Figure 2. Maternal hypertension rates at Community Hospital East, per 1,000 deliveries.

This project highlights the incredible importance of the interdisciplinary team working together to improve care processes and outcomes of care.

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WHAT’S NEXT

Following the successful outcomes improvement at CHE, CHNw implemented the same evidence-based practices at Community Hospital South, Community Hospital North, Community Howard Regional Health, and Community Hospital Anderson. Because of the continued successes in reducing the overall rate of maternal HTN, severe HTN is occurring much less frequently. The interdisciplinary team is focused on sustaining these outcomes improvement and providing ongoing communication and reinforcement of best practices in caring for maternal patients.

REFERENCES


ABOUT HEALTH CATALYST®

Health Catalyst® is a mission-driven data warehousing, analytics, and outcomes improvement company that helps healthcare organizations of all sizes perform the clinical, financial, and operational reporting and analysis needed for population health and accountable care. Our proven enterprise data warehouse (EDW) and analytics platform helps improve quality, add efficiency and lower costs in support of more than 50 million patients for organizations ranging from the largest US health system to forward-thinking physician practices.

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