Maternity Care Center at Chatham Hospital

By

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A Capstone Paper submitted to the faculty of
the University of North Carolina at Chapel Hill
in partial fulfillment of the requirements
for the degree of Master of Science
in the Physician Assistant Program

Chapel Hill

December 2018

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Scope of the Project

There is a population health need for a family medicine staffed low-risk birthing unit at Chatham Hospital in Siler City, NC to provide obstetric services to the surrounding rural community. This paper will explore the literature surrounding Low-risk birthing units (LRBU), data regarding obstetric care in rural communities, and birth data located in the area of influence surrounding Chatham Hospital. The goal is to determine whether a LRBU is a sustainable model at Chatham Hospital, and the allocation of resources necessary to achieve this. It was necessary to make these determinations to create a predictive model to determine potential patient volumes, pertinent demographics, and patient-related considerations in pursuit of establishing this service.

Background

Adequate and accessible perinatal services are imperative to the wellbeing of women and newborns. Childbirth is the most common cause for hospitalization in the U.S.[1] Despite this statistic rural hospitals are not offering obstetric services or are closing their doors, at a substantial rate.[2] A study of 27 rural hospitals with birthing units found that the top reasons for closures were staffing issues and low birth volume which accounted for 79% and 47% respectively.[3] As the number of physicians providing obstetric care decreases in rural areas the infant mortality rate increases. The loss of one family physician delivering babies in a rural county will increase infant mortality by 2.3%.[4]

From the 1980's to 2002 rural counties in the U.S. without obstetric (OB) care went from 24% to 44%. The lack of OB care in rural counties continued to worsen, showing a decrease of OB services by 33% from 1995-2012.[5] As a result, the availability of services compared to birth distribution is causing a growing disparity. Nearly six million women live in rural counties

without obstetricians. Of those women, 80% also do not have access to a hospital with OB services. As access to care decreases and distance of travel increases, perinatal mortality and adverse outcomes increase.[2] In a study of roughly 3,265 hospitals organized by birth-volume, the top 30.3% (1000 hospitals) accounted for roughly 69.2% of births. The remaining 2265 hospitals (roughly 70%) accounted for 30.8% of births.[2]

Importance of birth volume

Birth volumes have a significant impact on resource availability and hospital utilization. No standard definition exists for stratifying annual birth rates. A thorough literature review revealed that the most accepted numerical values tied to birth volumes are:

- < 100 annual births is low volume
- 100-250 is medium volume
- 250-450 is medium-high volume
- >500 is high volume.

Lower annual birth volumes show increases in both infant and maternal mortality rates.[1] Birth volumes correlate directly to population density; thus, low birth volumes are associated with rural areas, while high birth volumes are associated with urban areas.[6] As volume decreases, proficiency of the labor and delivery units decrease, demonstrating a direct relationship. Multiple challenges arise as birth volume decreases, such as lack of preparedness, a decrease in resources, and provider and nursing shortages. Rural areas have higher fluctuations in patient load, making it difficult to maintain steady birth volumes.[6] Local hospitals are often bypassed by patients to access larger facilities with more resources.[2]

Provider Trends

Obstetric services are organized most often into multidisciplinary teams.[7] Obstetricians, Family Physicians, General surgeons, and Midwives provide perinatal care. As previously demonstrated, there is a direct relationship between an increase in birth volumes and urban areas. In rural areas with low birth volumes, the primary providers of obstetric services tend to be family physicians. As the volume increases and shifts to urban areas, obstetricians tend to be the physician providing this service. Nearly 55% of low volume rural hospitals employ family physicians as primary obstetric providers.[8] Rural obstetric care is thus dependent on family physicians, yet the number of family physician perinatal visits decreased by nearly 50% over a 10-year span.[9] Fewer numbers of family physicians are continuing to include obstetric care as part of their practice, and 98% of rural hospitals report staffing challenges related to retaining physicians, whether obstetricians or family physicians.[6] In North Carolina from 2000-2004, 40 counties lost providers who perform deliveries.[10] One study determined that the decline in rural providers is due to lack of government initiatives on rural care, the academic influence leading rural medicine to be undervalued, and the discouragement of students for pursuing careers in these underserved areas.[11] This dilemma can be combated with residency programs and a mandate to train in rural communities.[11]

Development of Critical Access Hospitals

In 1997 the US government began an initiative to promote healthcare infrastructure in rural communities by licensing hospitals as Critical Access Hospitals (CAHs). A large percentage of patients treated at CAHs have Medicaid and Medicare. These hospitals are reimbursed at 101% of the cost to help offset the expenses and bridge the gap in the lack of care.[2]

Historically, CAHs and rural non-CAHs have been the two types of hospitals with obstetric services in rural locations. In general, across these types of rural hospitals, the number of obstetric providers is significantly lower than that of urban hospitals.[3] As a result, family physicians are providing more obstetric care in these remote areas.[8] In a study of 216,076 rural women, 25.4% gave birth at a non-local hospital.[12] Of the 25.4%, many of the women required maternal-fetal medicine or consultation with another medical specialist due to complications of the pregnancy.[5] In addition to requiring a higher level of care, roughly 50% of these women also had Medicaid rather than a private insurer.[5,13] Of the women requiring a higher level of care, Medicaid patients had a more substantial number of limiting factors including low-income levels preventing them from accessing the higher level of care they needed.[12] According to the American Academy of Family Physicians, 17.3% of rural family medicine patients use Medicaid across the nation. When viewing the South Atlantic region as a whole, which includes North Carolina the percentage increases to 33%.[10] This perpetuates the current situation of limitations and barriers to care in this uninsured population. This limits the access to care, as many providers will not accept Medicaid patients.[10]

Levels of Maternity Care

The need for an integrated maternity care system on a regional or national level has been identified to improve health outcomes. Birthing units can function as stand-alone facilities or can be incorporated into a hospital system and must follow the International Health Facility Guidelines to be within regulatory compliance. Birthing units are categorized by the level of care they provide.[14] Organizations such as the American College of Obstetricians and Gynecologists and Society for Maternal Fetal Medicine have started to establish set criteria by region to standardize maternity care facilities and the services they provide[15]. Maternity care facilities are

categorized by definition, capabilities, and health care providers into 5 different levels; Birth centers, Level I (Basic Care), Level II (specialty care), Level III (subspecialty care), and Level IV (regional perinatal healthcare centers) (Appendix 1, ACOG Table 1-2).[15] With proper classification, facilities are able to establish their specific scope of practice and develop standardized criteria which will improve neonatal outcomes.

Chatham Hospital and Obstetric Care

Chatham Hospital is the sole hospital in Chatham County, North Carolina. This facility is a CAH located in the town of Siler City, the largest municipality and one of four incorporated towns within Chatham County. The hospital with the exception of the surgical department, is staffed entirely by The University of North Carolina's Department of Family Medicine. The hospital currently has an emergency department, a medical inpatient service, an intensive care unit, and part time surgical services along with lab, imaging, and cardiac testing services. Chatham County located in the center of the state (Figure 1), has a population of 60,000 residents as of 2013 with 8,169 residents living within Siler City.[16] The county has 66% of residents living in rural areas with 93.1 persons per square mile compared to the state of North Carolina as a whole averaging 196.1 persons per square mile.

Figure 1. Location of Chatham County, NC.[a]

[a] Adapted from Google images

In 2014, the Chatham County community health assessment determined that access to healthcare is one of the top three priorities.[16] Chatham Hospital is the only hospital within a 25-mile range of Siler city, and currently does not offer obstetric care. Therefore, there are no

hospitals in Chatham County that currently provide labor and delivery services. Chatham County's primary care providers per 1000 residents has been decreasing over time and was 0.5 in 2011, compared to 0.8 within the state of North Carolina. Chatham Hospital suffers from the aforementioned difficulties of staffing and declining trends of providers in rural areas. Declining trends of providers, compounded with lack of access to care, and the absence of hospital obstetrical care in the county, set the stage for a crucial deficiency in quality healthcare.

As a response to combat the provider shortages and improve access to care within Chatham County, UNC Family Medicine is expanding their family medicine residency program to Chatham Hospital and the surrounding community. This effort will promote rural healthcare while exposing new providers to the area in an effort to decrease provider shortages, while increasing access to care, and training new providers in rural medicine. With the implementation of the residency program and the long-standing history of family medicine providers providing obstetric care in rural communities, the consideration for offering obstetric services and training at Chatham Hospital has arisen.

METHODS

A thorough review was conducted using PubMed, UpToDate, CINAHL, and Google Scholar. Individual searches were conducted to identify current news and articles pertaining to LRBUs, maternity care centers, closures of CAH's, and rural birthing data. A search of references listed in the primary articles was conducted. After the search was concluded 824 articles were identified in total with key words and MESH terms (Appendix 2). Out of the total 824 articles, 98 were determined to be relevant and reviewed for this paper and 16 research articles were included as direct references. The articles identified were not systematic reviews,

randomized control trials, prospective cohort studies, or meta-analyses and therefore did not require a critical appraisal.

Development of a Care Model at Chatham Hospital

To identify if a LRBU is a sustainable care model at Chatham Hospital a key stakeholder analysis was conducted. This involved UNC Hospital and Chatham Hospital leadership, members of the community, and practicing medical providers. The Chatham Hospital quality improvement team was then consulted and a project charter was completed assigning tasks and deadlines to all members involved. Key areas of focus were identified, to include:

(1) Understanding Chatham Hospital's area of influence

(2) Creating a historic and predictive model to forecast the potential number of births per year at Chatham Hospital using the identified area of influence

(3) Establishing Low-risk birth parameters for the unit

(4) Identifying a staffing model with a successful track record

(5) Determine the logistics needed to support the new unit.

Key stakeholders, with the help of Truven Health Analytics (a company that provides healthcare data and analytic services), wanted to identify zip codes within Chatham County that are close in proximity and also have residents who use Chatham Hospital. These zip codes needed to be geographically located closer to Chatham Hospital than other nearby hospitals and have a large percentage of patients who receive care in Siler City at Chatham Hospital or surrounding clinics. All patient data related to the identified zip codes for fiscal years 2015-2017 was then obtained. A market share analysis was conducted to determine the breakdown of patient by healthcare system (Table 1). The results from Table 1 were then used to create the predictive model for potential annual births at Chatham Hospital.

Table 1. Total Births by Healthcare System Fiscal Year 2015-2017.*

HOSPITAL SYSTEM	Births
UNIVERSITY OF NORTH CAROLINA HOSPITALS	1143
RANDOLPH HOSPITAL	278
CONE HEALTH	267
ALAMANCE REGIONAL MEDICAL CENTER	220
CENTRAL CAROLINA HOSPITAL	129
FIRST HEALTH MOORE REGIONAL HOSPITAL	63
WAKEMED CARY	56
DUKE REGIONAL HOSPITAL	52
DUKE UNIVERSITY MEDICAL CENTER	51
REX HEALTHCARE	39
NOVANT HEALTH FORSYTH MEDICAL CENTER	27
HIGH POINT REGIONAL HOSPITAL	17
WAKEMED	8
CHATHAM HOSPITAL	3
JOHNSTON HEALTH CLAYTON	2
NOVANT HEALTH THOMASVILLE MEDICAL CENTER	2
CAPE FEAR VALLEY HEALTH SYSTEM	1
NEW HANOVER REGIONAL MEDICAL CENTER	1
WAKE FOREST BAPTIST HEALTH - WILKES MEDICAL CENTER	1
WAKE FOREST BAPTIST MEDICAL CENTER	1
Grand Total	**2361**

*Data Adapted from Truven Health Analytics

The data received from Truven Health Analytics was first broken down by International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM) codes related to births. It was then organized by zip code, type of encounter, healthcare system, primary payer, diagnostic code, and diagnosis description. A statistical analysis was then completed using the data to determine the number of births per fiscal year broken down by the aforementioned categories. The resulted numbers were then used as the historical birth data in forecasting future birth rates at Chatham Hospital.

Birth data is divided into low and high risk. There are no set criteria for categorizing birth risk stratification, but rather it is completed on an individual facility basis. Therefore, a group of knowledgeable stakeholders and clinicians from UNC Department of Family Medicine determined the criteria as a group, utilizing existing practice guidelines and clinical experience (Table 2).

Table 2. Birth Risk Stratification.

Low Risk	High Risk
Term birth[1]	HIV
Live Birth	Maternal heart disease
Singleton	Fetal brain malformation
Vertex position	Eclampsia
No previous Cesarean	Retroverted uterus
No high risk diagnosis	Failed forceps or vacuum extraction
Maternal age[2]	Umbilical cord prolapse
	Vasa previa & placenta previa
	Uterine rupture
	Maternal age[3]

[1] greater than or equal to 37 weeks
[2] less than 35 years old
[3] greater than 35 years old

The historical data collected over fiscal year 2015-2017 was then broken down into three categories by the previously mentioned stakeholders:

1. Meets criteria for Chatham Hospital's proposed LRBU

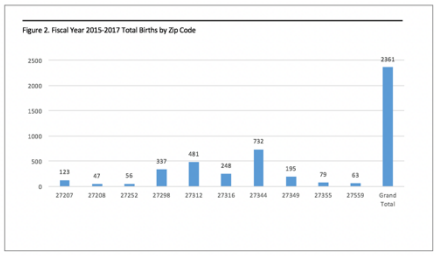
2. Does not meet Criteria for Chatham Hospital's LRBU

3. Unable to determine whether criteria are meant for Chatham Hospital's LRBU.

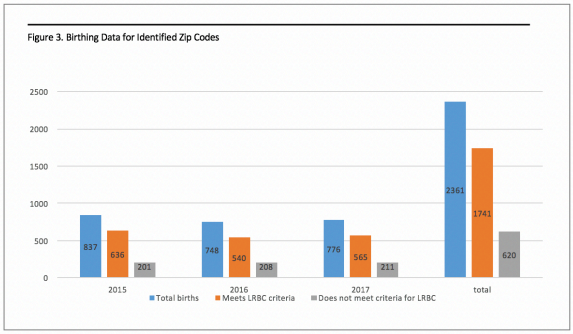
If the patient encounter could not be categorized with the existing data, the encounter was placed into the third undetermined category. Next, existing staffing model challenges were identified and reviewed to assist in establishing a successful staffing model at Chatham Hospital. Also, meetings were established with an architect to determine logistical and engineering requirements for the hospital and to review state regulations regarding birthing rooms and mandated requirements for the proposed unit.

Data Analysis

The data received from Truven Health Analytics identified 10 primary zip codes surrounding Chatham Hospital. The statistical analysis of the 10 primary zip codes identified 2,361 total births from fiscal years 2015-2017 (Figure 2).



Comparison of the birth data year-to-year showed no statistical significance. A total of 15 ICD-10-CM codes were identified related to births. The 2,361 births were then categorized by the identified ICD-10-CM codes (Table). Of those, 620 births (24%) were identified as high risk following the previously mentioned birth risk categorization established by the UNC Department of Family Medicine at Chatham Hospital and did not meet the requirements set for the proposed unit. 1,741 births (74%) were then classified as low risk and could have been successfully managed by an LRBU (Figure 3).



A market share analysis was then completed of the 1,741 low-risk births that could have potentially delivered at Chatham Hospitals LRBU. The market share analysis separated the births by the hospital system where they occurred (table 3).

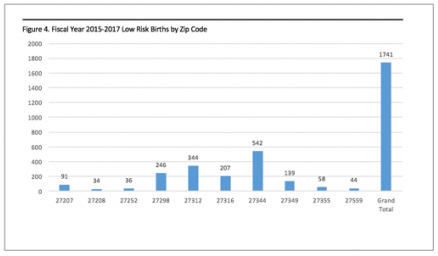
Table 3. Births by Healthcare System Fiscal Year 2015-2017 That Meet LRBU Criteria.*

HOSPITAL SYSTEM	Births
UNIVERSITY OF NORTH CAROLINA HOSPITALS	787
RANDOLPH HOSPITAL	243
CONE HEALTH	194
ALAMANCE REGIONAL MEDICAL CENTER	167
CENTRAL CAROLINA HOSPITAL	98
FIRST HEALTH MOORE REGIONAL HOSPITAL	58
WAKEMED CARY	50
DUKE REGIONAL HOSPITAL	40
DUKE UNIVERSITY MEDICAL CENTER	30
REX HEALTHCARE	29
HIGH POINT REGIONAL HOSPITAL	15
NOVANT HEALTH FORSYTH MEDICAL CENTER	12
WAKEMED	6
CHATHAM HOSPITAL	3
OTHER	3
JOHNSTON HEALTH CLAYTON	2
NOVANT HEALTH THOMASVILLE MEDICAL CENTER	2
WAKE FOREST BAPTIST HEALTH - WILKES MEDICAL CENTER	1
WAKE FOREST BAPTIST MEDICAL CENTER	1
GRAND TOTAL	**1741**

*Data Adapted from Truven Health Analytics

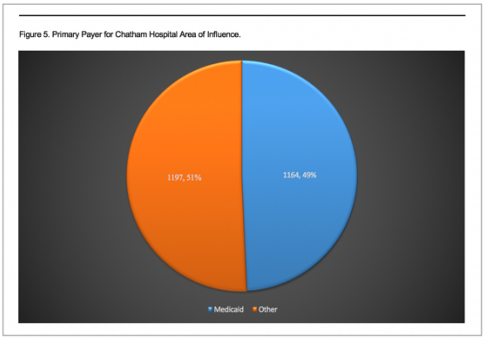
The analysis identified that out of the 1741 births, 787 births occurred at UNC and 3 births occurred at Chatham Hospital's ED, showing a total of 790 births (45.4%) occurred within the UNC system over fiscal year 2015-2017.

The 1,741identified as low-risk births were then broken down by individual zip code (Figure 4).



The area immediately surrounding Chatham Hospital, the 27344 zip code, had the highest number of births over the three-year period out of the identified area of influence with 738 births. Out of the 738 births within zip code 27344, 488 (66%) of the patients giving birth had Medicaid as their primary insurer. Medicaid was also

identified as the primary insurer for 49% of all births throughout Chatham Hospitals area of influence (Figure 5).



DISCUSSION

Currently, there are no intrapartum services located in Chatham County. Chatham Hospital may be able to address this deficit. The data is insufficient to truly capture the market share potential for an LRBU at Chatham Hospital, though provides a general idea of anticipated volumes. The statistical analysis reviewing birth data for Chatham Hospital's area of influence demonstrated roughly 790 total births per year throughout fiscal years 2015-2017, with roughly 580 births per year meeting the selection criteria for the proposed Level I Maternity Care Unit or LRBU. The zip code immediately surrounding Chatham Hospital, 27344 accounted for roughly 244 births per year, with 180 of those yearly births meeting the criteria for the proposed birthing unit. Therefore, 31% of yearly births that meet the proposed LRBU criteria reside in the immediate area surrounding Chatham Hospital and have the most significant geographical limitation of access to care. When considering the primary insurer for these births, Medicaid accounted for 66% percent of the births within zip code 27344. Medicaid insurance status has shown to be associated with lower socioeconomically status and increased barriers to care.[12] Therefore, a significant improvement is necessary to enhance access to care and decrease patient

burden by offering essential maternal care services with the proposed LRBU at Chatham Hospital.

Current birthing units in rural areas are functioning as low volume centers with less than 100 births per year. If Chatham hospital obtains 15% market share of historical births, they would be considered a low volume birthing center and have 87 deliveries annually. Twenty percent of market share would increase the hospital to a medium volume unit with 116 annual deliveries. It is important to consider that the population in the immediate area is predicted to continue to grow. Currently, a new chicken processing plant will open in 2019 in Siler City that will bring roughly 1250 jobs into the area. Considering the increasing population and taking into account unofficial records of historical data from the birthing unit in Siler City that closed in 1996, which delivered 200 annual births its last year before shutting their doors; it is imperative to plan for 250 annual births to ensure that the hospital and new unit will be equipped to handle the potential patient load. Currently, UNC's Department of Family Medicine is expanding their residency program at Chatham Hospital and the surrounding community. This includes Piedmont Health Services and Siler City Community Health Center (FQHC). These actions will assist in achieving the projected annual birth numbers. Chatham Hospital currently does not have the physical space to accommodate a new LRBU. Therefore, the hospital will need to make a substantial financial investment in the development of the new unit. Building plans have to include a calculation for growth to ensure preparation for exceeding current projections of 116 annual births. If Chatham Hospital does not account for growth, as the unit surpasses 116 annual births, patients will have a decrease in health outcomes as well as a decrease and mortality, due to the lack of resources and space needed to manage antepartum, intrapartum, and postpartum patients properly.

Birth risk stratification was an essential consideration in determining the predicted demand and use of an LRBU at Chatham Hospital. The established criteria for low and high-risk births in Table 2 should be viewed as objective data and considered a minimum set of criteria. The criteria must be adhered to, with no exceptions to prevent unnecessary risk and adverse maternal and neonatal outcomes, as well as to remain in compliance with the current recommendations of ACOG and SMFM. However, the criteria are not all-inclusive, and each patient will need to be assessed individually to determine the care they need. If the care needed exceeds the capabilities provided at the LRBU the patient will transfer to a facility with more capabilities. If a patient needs to transfer due to a high-risk pregnancy, established relationships with the labor and delivery unit at UNC Hospital and other surrounding hospitals is imperative.

For improvement of inpatient continuity of care, the classification amongst multiple maternity centers in the area needs to be standardized. For this reason, Chatham Hospital should follow the classification determined by the ACOG for the level of care at the new unit. Following these guidelines will also provide a clear understanding of the unit and the services provided. Following the ACOG classification, Chatham Hospital would function the most optimally as a level I Maternity Care Center. The hospital will need to provide a full-time family medicine provider on site that is certified to perform emergency cesarean sections or staff an on-call obstetrician to support a midwife or family physician who does not perform cesarean sections, along with having 24/7 access to anesthesia or CRNA, operating rooms, and the ability to perform emergency cesarean sections. The criteria mentioned above in addition to following the International Health Facility Guidelines will provide the groundwork for a successful maternity care center at Chatham Hospital.

Due to the difficulties of delivering adequate care and the mortality rates associated with LRBUs many considerations will affect the success of the unit. A mixed care model, to include nursing staff trained in obstetric care and other units is essential. Chatham Hospital is a CAH located in a rural setting and is more prone to fluctuating patient numbers. It is going to be imperative that the staffing model at the hospital involves a flexible cross-trained staff that can function in multiple departments. One of the leading causes of LRBU closures at CAH's and other hospitals is staffing challenges. The hospital should begin to train current employees as soon as feasible to overcome staffing challenges and develop/implement a training curriculum that ensures a cross-trained staff in all necessary departments. No survey was conducted to establish the acceptance rate by current employees at Chatham Hospital or within the community. These surveys are imperative before implementation of a LRBU at Chatham Hospital.

Due to the location of the hospital and the challenge of provider staffing in a rural facility, family medicine physicians should be the primary providers of obstetric services at Chatham Hospitals proposed LRBU with the assistance of an obstetric provider. The department of family medicine currently accounts for 100% of provider staffing in the Emergency Department and inpatient units at Chatham Hospital. A significant percentage of the providers work both on the inpatient service team as a hospitalist and also in the Emergency Department. The current staffing model at Chatham Hospital would be both efficient and economical compared to staffing a subspecialty service and should be implemented with the LRBU. Continuing the current staffing model, with the support of a family medicine physician certified to perform cesarean sections or an obstetrician, and well-trained nursing staff will significantly decrease the initial financial burden and make the LRBU more sustainable. UNC's Family Medicine's residency

program should commit to OB services and a presence at Chatham Hospital. Expanding the residency program to include Chatham Hospital's new LRBU will afford medical providers in training the opportunity to work in a rural area, promote rural health, and improve the staffing challenges from provider shortages. Lastly, establishing staffing requirements, anesthesia, surgical abilities, strict criteria for identifying low-risk births, and follow-up care will ensure success.

NEXT STEPS

The statistical data supports the need for a LRBU/Maternity care center at Chatham Hospital. Moving forward the level of support must be established by surveying all key stakeholders. Key stakeholders include current healthcare providers at Chatham Hospital, healthcare providers in the community and surrounding area, and the population in the local community within the ten zip codes identified as Chatham Hospital's area of influence. Before the investment of the new unit, it is essential to determine the community's views and interests as well as that of the current employees. If there is not a significant amount of buy-in from the local population, then the likelihood of success with the implementation will decrease. To understand the interests of the local populace demographics and culture will play a significant role. The Hispanic population comprises 20% of the total population within the area of interest, with a vast majority using Spanish as a primary language. Language barriers and cultural concerns such as interpreter services are an essential consideration when creating the unit. Employee support is also crucial to a successful LRBU. A mixed care model with a flexible staff is needed for the unit to be successful, conversely, if current employee buy-in is low, Chatham Hospital will not be able to overcome staffing challenges.

Appendix 1

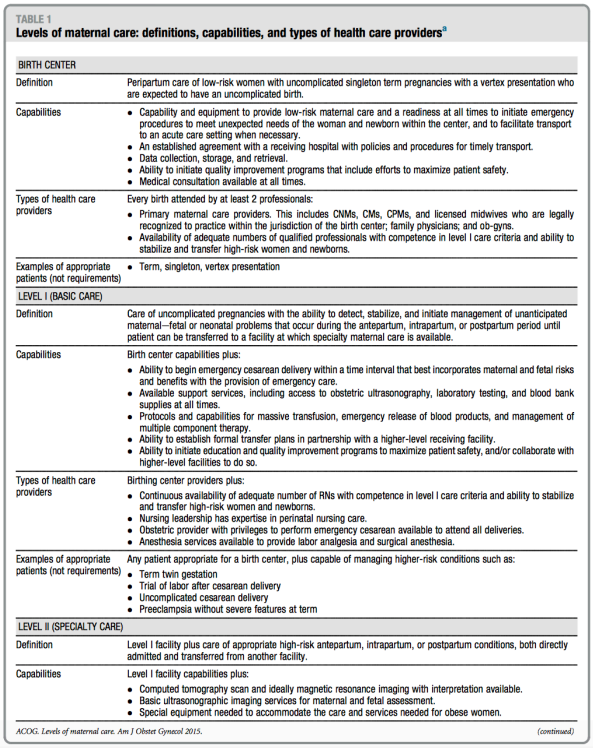


TABLE 1
Levels of maternal care: definitions, capabilities, and types of health care providers[a]

BIRTH CENTER	
Definition	Peripartum care of low-risk women with uncomplicated singleton term pregnancies with a vertex presentation who are expected to have an uncomplicated birth.
Capabilities	• Capability and equipment to provide low-risk maternal care and a readiness at all times to initiate emergency procedures to meet unexpected needs of the woman and newborn within the center, and to facilitate transport to an acute care setting when necessary. • An established agreement with a receiving hospital with policies and procedures for timely transport. • Data collection, storage, and retrieval. • Ability to initiate quality improvement programs that include efforts to maximize patient safety. • Medical consultation available at all times.
Types of health care providers	Every birth attended by at least 2 professionals: • Primary maternal care providers. This includes CNMs, CMs, CPMs, and licensed midwives who are legally recognized to practice within the jurisdiction of the birth center; family physicians; and ob-gyns. • Availability of adequate numbers of qualified professionals with competence in level I care criteria and ability to stabilize and transfer high-risk women and newborns.
Examples of appropriate patients (not requirements)	• Term, singleton, vertex presentation
LEVEL I (BASIC CARE)	
Definition	Care of uncomplicated pregnancies with the ability to detect, stabilize, and initiate management of unanticipated maternal–fetal or neonatal problems that occur during the antepartum, intrapartum, or postpartum period until patient can be transferred to a facility at which specialty maternal care is available.
Capabilities	Birth center capabilities plus: • Ability to begin emergency cesarean delivery within a time interval that best incorporates maternal and fetal risks and benefits with the provision of emergency care. • Available support services, including access to obstetric ultrasonography, laboratory testing, and blood bank supplies at all times. • Protocols and capabilities for massive transfusion, emergency release of blood products, and management of multiple component therapy. • Ability to establish formal transfer plans in partnership with a higher-level receiving facility. • Ability to initiate education and quality improvement programs to maximize patient safety, and/or collaborate with higher-level facilities to do so.
Types of health care providers	Birthing center providers plus: • Continuous availability of adequate number of RNs with competence in level I care criteria and ability to stabilize and transfer high-risk women and newborns. • Nursing leadership has expertise in perinatal nursing care. • Obstetric provider with privileges to perform emergency cesarean available to attend all deliveries. • Anesthesia services available to provide labor analgesia and surgical anesthesia.
Examples of appropriate patients (not requirements)	Any patient appropriate for a birth center, plus capable of managing higher-risk conditions such as: • Term twin gestation • Trial of labor after cesarean delivery • Uncomplicated cesarean delivery • Preeclampsia without severe features at term
LEVEL II (SPECIALTY CARE)	
Definition	Level I facility plus care of appropriate high-risk antepartum, intrapartum, or postpartum conditions, both directly admitted and transferred from another facility.
Capabilities	Level I facility capabilities plus: • Computed tomography scan and ideally magnetic resonance imaging with interpretation available. • Basic ultrasonographic imaging services for maternal and fetal assessment. • Special equipment needed to accommodate the care and services needed for obese women.

ACOG. Levels of maternal care. Am J Obstet Gynecol 2015. (continued)

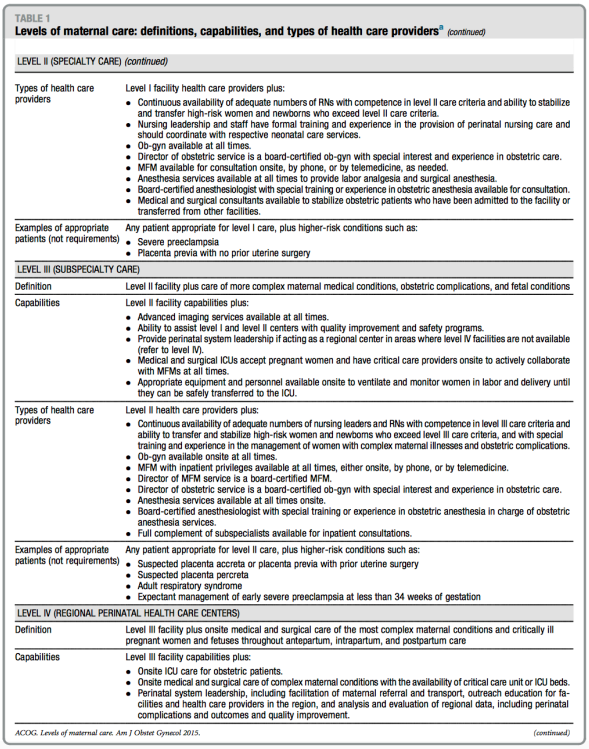


TABLE 1
Levels of maternal care: definitions, capabilities, and types of health care providers[a] *(continued)*

LEVEL II (SPECIALTY CARE) *(continued)*	
Types of health care providers	Level I facility health care providers plus: • Continuous availability of adequate numbers of RNs with competence in level II care criteria and ability to stabilize and transfer high-risk women and newborns who exceed level II care criteria. • Nursing leadership and staff have formal training and experience in the provision of perinatal nursing care and should coordinate with respective neonatal care services. • Ob-gyn available at all times. • Director of obstetric service is a board-certified ob-gyn with special interest and experience in obstetric care. • MFM available for consultation onsite, by phone, or by telemedicine, as needed. • Anesthesia services available at all times to provide labor analgesia and surgical anesthesia. • Board-certified anesthesiologist with special training or experience in obstetric anesthesia available for consultation. • Medical and surgical consultants available to stabilize obstetric patients who have been admitted to the facility or transferred from other facilities.
Examples of appropriate patients (not requirements)	Any patient appropriate for level I care, plus higher-risk conditions such as: • Severe preeclampsia • Placenta previa with no prior uterine surgery
LEVEL III (SUBSPECIALTY CARE)	
Definition	Level II facility plus care of more complex maternal medical conditions, obstetric complications, and fetal conditions
Capabilities	Level II facility capabilities plus: • Advanced imaging services available at all times. • Ability to assist level I and level II centers with quality improvement and safety programs. • Provide perinatal system leadership if acting as a regional center in areas where level IV facilities are not available (refer to level IV). • Medical and surgical ICUs accept pregnant women and have critical care providers onsite to actively collaborate with MFMs at all times. • Appropriate equipment and personnel available onsite to ventilate and monitor women in labor and delivery until they can be safely transferred to the ICU.
Types of health care providers	Level II health care providers plus: • Continuous availability of adequate numbers of nursing leaders and RNs with competence in level III care criteria and ability to transfer and stabilize high-risk women and newborns who exceed level III care criteria, and with special training and experience in the management of women with complex maternal illnesses and obstetric complications. • Ob-gyn available onsite at all times. • MFM with inpatient privileges available at all times, either onsite, by phone, or by telemedicine. • Director of MFM service is a board-certified MFM. • Director of obstetric service is a board-certified ob-gyn with special interest and experience in obstetric care. • Anesthesia services available at all times onsite. • Board-certified anesthesiologist with special training or experience in obstetric anesthesia in charge of obstetric anesthesia services. • Full complement of subspecialists available for inpatient consultations.
Examples of appropriate patients (not requirements)	Any patient appropriate for level II care, plus higher-risk conditions such as: • Suspected placenta accreta or placenta previa with prior uterine surgery • Suspected placenta percreta • Adult respiratory syndrome • Expectant management of early severe preeclampsia at less than 34 weeks of gestation
LEVEL IV (REGIONAL PERINATAL HEALTH CARE CENTERS)	
Definition	Level III facility plus onsite medical and surgical care of the most complex maternal conditions and critically ill pregnant women and fetuses throughout antepartum, intrapartum, and postpartum care
Capabilities	Level III facility capabilities plus: • Onsite ICU care for obstetric patients. • Onsite medical and surgical care of complex maternal conditions with the availability of critical care unit or ICU beds. • Perinatal system leadership, including facilitation of maternal referral and transport, outreach education for facilities and health care providers in the region, and analysis and evaluation of regional data, including perinatal complications and outcomes and quality improvement.

ACOG. Levels of maternal care. Am J Obstet Gynecol 2015. (continued)

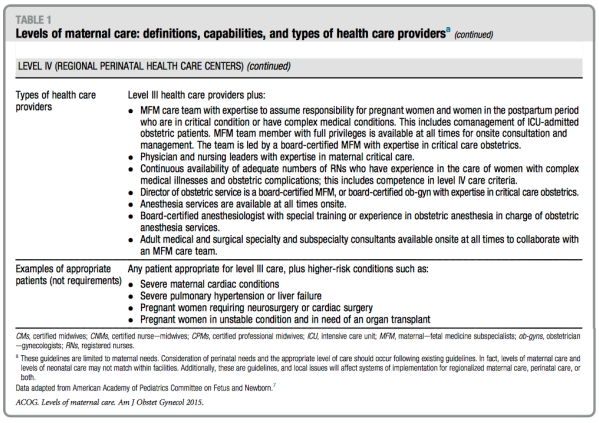


TABLE 1
Levels of maternal care: definitions, capabilities, and types of health care providers[a] *(continued)*

LEVEL IV (REGIONAL PERINATAL HEALTH CARE CENTERS) *(continued)*	
Types of health care providers	Level III health care providers plus: • MFM care team with expertise to assume responsibility for pregnant women and women in the postpartum period who are in critical condition or have complex medical conditions. This includes comanagement of ICU-admitted obstetric patients. MFM team member with full privileges is available at all times for onsite consultation and management. The team is led by a board-certified MFM with expertise in critical care obstetrics. • Physician and nursing leaders with expertise in maternal critical care. • Continuous availability of adequate numbers of RNs who have experience in the care of women with complex medical illnesses and obstetric complications; this includes competence in level IV care criteria. • Director of obstetric service is a board-certified MFM, or board-certified ob-gyn with expertise in critical care obstetrics. • Anesthesia services are available at all times onsite. • Board-certified anesthesiologist with special training or experience in obstetric anesthesia in charge of obstetric anesthesia services. • Adult medical and surgical specialty and subspecialty consultants available onsite at all times to collaborate with an MFM care team.
Examples of appropriate patients (not requirements)	Any patient appropriate for level III care, plus higher-risk conditions such as: • Severe maternal cardiac conditions • Severe pulmonary hypertension or liver failure • Pregnant women requiring neurosurgery or cardiac surgery • Pregnant women in unstable condition and in need of an organ transplant

CMs, certified midwives; *CNMs*, certified nurse–midwives; *CPMs*, certified professional midwives; *ICU*, intensive care unit; *MFM*, maternal–fetal medicine subspecialists; *ob-gyns*, obstetrician–gynecologists; *RNs*, registered nurses.

[a] These guidelines are limited to maternal needs. Consideration of perinatal needs and the appropriate level of care should occur following existing guidelines. In fact, levels of maternal care and levels of neonatal care may not match within facilities. Additionally, these are guidelines, and local issues will affect systems of implementation for regionalized maternal care, perinatal care, or both.

Data adapted from American Academy of Pediatrics Committee on Fetus and Newborn.[7]

ACOG. Levels of maternal care. Am J Obstet Gynecol 2015.

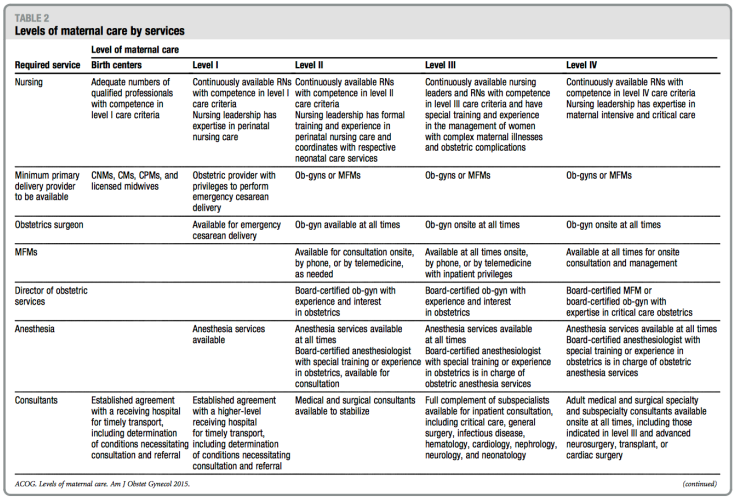


TABLE 2
Levels of maternal care by services

	Level of maternal care				
Required service	**Birth centers**	**Level I**	**Level II**	**Level III**	**Level IV**
Nursing	Adequate numbers of qualified professionals with competence in level I care criteria	Continuously available RNs with competence in level I care criteria Nursing leadership has expertise in perinatal nursing care	Continuously available RNs with competence in level II care criteria Nursing leadership has formal training and experience in perinatal nursing care and coordinates with respective neonatal care services	Continuously available nursing leaders and RNs with competence in level III care criteria and have special training and experience in the management of women with complex maternal illnesses and obstetric complications	Continuously available RNs with competence in level IV care criteria Nursing leadership has expertise in maternal intensive and critical care
Minimum primary delivery provider to be available	CNMs, CMs, CPMs, and licensed midwives	Obstetric provider with privileges to perform emergency cesarean delivery	Ob-gyns or MFMs	Ob-gyns or MFMs	Ob-gyns or MFMs
Obstetrics surgeon		Available for emergency cesarean delivery	Ob-gyn available at all times	Ob-gyn onsite at all times	Ob-gyn onsite at all times
MFMs			Available for consultation onsite, by phone, or by telemedicine, as needed	Available at all times onsite, by phone, or by telemedicine with inpatient privileges	Available at all times for onsite consultation and management
Director of obstetric services			Board-certified ob-gyn with experience and interest in obstetrics	Board-certified ob-gyn with experience and interest in obstetrics	Board-certified MFM or board-certified ob-gyn with expertise in critical care obstetrics
Anesthesia		Anesthesia services available	Anesthesia services available at all times Board-certified anesthesiologist with special training or experience in obstetrics, available for consultation	Anesthesia services available at all times Board-certified anesthesiologist with special training or experience in obstetrics is in charge of obstetric anesthesia services	Anesthesia services available at all times Board-certified anesthesiologist with special training or experience in obstetrics is in charge of obstetric anesthesia services
Consultants	Established agreement with a receiving hospital for timely transport, including determination of conditions necessitating consultation and referral	Established agreement with a higher-level receiving hospital for timely transport, including determination of conditions necessitating consultation and referral	Medical and surgical consultants available to stabilize	Full complement of subspecialists available for inpatient consultation, including critical care, general surgery, infectious disease, hematology, cardiology, nephrology, neurology, and neonatology	Adult medical and surgical specialty and subspecialty consultants available onsite at all times, including those indicated in level III and advanced neurosurgery, transplant, or cardiac surgery

ACOG. Levels of maternal care. Am J Obstet Gynecol 2015. *(continued)*

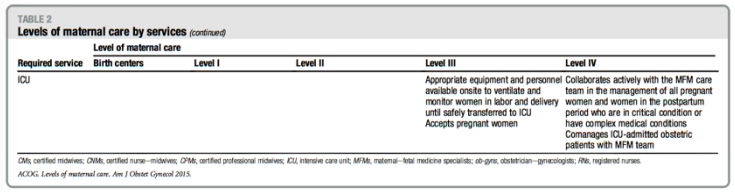


TABLE 2
Levels of maternal care by services *(continued)*

	Level of maternal care				
Required service	**Birth centers**	**Level I**	**Level II**	**Level III**	**Level IV**
ICU				Appropriate equipment and personnel available onsite to ventilate and monitor women in labor and delivery until safely transferred to ICU Accepts pregnant women	Collaborates actively with the MFM care team in the management of all pregnant women and women in the postpartum period who are in critical condition or have complex medical conditions Comanages ICU-admitted obstetric patients with MFM team

CMs, certified midwives; *CNMs*, certified nurse–midwives; *CPMs*, certified professional midwives; *ICU*, intensive care unit; *MFMs*, maternal–fetal medicine specialists; *ob-gyns*, obstetrician–gynecologists; *RNs*, registered nurses.

ACOG. Levels of maternal care. Am J Obstet Gynecol 2015.

Appendix 2

MESH TERMS AND KEY WORDS
-low[All Fields] AND ("risk"[MeSH Terms] OR "risk"[All Fields]) AND birthing[All Fields] AND unit[All Fields]; Identifying 72 articles
-OB[All Fields] AND ("physicians, family"[MeSH Terms] OR ("physicians"[All Fields] AND "family"[All Fields]) OR "family physicians"[All Fields] OR ("family"[All Fields] AND "physician"[All Fields]) OR "family physician"[All Fields]); Identifying 199 articles
-Obstetric[All Fields] AND care[All Fields] AND ("physicians, family"[MeSH Terms] OR ("physicians"[All Fields] AND "family"[All Fields]) OR "family physicians"[All Fields] OR ("family"[All Fields] AND "physicians"[All Fields])); Identifying 491 articles
-("obstetrics"[MeSH Terms] OR "obstetrics"[All Fields]) AND ("Crisis"[Journal] OR "crisis"[All Fields]) AND ("family"[MeSH Terms] OR "family"[All Fields]); Identifying 62 articles

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