

Critical Care Obstetrics (CCOB) Program Year One: Risk Stratification and Outcomes for Patients who Received Care on Labor and Delivery (L&D) and Those Transferred to an Intensive Care Unit (ICU)

James Conwell, DO; Ralph Alberto; Yael Sarig; Ashley Munoz RN; Jessica Morgan MD; Jean-Ju Sheen MD; and Ruth Landau MD

Department of Anesthesiology, Columbia University Medical Center, New York

- From 2020-2022, the maternal ICU admission rate in the US was 1.8 per 1,000 births (1)
- Our CCOB program was launched in 2024 to standardize our approach to medically complex obstetric patients.
- Patients with the CCOB designation receive specialized nursing care, telemetry monitoring, and multidisciplinary rounding led by the obstetric anesthesia team on L&D
- We previously evaluated characteristics of CCOB patients with chronic comorbidities (planned), and acute diagnoses (unplanned), and found unplanned cases were more likely to become critically ill (2)
- In this study, we characterized factors associated with ICU transfer and evaluated outcomes of CCOB patients admitted to an ICU vs those receiving all their critical care in our CCOB unit on L&D, hypothesizing that outcomes would be similar

- Starting in 2023, a working group of nurses, obstetricians and anesthesiologists defined criteria for CCOB designation at our institution. (figure 1)
- The CCOB designation was added to our electronic medical record, EPIC, in May 2024, allowing all patients meeting criteria to be reviewed.
- Characteristics and outcomes between CCOB patients transferred to an ICU and those cared for only in the CCOB unit on L&D were reviewed.
- Maternal outcomes included a vasoactive infusion requirement, quantitative blood loss, hemorrhage, blood product transfusion, hospital length of stay and CCOB unit length of stay

Conditions for CCOB Designation

Neurological Conditions:

- Encephalopathy
- Acute stroke (Ischemic or non-ischemic)
- Acute seizure disorder (status epilepticus)
- Neurological lesion (mass or aneurysm) requiring close monitoring
- Eclampsia

Psychiatric Conditions

- Acute psychiatric illness
- Substance use disorder (history of SUD/OD, acute intoxication, withdrawal, or the need for enhanced postpartum pain management)

Cardiac Conditions:

- NYHA: II or mWHO II or CARPREG II
- Hypertensive Disorders requiring antihypertensive infusions or invasive monitoring
- Arrhythmias requiring monitoring or recent cardioversion

Respiratory Conditions:

- Respiratory disease with new or increasing oxygen requirement
- Asthma exacerbation; status asthmaticus
- Pulmonary embolism
- Acute chest (SSC)

Kidney failure:

- Acute kidney injury, ESRD, or new dialysis requirement
- Transplant at risk of kidney dysfunction

Liver failure or metabolic decompensation:

- Acute liver injury, cirrhosis, or acute fatty liver disease of pregnancy
- Hypoglycemia or DKA

Bleeding/ Coagulation:

- Placental abruption with associated coagulopathy
- Disseminated intravascular coagulation (DIC)
- Peripartum hemorrhage with associated shock
- Placental accreta spectrum (PAS) disorder

Sepsis or Infection:

- Septic shock
- Clinical condition requiring invasive monitoring or central access for care
- Clinical condition deemed appropriate for CCOB by the care team

Other:

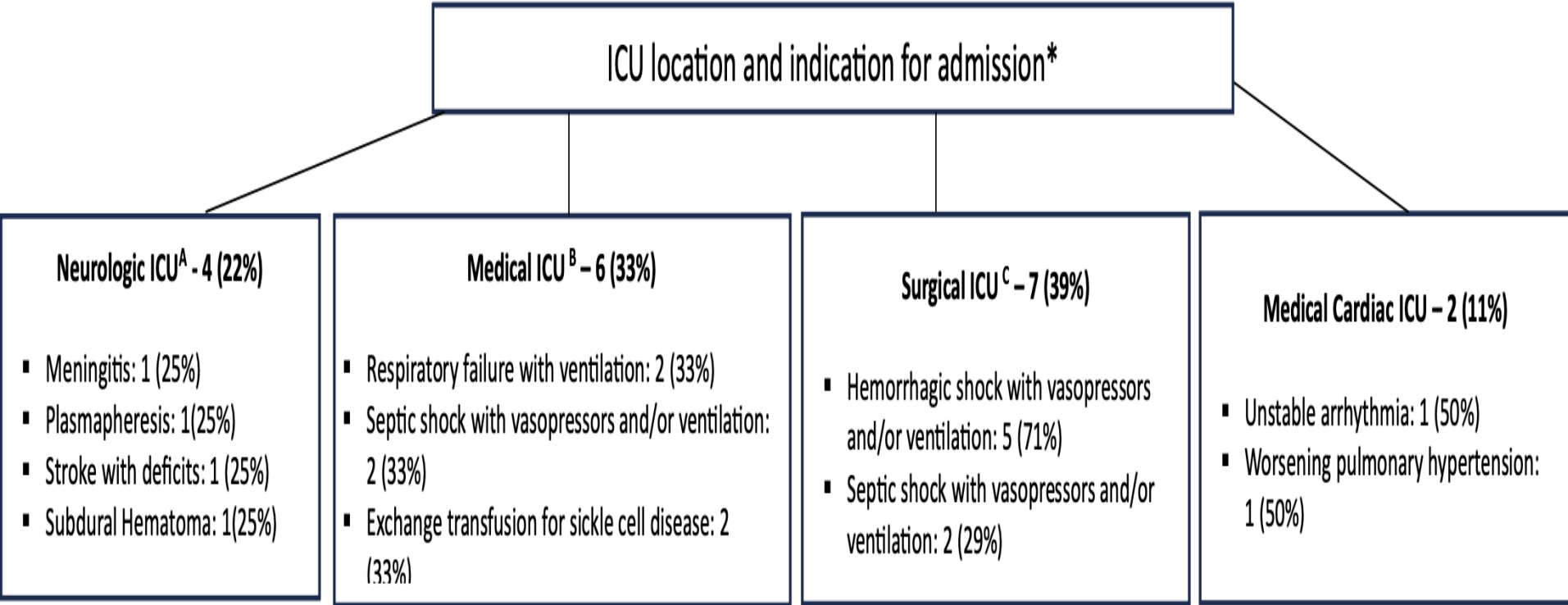
- Any patient that the Obstetric or Anesthesiology teams determine requires CCOB care

Fig 1: Conditions for CCOB Monitoring

Table 1. Critical Care Obstetrics (CCOB) patients’ characteristics and outcomes based on ICU Admission (n=165) May 2024-July 202

	CCOB-No ICU Admission (n=147)	CCOB – ICU Admission (n=18)	P-value
Planned CCOB Level of Care	92 (62.59%)	5 (27.77%)	0.0094
Maternal demographics			
Maternal age (years)	32.9 ±6.33	32 ± 4.55	0.48
Body mass index (kg/m²)	31.45 ± 6.68	30 ± 9.98	0.615
Multiparous, n	96 (65.31%)	12 (66.66%)	0.99
Race			
Black, n	25 (17%)	6 (33.33%)	0.113
White, n	48 (32.65%)	4 (22.22%)	0.43
Hispanic, n	51 (34.69 %)	5 (27.77%)	0.79
Other/declined to report race, n	23 (15.65%)	3 (16.66%)	0.722
Obstetric data and comorbidities			
Gestational age at admission (weeks)	35 + 5 ± 4.49	32+6 ± 4.99	0.034
Gestational age at delivery (weeks)	36 + 1 ± 3.95	33 + 4 ±4.49	0.034
Preeclampsia, n	25 (17%)	4 (22.22%)	0.52
Diabetes, n	20 (13.61%)	3 (16.66%)	0.72
Cesarean delivery, n	83 (86.60%)	13 (72.22%)	0.311
Anesthesia for delivery			
Combined spinal epidural (CSE), n	115 (78.23%)	12 (66.66%)	0.37
Single shot spinal, n	23 (15.65%)	2 (11.11%)	0.999
General anesthesia, n	14 (9.52%)	6 (33.33%)	0.011
CCOB Indication			
Neurological, n	14 (9.52%)	5 (27.77%)	0.038
Psychiatric, n	9 (6.12%)	0 (0%)	0.59
Cardiac, n	69 (46.94%)	3 (16.66%)	0.02
Respiratory, n	15 (10.2%)	6 (33.33%)	0.01
Renal, n	13 (8.84%)	4 (22.22%)	0.095
Hepatic or Metabolic, n	8 (5.44%)	1 (5.56%)	0.99
Bleeding or Coagulopathy, n	29 (19.73%)	7 (38.88%)	0.074
Sepsis or infection, n	12 (8.16%)	7 (38.88%)	0.0013
Required a vasoactive Infusion, n	37 (25.17%)	8 (44.44%)	0.096
Baby admitted to NICU, n	63 (42.86%)	11 (61.11%)	0.20
Fetal demise, n	3 (2%)	1 (5.55%)	0.37
Quantitative blood loss (mL)	956.4 ±1072	1794 ± 2548	0.198
Postpartum hemorrhage, n	42 (28.57%)	7 (38.88%)	0.41
Blood product transfusion (n patients)	33 (22.45%)	6 (33.33%)	0.37
Blood products transfusions (n units)	1.021 ± 4.04	4.5 ± 9.62	0.1408
Hospital length of stay (days)	5.94 ± 5.6	14.66 ±18	0.057
CCOB High Risk unit stay (hours)	58 ± 47.8	94 ± 125	0.23

Figure 2: ICU location and admission indication



Data presented as mean ± standard deviation or number (%)
*One patient was admitted to two different ICU’s
A: Two patients admitted directly to neurologic ICU from emergency department for stroke with deficits, and a new subdural hematoma; one patient admitted directly to ICU from outside hospital for meningitis treatment
B: One patient transferred to Medical ICU directly from emergency department for sepsis treatment; one patient transferred to ICU for exchange transfusion directly following delivery
C: Two patients admitted to Surgical ICU directly from the operating room for massive hemorrhage; one patient admitted to ICU directly from outside hospital for coagulopathy

- There were no significant differences in outcomes between CCOB patients transferred to the ICU at any time point and those who were not, though confounding by indication was possible.
- Some patients were admitted to an ICU before receiving CCOB care.
- Patients transferred to an ICU were more likely to be unplanned CCOB and had a septic, respiratory or neurological CCOB indication.
- Future work should focus critical care resources and specialized teams to care for acutely ill patients on L&D.
- This care system can serve as a model for other institutions.

1. NCHS Data Brief, no 485 2023.

2. SOAP Annual Meeting 2025; Abstract ID 2045267