Developing A Transitional Fetal-Neonatal Neurology Program

Sarah Mulkey, M.D., Ph.D.
Fetal-Neonatal Neurologist, Fetal Medicine Institute
Division of Fetal and Transitional Medicine
Children’s National Health System

Taeun Chang, M.D.
Director, Neonatal Neurology Program
Division of Neurophysiology, Epilepsy & Critical Care
Children’s National Health System
Sarah Mulkey, M.D., Ph.D.
Has no financial relationships to disclose or Conflicts of Interest (COIs) to resolve.

Taeun Chang, M.D.
Has no financial relationships to disclose or Conflicts of Interest (COIs) to resolve.
OBJECTIVES

• Understand how a fetal program can be set up in a children’s hospital and what some of the unique challenges are

• Discuss the goals of a transitional fetal-neonatal program

• Develop ideas on ways to create a successful transitional fetal-neonatal program

• Be familiar with certain interventions the fetal-neonatal neurologist should know
Fetal Medicine Institute (FMI) Overview

• Unique fetal medicine program in a children’s hospital
• Provides comprehensive fetal imaging
  – Ultrasound
  – MRI
• Opportunity for multi-disciplinary consultations
• Goal is to provide the most accurate diagnosis and prognosis for the condition(s)
• This knowledge can improve fetal-neonatal transition and enable planning for postnatal care
2016 Fetal Medicine Institute Consults

Total Consults by Specialty

- Genetic Counseling
- Neurology
- Nurse Practitioner
- Genetics
- Neonatology
- Surgery
- Urology
- Orthopaedics
- Cranio/Plastics
- Neurosurgery
- Infectious Disease
- Nephrology
- PANDA/HELP
- Radiology (Consult)
- Hematology/Oncology

Children's National
2016 Top 25 Neurology Diagnoses

Total Cases by Diagnosis

Ventriculomegaly
Microcephaly/Small Head
Absent Septum Pellucidum
Agenesis of the Corpus Callosum
Mega Cisterna Magna
Cerebellar Hypoplasia
Intracranial Cyst
Asymmetrical Fossa Abnormality
NTD, unspecified
Macrocephaly
Hypoplastic Vermis
Dandy-Walker Malformation
Intraventricular Hemorrhage
Holoprosencephaly
Hypoplastic Corpus Callosum
Abnormal Brain Development
Myelomeningocele
Aqueductal Stenosis
Colpocephaly
FMI program set-up

• Referrals come from MFM offices
• Cases are rapidly reviewed by a genetic counselor or nurse practitioner
  – Determine necessary specialty consultations
  – Understand gestational time and planning
  – Phone call with patient to schedule/obtain history
  – Ensure full records from MFM/OB
• Anticipatory guidance for day of consult
  – MRI safety
  – Prepare for a long day
FMI program personnel

• Schedulers
• Genetic counselors/nurse practitioner
• Radiologist(s)
• Radiology techs
• Clinic manager
• Multiple pediatric specialists
• Patient experience liaison
• Physician referral liaison/outreach
• Academic coordinator
Fetal Medicine Inst. clinic set-up

- Adult friendly waiting room
- Snacks/beverages
- Postnatal visits kept separate room fetal

- Ultrasound rooms in clinic
- Radiologist review room in clinic
Typical patient schedule

- 7 am fetal MRI
- 9 am fetal US
- 10 am team reviews imaging with radiologist and neuroradiologist
- 10:30 am fetal neurology consultation
  – Fetal neurologist and genetic counselor or NP meet with the patient
- 11:30 am additional consultations (neonatology, neurosurgery, genetics, etc.) or echocardiogram
- Patient experience liaison coordinates the day and keeps patient updated with what is next
Structure of consultation

• Obtain patient and family history
• Assess patients current understanding of the condition
• **Teach** about the fetal brain and the condition
Fetal consultation room

Consultant has
- Large computer monitor
- Ability to show images in room
- Brain model/fetal diagrams

Comfortable seating
- Patient
- Family members
- GC/NP
- Learners
Fetal consultation findings

Consultation Result

- Normal/variant
- Confirm referral diagnosis
- Worse finding(s) than the referral diagnosis/new findings
Diagnosis & Prognosis

• **Goal**- make the *most accurate* diagnosis

• Limitations of fetal imaging
  – Some conditions not fully recognized until later in gestation
  – Need for fetal MRI vs. US, and postnatal studies

• Describe the outcome of the condition
  – Ability to transition at birth
  – Would NICU be needed?
  – Early developmental impact
  – Childhood outcome

• Understand pregnancy options based on gestational age
Follow-up planning

• Timing
  – 3rd trimester ± imaging ± other consultations
  – Postnatal (NICU vs. outpatient)
    • Imaging and timing (nonsedate MRI)
• Phone call to MFM on day of consult
• Rapid generation of reports/letters to referring physicians
• Weekly radiology and multi-disciplinary case review
Illustrative case

• Woman 21 4/7 wks into a di-di twin pregnancy was referred to FMI
  – Twin A- Dandy-Walker Malformation and agenesis of the corpus callosum (ACC)
  – Twin B- ACC

• Fetal neurology consultation-
  – Twin A- mild R ventriculomegaly (12mm) with interhemispheric cyst and ACC
  – Twin B- R ventricle more prominent, ACC
Imaging at 21 4/7 weeks

Twin A
- ACC
- R ventricle 12 mm
- L ventricle 3 mm
- Interhemispheric cyst
- Normal posterior fossa

Twin B
- ACC
- Mild prominence of R ventricle
Case follow-up

• MFM contacted our GC at 27 wks
  – ~5 wks following initial fetal consultation
  – Moderate-severe ventriculomegaly in both fetuses (28 and 17mm, respectively)!

• Patient was urgently seen
  – Fetal MRI & US
  – Neurology and genetics consultations
Fetal MRI at 27 weeks

Twin A

Severe bilateral ventriculomegaly
Aqueductal stenosis
ACC

Twin B
This case illustrates

• Close working relationship with referring providers
• Necessity to schedule patients quickly
• Plans change
• Being there for our patients and supporting their decisions
• Staff needed to coordinate care options for patients
OBJECTIVES

• Understand how a fetal program can be set up in a children’s hospital and what some of the unique challenges are

• Discuss the goals of a transitional fetal-neonatal program

• Develop ideas on ways to create a successful transitional fetal-neonatal program

• Be familiar with certain interventions the fetal-neonatal neurologist should know
What are the goals of a transitional fetal-neonatal program?

• Bridging clinical care and population health to improve the health and outcome of fetuses
  – Fetal care – delivery – transport – subspecialty newborn care – long term follow up care
  – Continuity of care

• Anticipatory planning
  – Providing options and resources, making informed decisions, setting goals, easing patient anxiety, planning transitions, and continuing diagnostic work up

• Being born at the right place matters
  – Coordinating fetal health services
  – Providing comprehensive care for neonates
  – Coordination and care at delivery and transport

International Symposium on the FETAL BRAIN
What approach lends to a successful transitional fetal-neonatal program

Acknowledge the challenges of developing a model of fetal-neonatal care

- **Defining measurable outcomes**
  - Live births, mortality rate, LOS versus maternal anxiety, seamless care, communication
  - Short & long term outcomes, ER visits, admissions, PICU admissions, costs

- **Challenges of coordinating care between maternal vs fetal providers**
  - Create collaborative forums to share information confidentially

- **Learn from other stakeholders**
  - Pregnant women/couples, support groups, insurance and community organizations

- **Challenges to transport**
  - Funding, geography, antenatal transport

- **Policy issues – certificate of need**
  - State versus federal policies

- **Financial challenges**
  - Unmet needs, misaligned incentives

- **Challenges of coordinating complex care patients**
  - Multiple intersecting providers, communication, family care, anticipatory planning
Other Models of Complex Care

Models of Complex Care

• Hospital based NICU focused model
• Outpatient Focused Medical Home
• Complex Care High Risk Clinic models

Common Features of Medically Complex Patients

• Multiple subspecialty involvement
• Polypharmacy
• Comorbidities
• Frequent ER or inpatient visits
• Functional limitations, often severe
• Technology dependence
• High tertiary center and other healthcare use
• High cost of care

Needs of Complex Care Patients

• Primary care provider
• Dural medical equipments
• Pharmacy
• Nursing and/or therapists
• Access & availability 24/7
• Close to home resources
• Continuity of care
• Insurance & benefit coverage
• Identification of resources
• Coordination of care, “Go-to” person
• Defined roles of care team members
• Frequent communication between providers and families
• Care plan and emergency plan
• Trust between families and providers
• Assistance with goal setting, transitions, plans for future (anticipatory planning)
Current State of Fetal and Neonatal Neurology Patient Management

Inpatient Care
- Inova Fairfax
- Reston HC
- MWH
- Virginia HC
- Sentara NVMC
- GW Hospital
- Shady Grove AH
- Holy Cross
- Anne Arundel MC
- PRMC
- Holy Cross
- Shady Grove AH
- Reston HC

Fetal-Neonatal Neurology
- Fetal Medicine
  - du Plessis
  - Mulkey
  - Chang
  - Genetic counselors

Orthopedics
Therapists
Neurogenetics
Neurosurgery
Neurology
Social Work
PM&R
Multi-D Clinics
Primary Care

Neonatal Neurology
- Chang
- Tsuchida
- Mulkey
- Scafidi
Fetal/Neonatal Neurology Patient Management with Dedicated Nurse Coordinator

- Inpatient Care
  - Inova Fairfax
  - Reston HC
  - Virginia HC
  - Sentara NVMC
  - Children's National
  - GW Hospital
  - Shady Grove AH
  - Holy Cross
  - PRMC
  - Anne Arundel MC

- Fetal-Neonatal Neurology
  - Fetal Medicine Institute du Plessis, Mulkey, Chang
  - Neonatal Neurology & Neurocritical Care
    Chang, Tsuchida, Mulkey, Scafidi

- OP Follow-up Care
  - Neurogenetics
  - Orthopaedics
  - PM&R
  - Neurosurgery
  - Multi-D Clinics
  - Neurology
  - Social Work
  - Primary Care

Single Point of Contact

Patients

International Symposium on the FETAL BRAIN
Need for Complex Care Coordination

• Less than 1% of children are considered medically complex; yet, they account for ~1/3 of total health care spending

• Complex care population doubled from 1993-2005 (Burns et al Pediatrics 2010, 126: 638-646)

• Increases parent and patient satisfaction

• Improves efficiency and capacity

• Decreases LOS and readmissions and emergency visits
OBJECTIVES

• Understand how a fetal program can be set up in a children’s hospital and what some of the unique challenges are

• Discuss the goals of a transitional fetal-neonatal program

• Develop ideas on ways to create a successful transitional fetal-neonatal program

• Be familiar with interventions the fetal-neonatal neurologist should know
In Utero Interventions

• Fetal cardiac intervention for fetal arrhythmia

• Intrauterine blood transfusions for severe fetal anemia
  – Rh or non-Rh(D) alloimmunization
  – Parvovirus B19 infection
  – Chronic fetomaternal hemorrhage
  – Homozygous alpha-thalassemia

• Fetoscopic laser photocoagulation for twin-twin transfusion syndrome

• Selective reduction by radio frequency ablation
  – High-order multiple pregnancy
  – Complicated monochorionic twin pregnancies

• Fetal surgery for
  – Endotracheal balloon occlusion
  – Vesico-amniotic shunt placement for low urinary tract obstruction
  – Thoraco-amniotic shunt placement for fetal hydrothorax
  – Sacrococcygeal teratoma
  – Spina bifida

• Ex-utero intrapartum treatment (EXIT)
  – EXIT to airway
  – EXIT to ECMO
  – EXIT to resection
Twin-Twin Transfusion Syndrome (TTTS)

- Abnormal placenta vascular connections causing uneven blood flow between multiple gestations with a common monochorionic placenta (donor vs recipient)

- Occurs in 10-15% of monochorionic twins.
  - Recipient twin can present with polyhydramnios, heart failure, hydrops, and even death
  - Donor twin can present with oligohydramnios, renal or multiorgan failure

- Treatment
  - Fetoscopic laser photocoagulation of recipient chorionic plate vessels in stage II, III or IV TTTS
    - Fetal death rate higher for donor
  - Reduction amniocentesis of recipient twin to improve blood flow to donor twin & comfort
  - Survival improved in laser (76% of one fetus; 36% of both twins) vs amnioreduction only (51% of one fetus; 26% of both twins)

- Outcomes
  - Majority of treated TTTS survive to be normal & healthy
  - If untreated, survival is 10-15% with 15-50% risk of neurodisabilities in survivors
  - If one twin dies, surviving twin has up to 40% risk of brain injury
Management of Myelomeningocele Study (MOMS)*

Inclusion Criteria
• Singleton pregnancy
• Gestational age 19-25.9 weeks
• Lesion level T1-S1
• Evidence of hindbrain herniation
• Normal karyotype

Outcome
• Decrease in shunt placement by 12 months of age (40% vs 82%)
• Improved motor level & ambulation at 30 months of age
  – 43% were 1 level or better (vs 21%)
  – 71% walking (42% w/o orthotics) vs 50% in postnatal group (21% w/o orthotics)
• Less mild or no hindbrain herniation (76% vs 33%)
• Need for clean intermittent catheterization was not changed by 30 months of age
• No maternal death, but increased risk for maternal blood transfusion, preterm delivery, and uterine dehiscence or rupture

*Adzick et al 2011 NEJM
Fetal/Neonatal Alloimmune Thrombocytopenia (FAIT / NAIT/FNAIT)

• Maternal alloimmunization against fetal/neonatal platelet antigens inherited from the father resulting in platelets < 150,000 /µL.

• Uncommon but can cause severe thrombocytopenia in the newborn causing diffuse petechial skin lesions (mild) to intracranial hemorrhage (severe) and even death.

• Prevalence reported 1 in 350 and 1 in 5000 live births.

• Can occur in first pregnancies, with a high rate of recurrence rate and often progressively more severe.

• Treatment includes IVIG ± steroids. Serial intrauterine platelet transfusions increases risk for preterm delivery (Winkelhorst et al Blood 2017).
Fetal/Perinatal Meningoencephalitis (TORCHES-Z)

- Toxoplasmosis, Other, Rubella, Cytomegalovirus, Herpes Simplex, Enterovirus, Syphilis, Zika
  - Other includes Hepatitis B, HIV, Parvovirus B19, Parechovirus, VZV, Lymphocytic Choriomeningitis Virus (LCMV)
- Accounts for 2-3% of all congenital anomalies

<table>
<thead>
<tr>
<th>Sequelae</th>
<th>Toxo</th>
<th>Rubella</th>
<th>CMV</th>
<th>HSV</th>
<th>EV</th>
<th>Syphilis</th>
<th>VZV</th>
<th>HIV</th>
<th>LCMV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mental retardation</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Seizures</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Blindness</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Deafness</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Motor disability</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Learning disability</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Limb deformity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Cardiac dysfunction</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Hepatic dysfunction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Endocrine dysfunction</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

Fetal Brain

Children's National
Fetal Medicine Institute
Part of the Children's National Health System
Postnatal Planning

• Limitations of Care / Hospice
  – Autopsy, genetic testing, placental pathology

• Delivery Strategies
  – Nursery vs NICU vs Regional NICU
  – Transport

• In NICU Care
  – Familiar faces, linking maternal studies to newborn

• Subspecialty or Multi-disciplinary Clinics
  – Spina bifida clinic, Craniofacial clinic, Perinatal Brain Injury clinic, Neurogenetic clinic, Neuromuscular clinic
Elective Termination

First Trimester
- Medical termination available up to 9 weeks gestation
  - Methotrexate and Misoprostol
  - Mifepristone and Misoprostol (RU486)
- Surgical termination
  - Manual vacuum aspiration (MVA) with local anesthesia
  - Dilation & curettage (D&C) up to 16 weeks

Second Trimester
- D&C
- Dilation & Evacuation (D&E) used after 16 weeks
- Induction

Third Trimester (late terminations)
- Often not legal in most states except in certain medical situations
- Defined as the point of viability (~ 24 weeks gestation)
- Induction or D&E

- 1.3 – 1.4 million abortions annually in the U.S.
- 66% occur < 8 weeks, 92% occur < 13 weeks, 7.1% between 14-20 weeks, 1.3% ≥ 21 weeks
- Women in their 20s account for >50% of all abortions
- 23% are medical abortions; half by mifepristone
- 68% by D&C ≤ 13 weeks
- 1% are by induction
Overview of Elective Termination Laws in the U.S.

Physician & Hospital Requirements
• 38 states require termination to be performed by a licensed physician

Gestational Limits
• 43 states prohibit termination after 20-24 weeks
• Exceptions in cases of threat to woman’s life or health, rape, incest, fetal abnormality

Partial Birth Abortions
• Prohibited in 19 states

Public Funding
• 17 states fund all or most medically necessary terminations for Medicaid

Coverage by Private Insurance
• 11 states restrict coverage by private insurance to only threat of woman’s life

Refusal
• 45 states allow health care providers to refuse participation in terminations
• 42 states allow institutions to refuse to perform terminations – 16 limit to private or religious centers

State-Mandated Counseling
• 16 states require women be given counseling

Waiting Periods
• 27 states require woman to wait a period of time, usually 24hrs between counseling and the procedure. 14 states require the women to have two separate clinic visits

Parental Involvement
• 37 states require some parental involvement in cases involving minors
Limitation of Care / Hospice Referral

• Late third trimester palliative care consult

• Coordination with birthing center, local hospice care program, and primary care provider

• Diagnostic workup is important if woman is likely to have another pregnancy

• Long term follow up care may still be necessary for management of seizures and cerebral palsy
Resources

Books

- *A Time to Decide, A Time to Heal*
  Molly Minnick, Kathleen J Delp, Mary C. Ciotti
- *Precious Lives, Painful Choices: A prenatal decision-making guide*
  Sherokee Ilse

Support Resources

- www.aheartbreakingchoice.com
- www.isaiahspromise.net
Delivery Strategies

Level 1
• Do not need transfer to Children’s
• Outpatient evaluation or follow

Level 2
• Immediate access to a neonatologist (local Level III NICU)
• Require no-urgent transfer to Children’s after stabilization

Level 3
• Require immediate access to a Children’s subspecialist (nearby Level III NICU)
• Require urgent transfer to Children’s after stabilization

Level 4
• Critical condition requiring delivery or EXIT delivery at Children’s
Levels of Neonatal Care (AAP & ACOG 2012)

Level I (Well Baby Nursery)
- Can provide neonatal resuscitation at every delivery
- Can stabilize and provide care for newborns born at 35-37 weeks gestation who are stable
- Providers can be pediatricians, family physicians, NPs

Level II (Specialty Care Nursery)
- Can provide care for neonates born ≥ 32 weeks gestation and weighing ≥ 1500 g who are not anticipated to need subspecialty services
- Can provide mechanical ventilation for < 24 hrs or CPAP
- Can stabilize neonates born < 32 weeks gestation and weighing < 1500 g until transfer to a NICU
- Providers must include pediatric hospitalists, neonatologists, and NNPs

Level III (NICU)
- Can provide sustained life support
- Can provide comprehensive care for neonates born at all ages and weights with critical illness
- Can provide prompt access to pediatric medical subspecialists, pediatric surgical specialists, pediatric anesthesiologists and pediatric ophthalmologists
- Can provide iNO and HF oscillators
- Can provide advanced imaging with urgent interpretations (HCT, MRI, Echo)

Level IV (Regional NICU)
- Located within an institution with the capability to provide surgical repair of complex congenital or acquired conditions
- Maintains a full range of pediatric medical and surgical subspecialists and pediatric anesthesiologists on site
- Can facilitate transport and provide outreach education
Long Term Complex Care

• Complex Care Clinic

• PANDA (Palliative Care Team)

• Ethics Consult

• HELLP (Hospitalist Complex Care Team)

• Subspecialty Clinics
  • Infant Development
  • Fetal Neurology vs Neonatal Neurology
  • Neurosurgery
  • Genetics
  • Orthopedics
  • Pulmonary
  • Gastroenterology

• Multi-disciplinary Clinics
  – Spina bifida clinic
  – Craniofacial clinic
  – Perinatal Brain Injury clinic
  – CANDO clinic (cardiology)
  – Neurogenetic clinic
  – Neuromuscular clinic
Conclusions

• Fetal neurology requires specialized skills, knowledge set, and experience separate from neonatal or pediatric neurology

• A successful transitional fetal-neonatal neurology program requires coordination with multiple disciplines and continuity of care from the fetal to perinatal to postnatal periods

• Early prenatal diagnosis of neurologic conditions & injuries may allow for prenatal intervention and/or neuroprotection
Fetal - Neonatal Neurology Program

- **Fetal & Transitional Medicine**
  - Adré du Plessis, MBBS, MPH*
  - Sarah Mulkey, M.D., Ph.D.
  - Anna Penn, M.D., Ph.D.
  - Lindsay Pesacreta, NP
  - Genetic counselors – Meg Menzel, Anne Lawrence, Kate Cilli

- **Neonatal Neurointensivists-Neurologists**
  - Taeun Chang, M.D.*
  - Sarah Mulkey, M.D.; Ph.D., Joseph Scafidi, D.O., M.S.; Tammy N. Tsuchida, M.D., Ph.D.

- **Neonatology**
  - Billie L. Short, M.D.*

- **Fetal Radiology**
  - Dorothy Bulas, M.D. *;
  - Ana Blask, M.D.; Judyta Loomis, M.D.; Eva Rubio, M.D.;

- **Pediatric Neuroradiology**
  - L. Gilbert Vezina, M.D.*
  - Zarir Khademian, M.D.; Jonathan Murnick, M.D.; Matthew Whitehead, M.D.;

- **MRI Research for the Developing Brain**
  - Catherine Limperopoulos, Ph.D.*;

- **Pediatric Neurophysiology**
  - William Gaillard, M.D.*
  - Dewi Cabacar, M.D.; Joan Conry, M.D.; Amy Kao, M.D.; John Schreiber, M.D.; Tammy Tsuchida, M.D., Ph.D.; Thuy Vu, M.D.; Steven Weinstein, M.D.; Tesfaye Zelleke, M.D.
  - **Biomedical engineering**

- **Infant Development**
  - Tara Brennan, Ph.D. *; Melissa Liggett, Ph.D.; Penny Glass, Ph.D.;

- **Physical Medicine & Rehabilitation**
  - Sally Evans, M.D.*
  - Olga Morozova, M.D.
  - Occupational, Physical, Speech Therapy

- **Pediatric Neurosurgery**
  - Robert Keating, M.D.*
  - Chima Oluigbo, M.D.; Suresh Magge, M.D.; John Myseros, M.D.;

- **Perinatal Pathology**
  - Christine Reyes, M.D.*; Elena Puscasiu, M.D.; Allison Huppman, M.D.
Questions for discussion

• Do you (or your center) perform fetal neurology consults?

• Are you considering a fetal neurology program?

• What are your obstacles in establishing a fetal neurology program?

• Do you (or your center) have a neonatal neurology or neurocritical care service?
Second Annual International Symposium on the FETAL BRAIN