



# Early identification of women likely to be high utilizers of perinatal acute care services

Christine Field, MD, MPH<sup>1</sup>, Christine Tucker, PhD<sup>3</sup>, Sarah Verbiest, DrPH, MSW, MPH<sup>1,5</sup>, Renée Ferrari, PhD<sup>2</sup>, Michele Jonsson-Funk, PhD<sup>4</sup>, Alison Stuebe, MD, MSc<sup>1,3</sup>

<sup>1</sup>Department of Obstetrics and Gynecology, <sup>2</sup> Lineberger Comprehensive Cancer Center, School of Medicine and UNC Health Care, <sup>3</sup>Department of Maternal and Child Health, <sup>4</sup>Department of Epidemiology, Gillings School of Global Public Health, <sup>5</sup>Jordan Institute for Families, School of Social Work, University of North Carolina at Chapel Hill



## Background

- Patients in the general and obstetric populations seek emergency services both for urgent and non-urgent medical problems.
- Non-urgent issues may be better addressed by the patient's usual prenatal care provider in an outpatient setting.
- In order to identify women who might benefit from care coordination, we sought to identify women in early pregnancy likely to be high utilizers of emergency and inpatient care.

## Methods

### Study Design

- We conducted a secondary analysis of 3423 women within the Care4Moms cohort who received prenatal care within our health system and delivered at the North Carolina Women's Hospital between July 1, 2014, and June 30, 2016.
- Included women with ≥1 prenatal outpatient encounter in early pregnancy, defined as before 20 weeks' gestation.

### Definitions

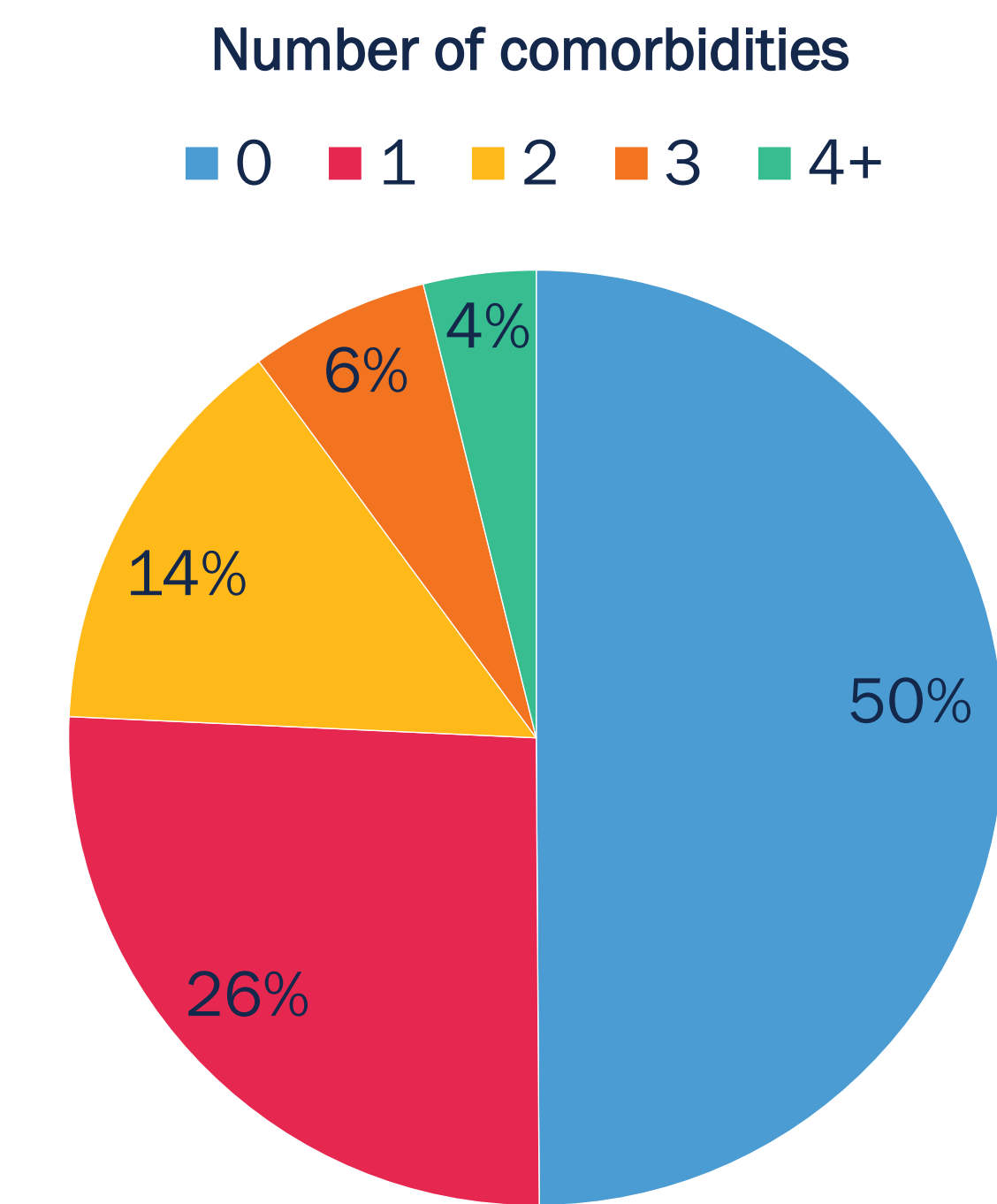
- **Comorbidities:** classified by number of Non-Obstetric diagnoses documented in the first 20 weeks of pregnancy, using Clinical Classification Software (CCS) codes.
  - atherosclerosis (114-117), cancer (11-41), cardiac disease (96.97,100-108,213), cerebrovascular disorders (109-113), GI disorders (135-155), headache (84), infection (1-9), neurologic disorders (76-83,85), non-gestational diabetes (49,50), non-gestational hypertension (98.99), psychiatric disorders (650-670), renal disease (156-158), respiratory disorders (122-134), thrombophlebitis (118), urinary disorders (159-163).
- **Severe maternal morbidity:** determined using Alliance for Innovation on Maternal Health (AIM) criteria.
- **High utilization:** three or more OB triage, emergency department or inpatient admissions during pregnancy.

### Statistical Analysis

- Data was analyzed with SAS 9.4 (Cary, NC) using chi square tests.
- P-values < 0.05 were considered statistically significant.

## Results

- A total of 3423 women were included in the current analysis, of which 1708 had no comorbidities, 884 had one comorbidity, 485 had two comorbidities, 213 had three comorbidities and 133 had four or more comorbidities.
- Comorbidities were highly predictive of maternal and infant morbidity, and acute care utilization.

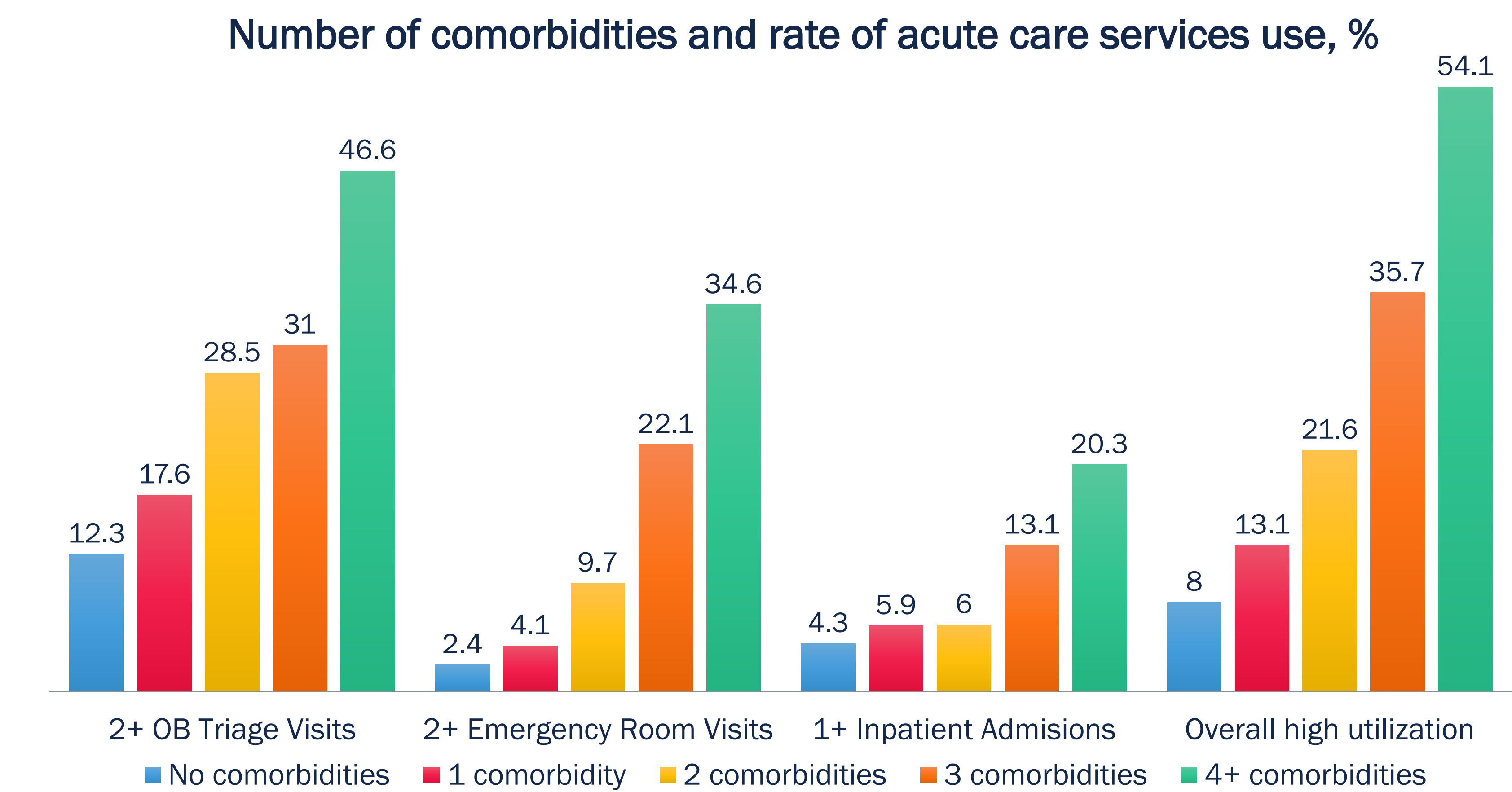


Women with more comorbidities in early pregnancy were more likely to experience severe maternal morbidity, to have an infant admitted to the NICU, and to be high utilizers of acute care during pregnancy and postpartum.

	Outcomes, %, by number of comorbidities						p
	All	0	1	2	3	4+	
<b>Perinatal Outcomes</b>							
Severe maternal morbidity	2.5	1.5	3.3	1.9	3.3	9.8	<0.0001
Infant admitted to NICU	13.2	11.1	11.4	17.3	18.3	29.3	<0.0001
<b>During Pregnancy</b>							
High utilization	14.8	8.0	13.1	21.6	35.7	54.1	<0.0001
Number of OB Triage visits							<0.0001
1	25.0	23.3	25.9	26.6	28.2	30.1	
2+	18.5	12.3	17.6	28.5	31.0	46.6	
Number of Emergency Department visits							<0.0001
1	11.3	7.8	11.1	16.3	19.7	24.8	
2+	18.5	12.3	17.6	28.5	31.0	46.6	
Number of inpatient admissions							<0.0001
1	5.2	3.8	5.3	5.6	8.9	14.3	
2+	1.0	0.5	0.6	0.4	4.2	6.0	
<b>Discharge to 90 days postpartum</b>							
Number of Emergency Department visits							<0.0001
1	3.5	2.1	3.5	5.4	6.6	10.5	
2+	1.3	0.8	0.8	1.2	3.8	8.3	
Readmission, 1+	2.5	1.5	2.4	4.3	4.2	7.5	<0.0001

Among women with four or more comorbidities:

- Severe maternal morbidity was experienced by 9.8% and 29.3% had an infant admitted to the Newborn Critical Care Unit (NCCU).
- During pregnancy, 34.6% had two or more emergency department visits, 46.6% had two or more OB Triage visits and 20.3% had at least one inpatient admission.
- In the 90 days following birth, 19.8% had one or more emergency department visits and 7.5% were readmitted.



## Conclusions

- Non-obstetric comorbidities in early pregnancy identify women at increased risk for perinatal morbidity and mortality, and high perinatal acute care utilization.
- These criteria can identify women who may benefit from interventions designed to reduce acute care service utilization and minimize risk of perinatal morbidity and mortality, such as multidisciplinary care coordination.

We acknowledge the assistance of the NC Translational and Clinical Sciences (NC TraCS) Institute, which is supported by the National Center for Advancing Translational Sciences (NCATS), National Institutes of Health, through Grant Award Number UL1TR002489. This study was supported by the Health Resources and Services Administration (HRSA) of the U.S. Department of Health and Human Services (HHS) under grant number R40MC29455 Care4Moms for \$897,986. This information or content and conclusions are those of the authors and should not be construed as the official position or policy of, nor should any endorsements be inferred by HRSA, HHS or the U.S. Government.

