CVI in the NICU: A Brief Survey

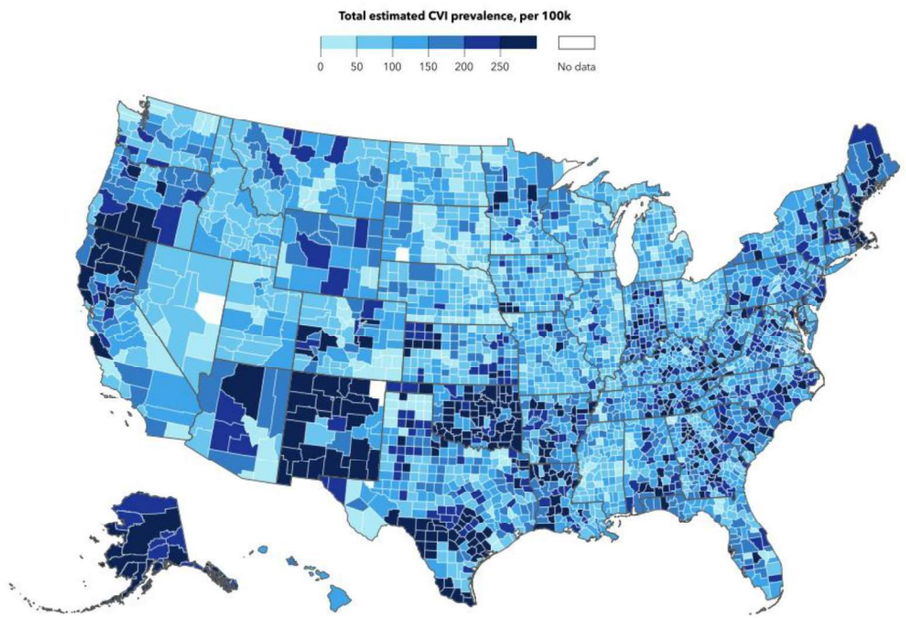
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What is CVI?

Cerebral, or cortical, visual impairment (CVI) is a disorder characterized by visual deficits resulting from damage to visual pathways in the brain (rather than the eye) that are posterior to the lateral geniculate body, including visual processing areas.

A recent model from USA estimated there is at least <u>180,449 individuals</u> aged 0-22 years with diagnosed or likely CVI (only 14% diagnosed*).* Among these with CVI, 65% have CP, 64% epilepsy, 72% developmental delay, and 20% genetic anomalies *(Perkins School of the Blind, 2024)*



From: The current state of CVI: A hidden epidemic (Perkins School for the Blind, 2024.

Recently, the National Institutes of Health (NIH) CVI Working Group defined CVI as: "a spectrum of visual impairments caused by an underlying brain abnormality that affects the development of visual processing pathways and is characterized by deficits in visual function and functional vision."

Aim

Currently, in the NICU, there is not much conversation about the risk of developing CVI in high-risk population, and this is an area where we could improve. This project was designed to identify the current baseline knowledge of CVI among providers and care staff.

- **Aim 1: Identify the current knowledge of CVI among providers in the NICU**
- **Aim 2: Educate providers and NICU staff about CVI and how to recognize risk in their patients.**
- **Aim 3: Create a CPG that details the protocol that should be followed when an infant with elevated risk of CVI is identified.**

Methods

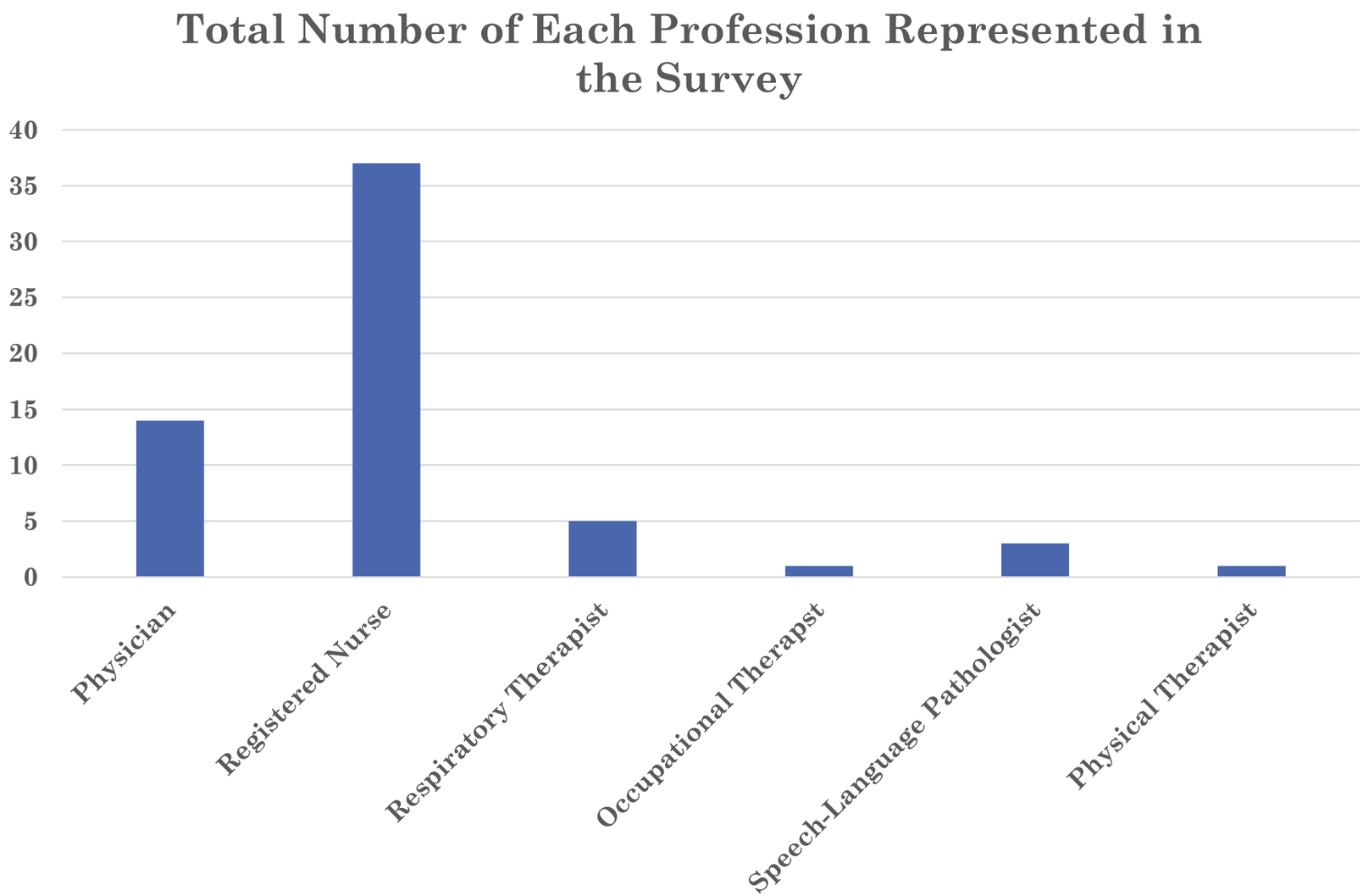
Survey Creation: The survey was created using the most recent resources on CVI (AAP, AAO, etc.) and verified by experts in the field.

Survey Distribution: We used redcap to distribute the survey to providers in the NICU at BWH.

Data Analysis: Using the responses received, we were able to summarize and analyze the data to create a summary of the findings.

Who Did We Hear From?

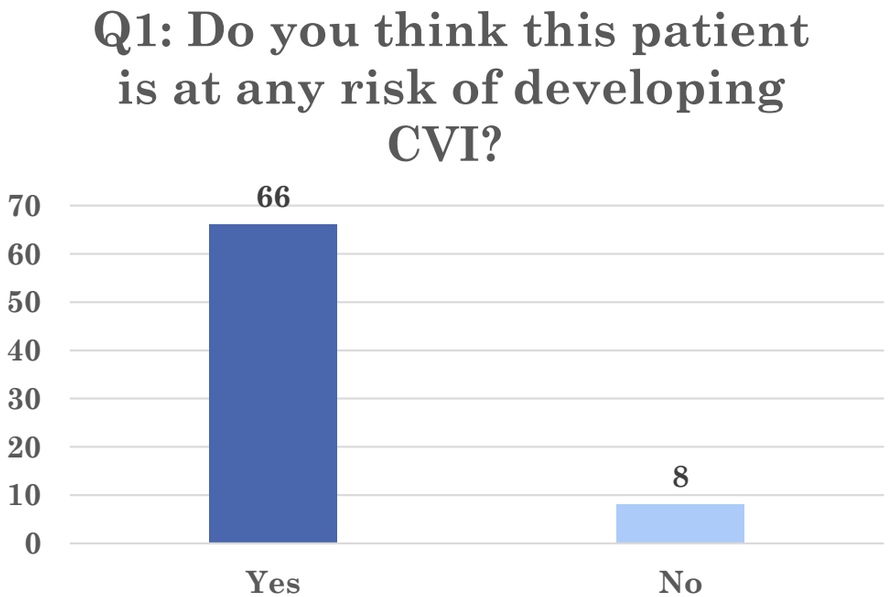
Of the 61 total respondents that answered this question:

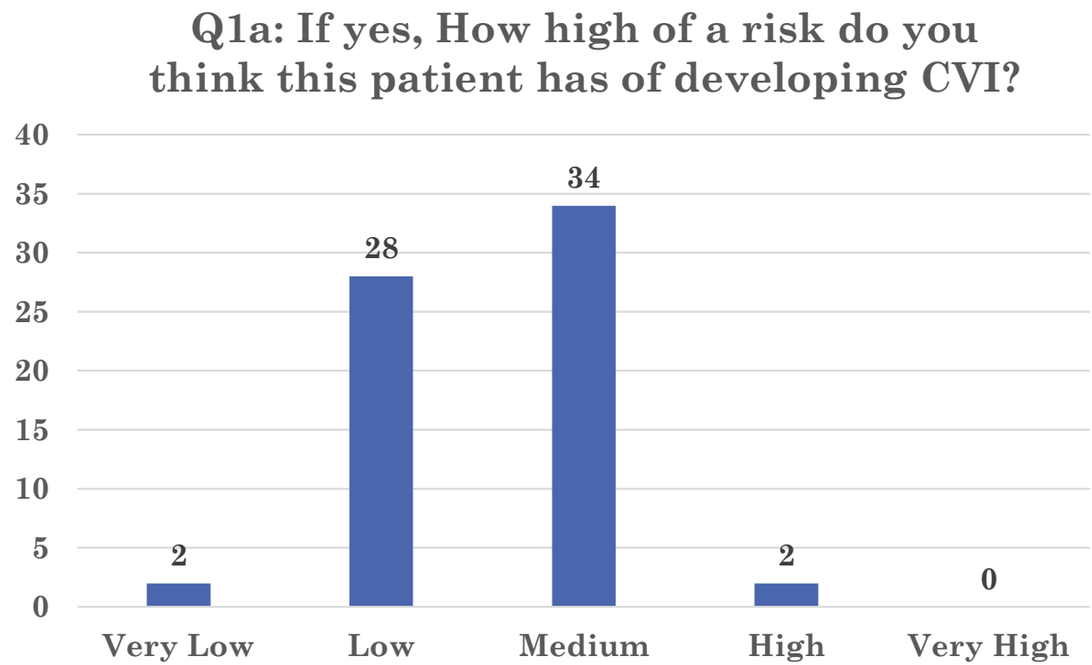


Case Study 1:

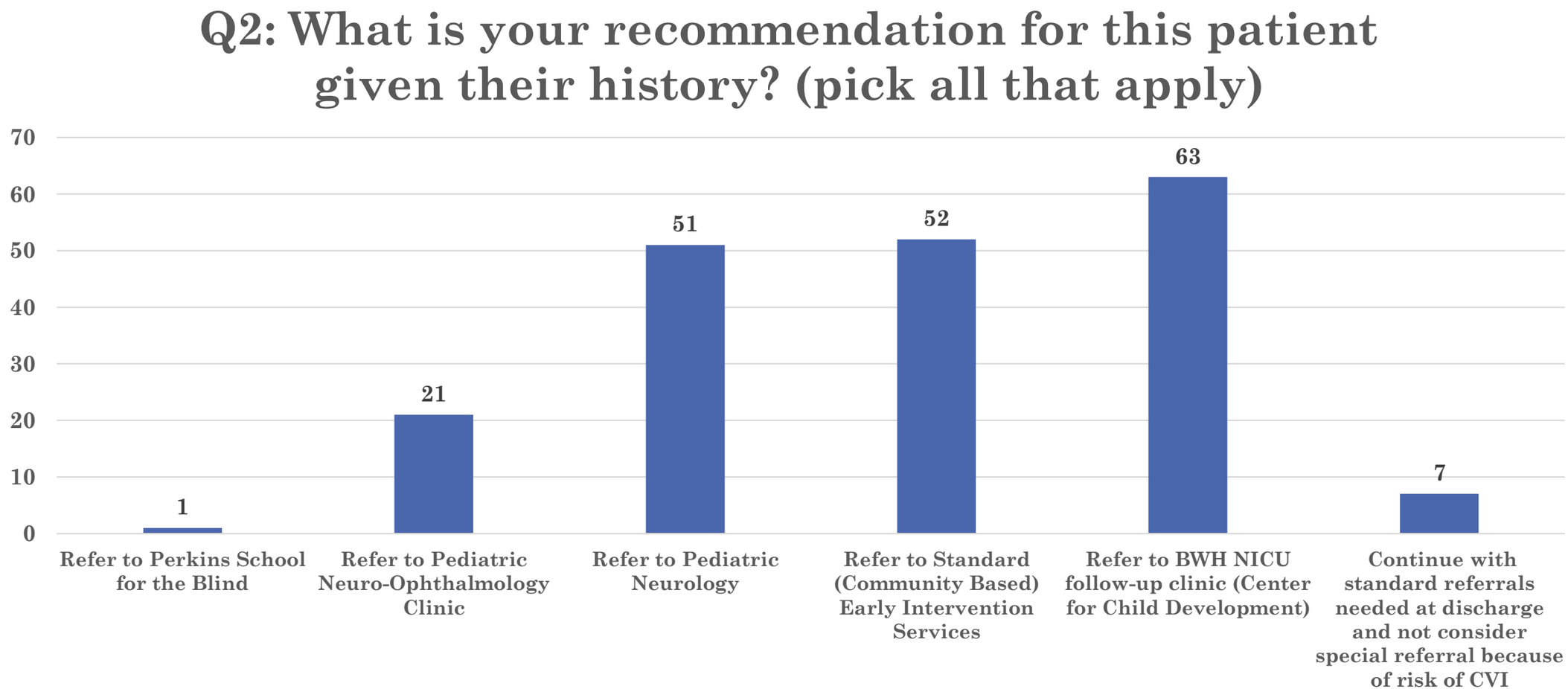
There is a term infant with HIE who received therapeutic hypothermia for moderate encephalopathy. MRI showed very small areas of brain injury. The baby was discharged at day 6 with normal neurological examination.

Here are the results...

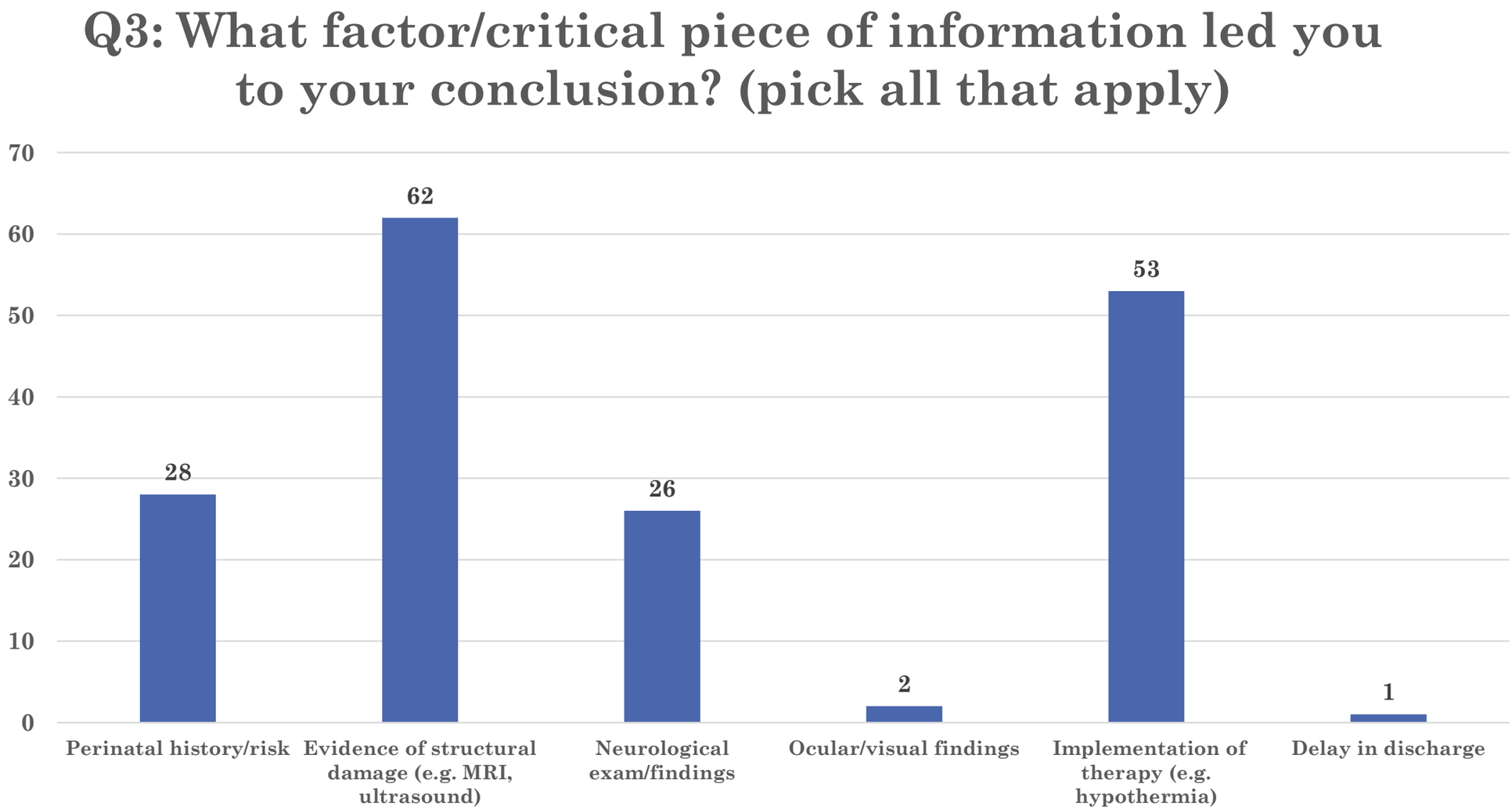




Here are the results… cont'd



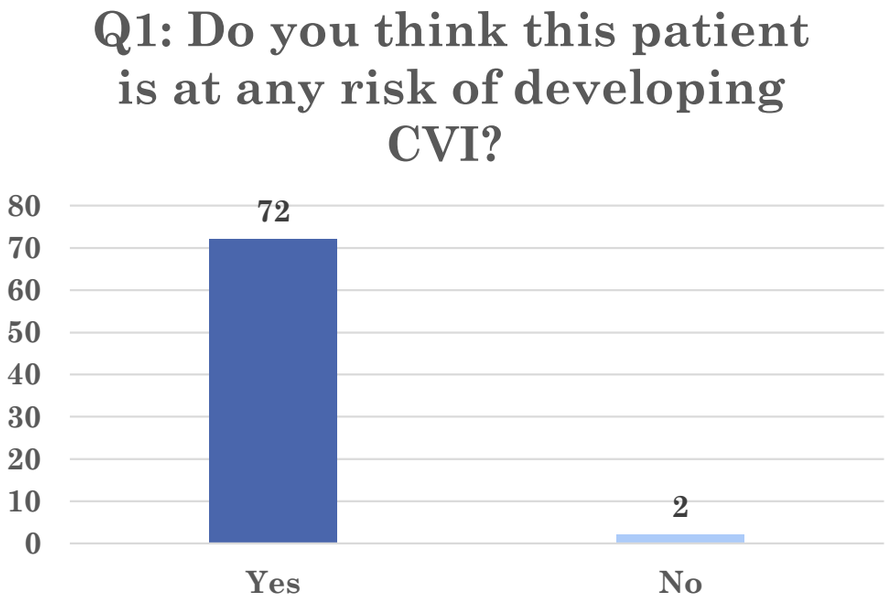
Here are the results… cont'd

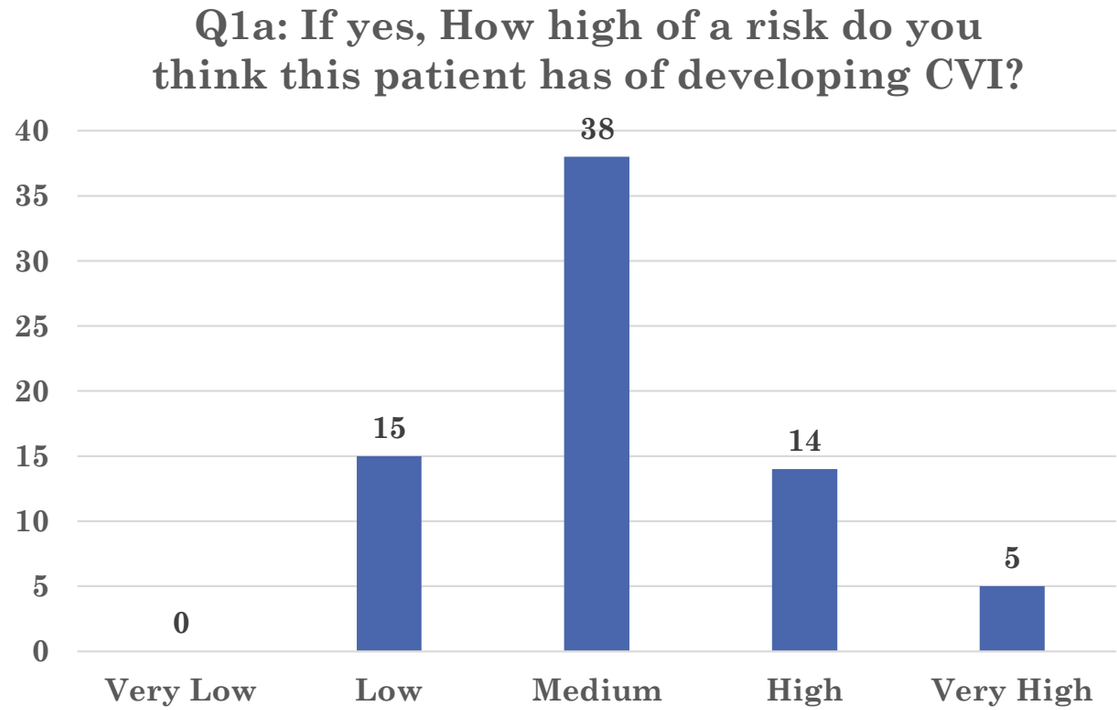


Case Study 2:

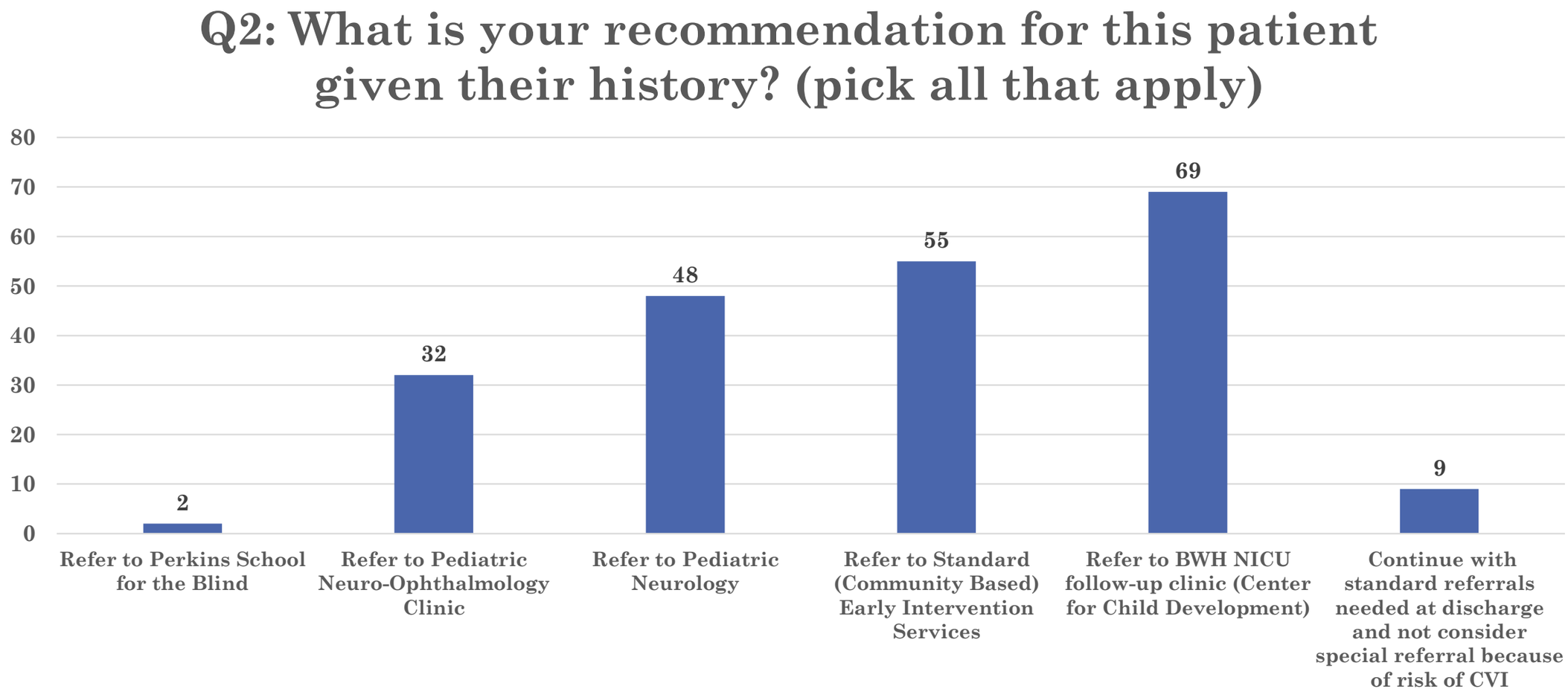
There is an ex 26-weeker who was delivered in the setting of chorioamnionitis. The baby was intubated for 3 days, then went to CPAP till 32 weeks PMA. Serial cranial ultrasound did not show any hemorrhage, but term equivalent age showed small areas of punctate white matter injury.

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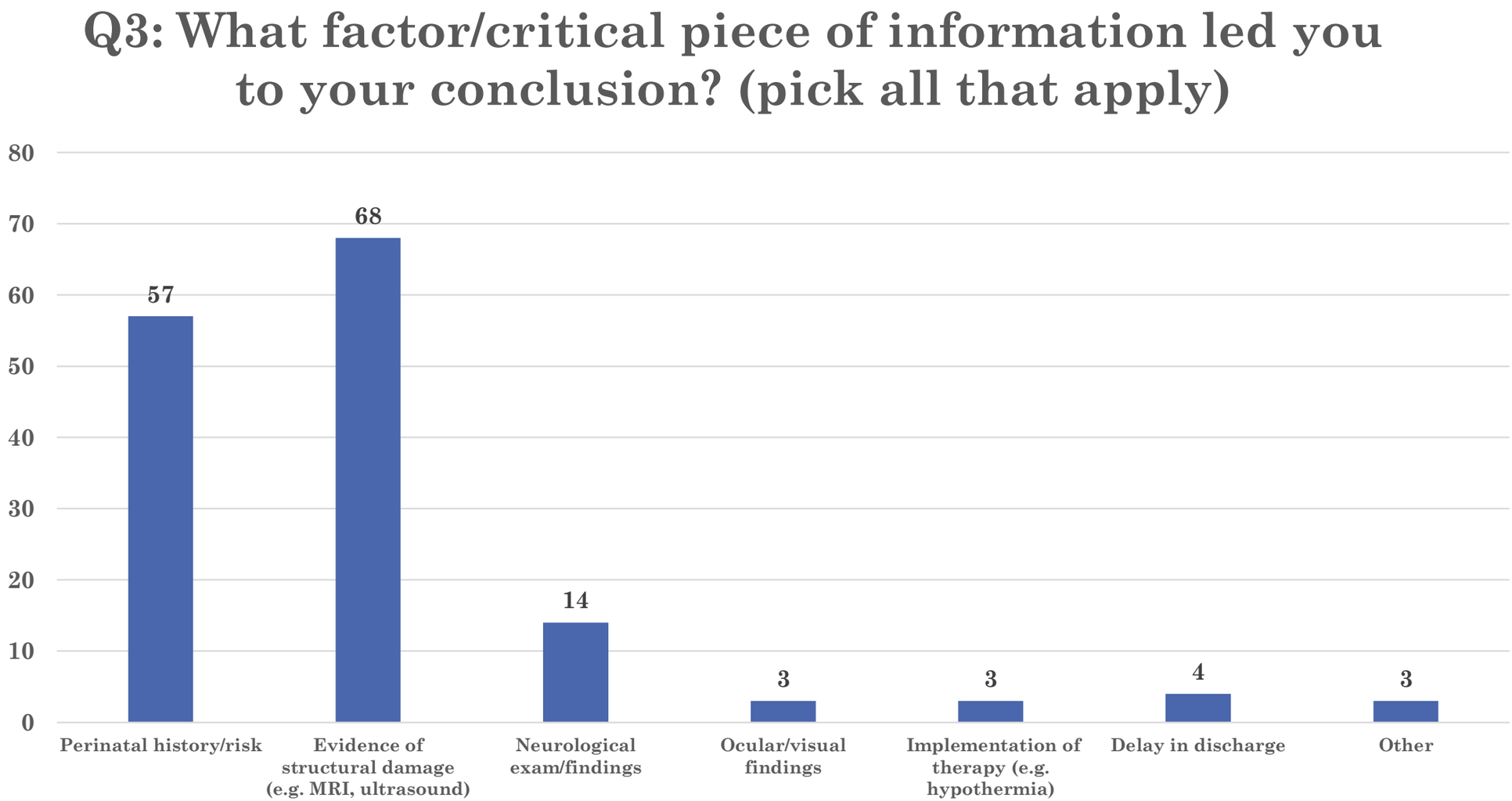




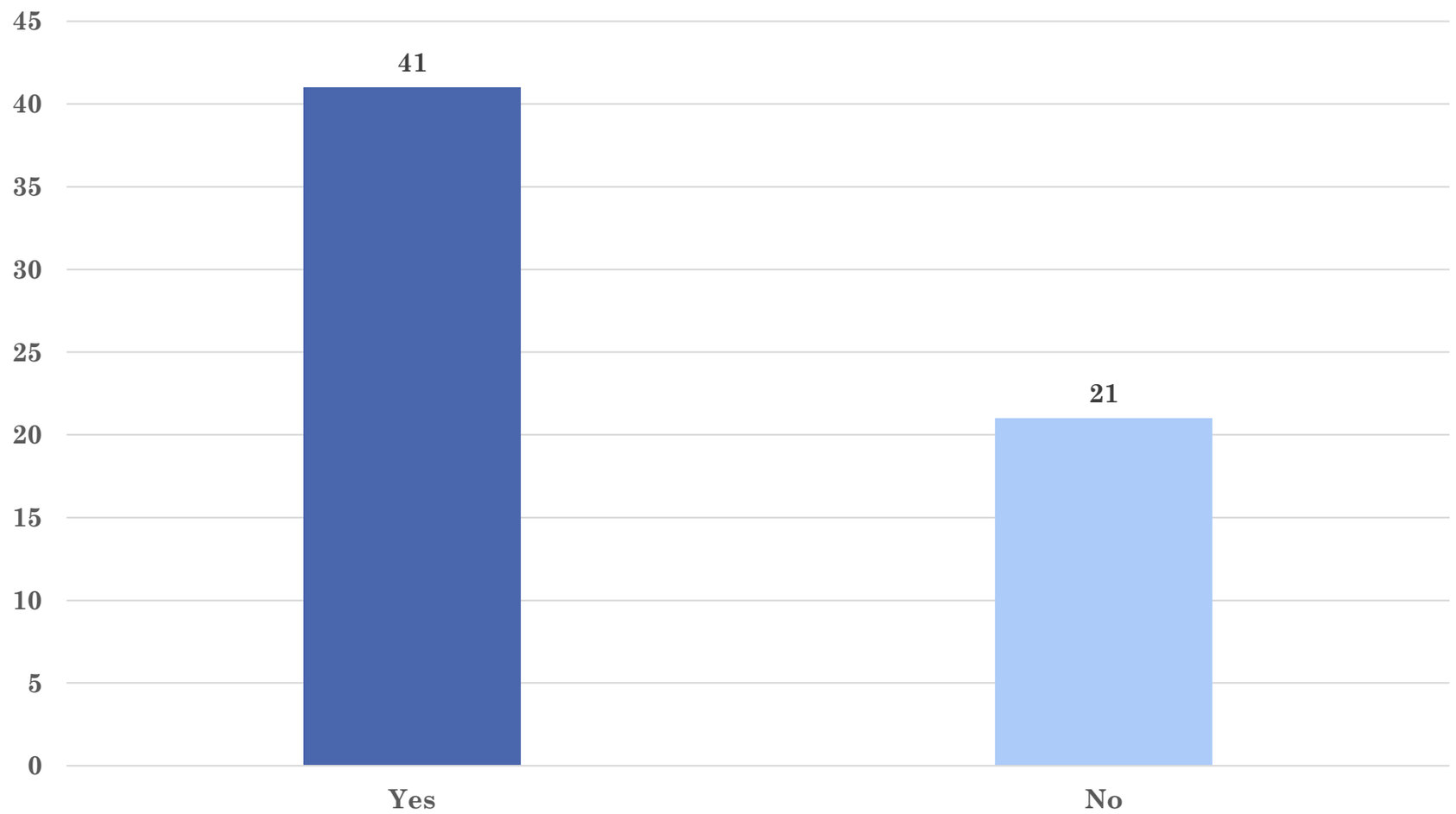
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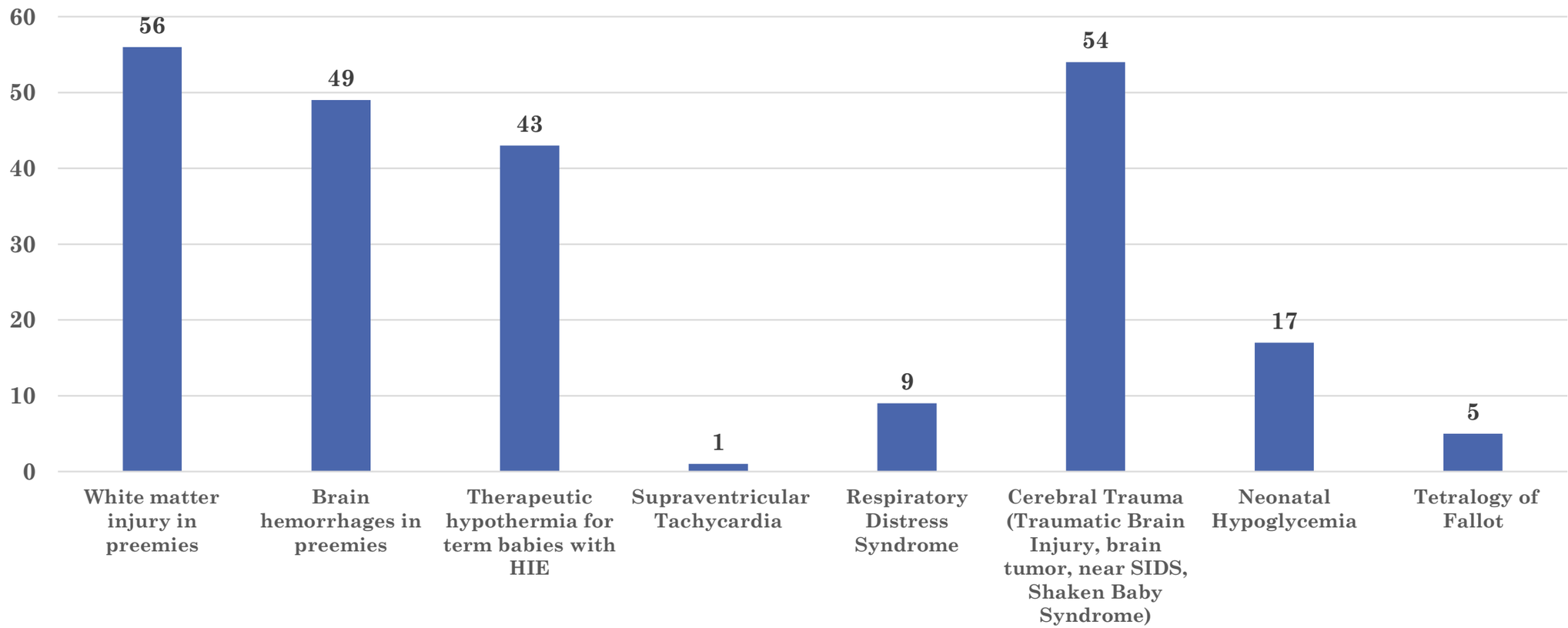
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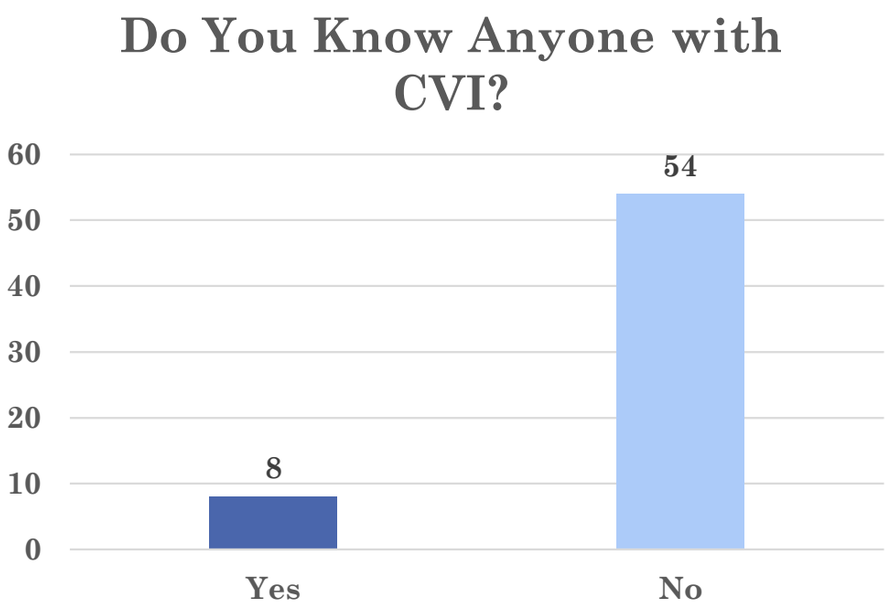
Do you know what CVI is?

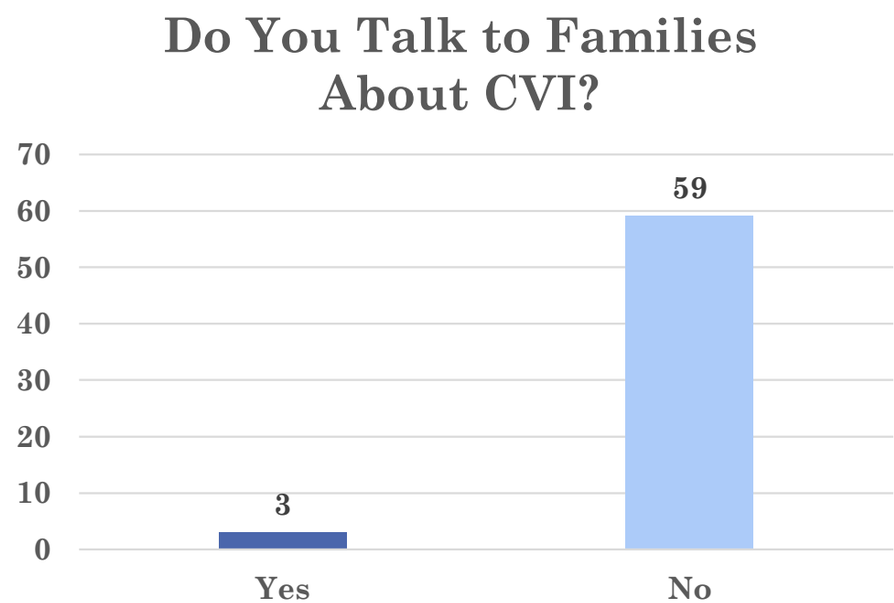


What are some common risk factors of CVI? (pick all that apply)

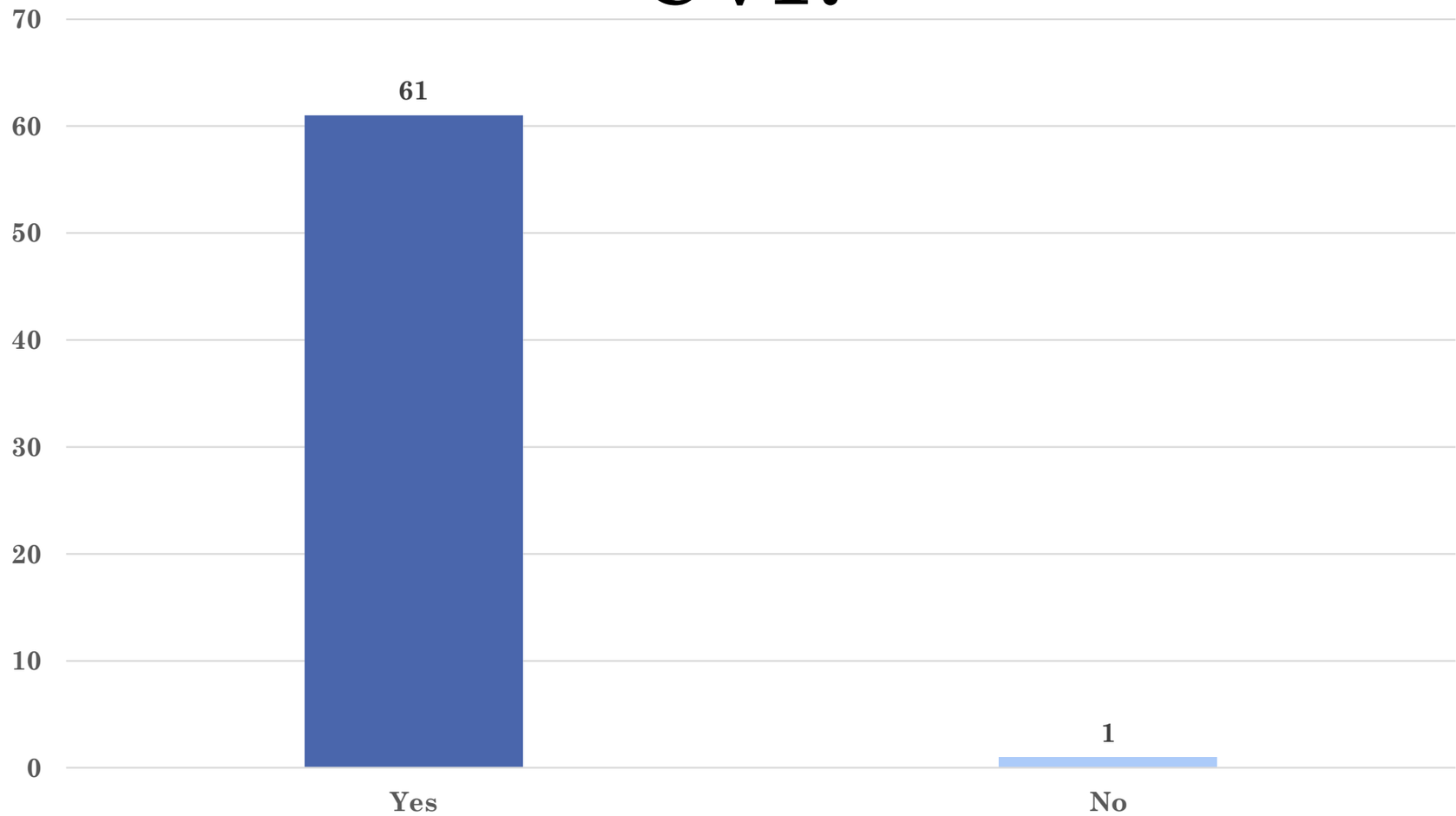


Here are some more questions…

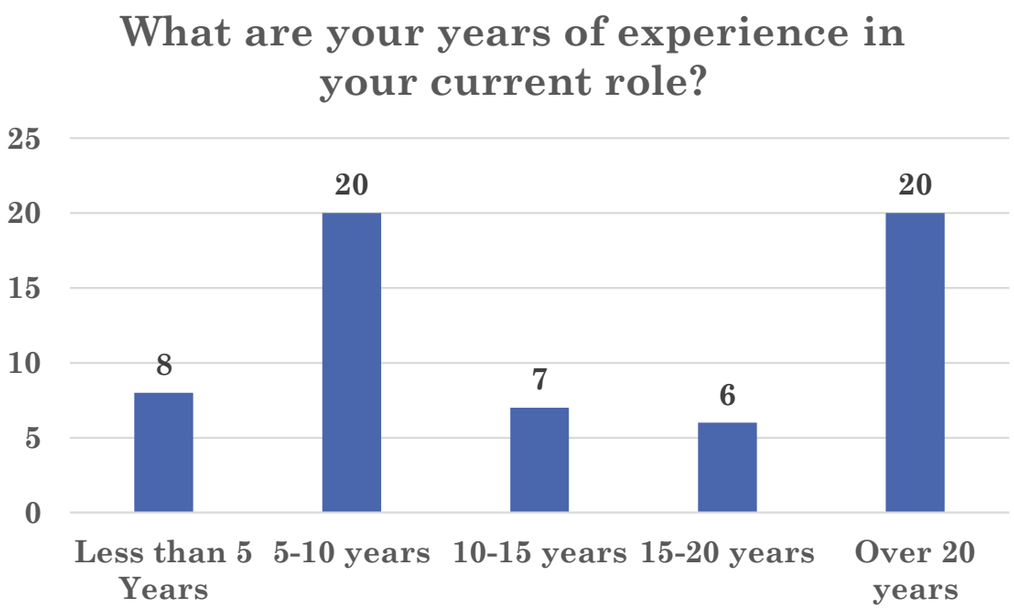


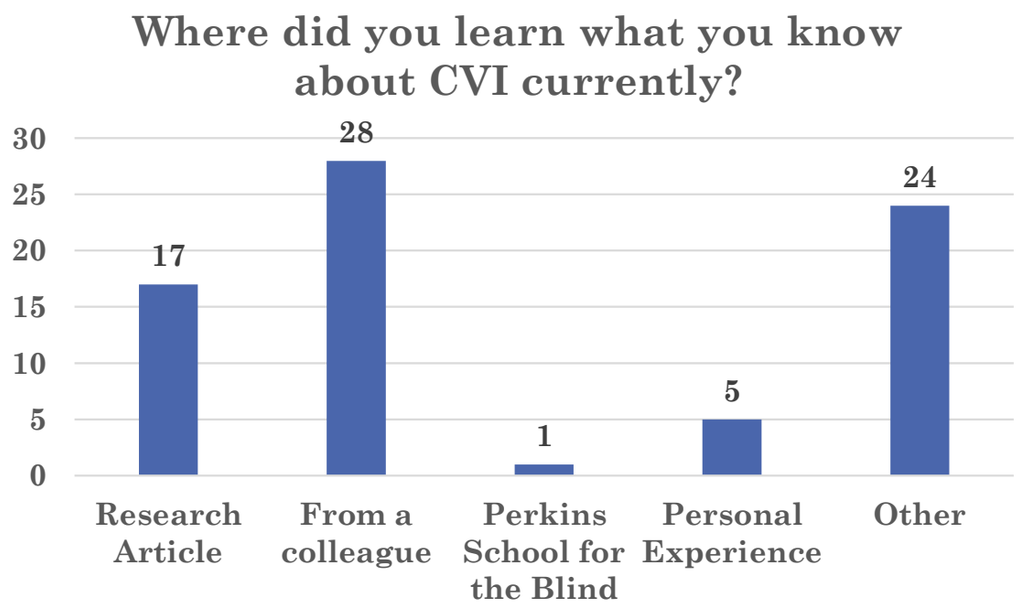


Do you want to learn more about CVI?

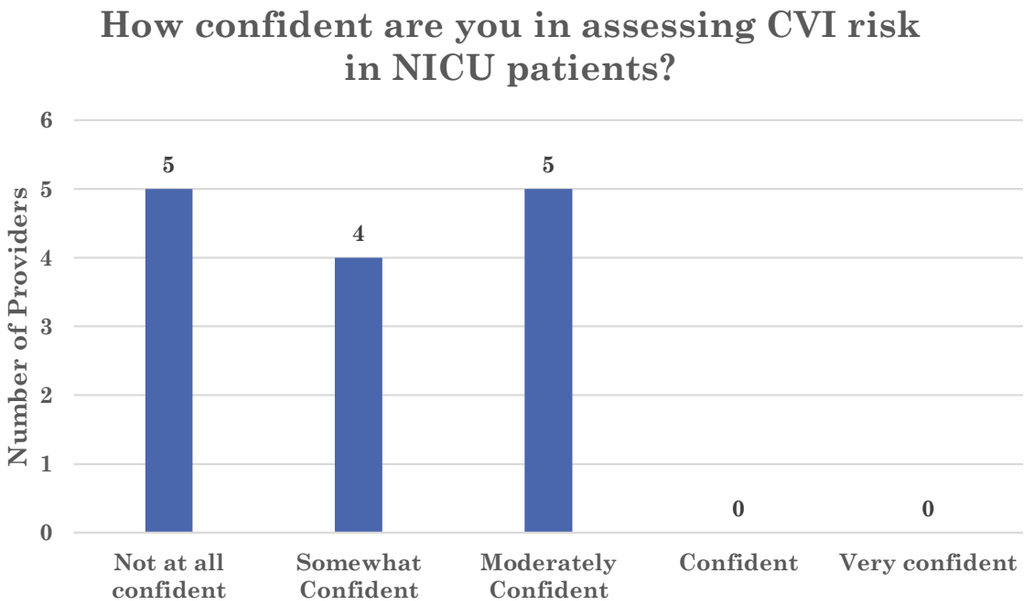


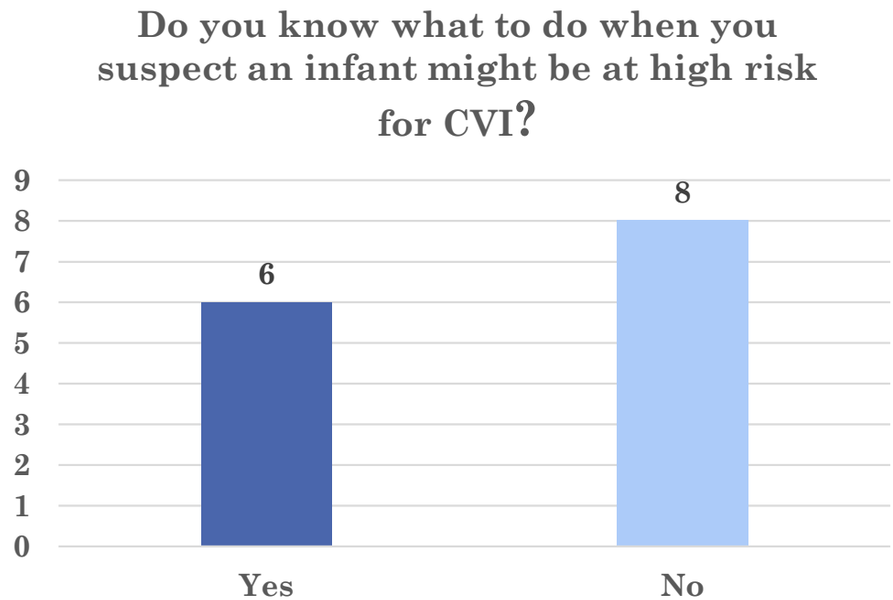
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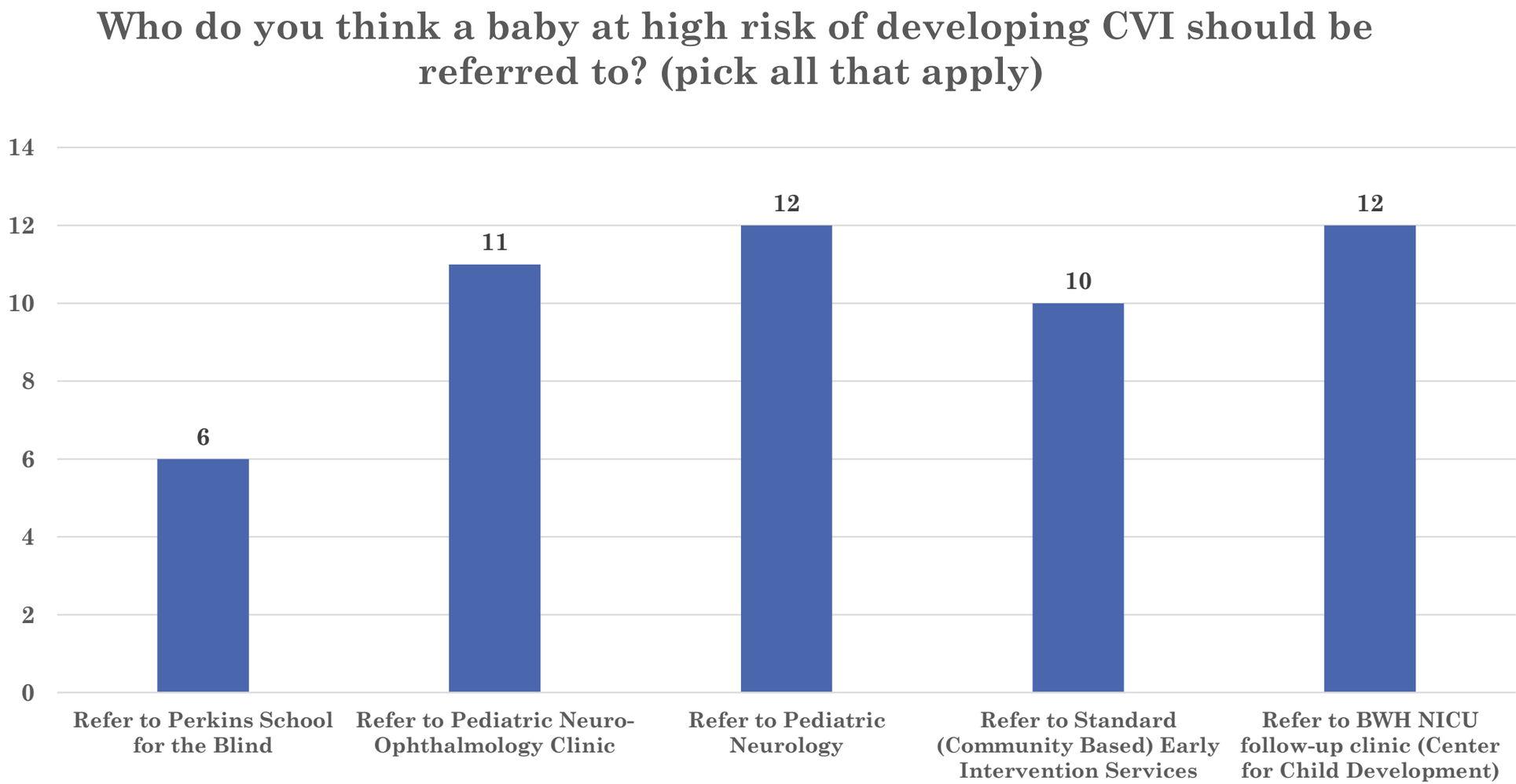


From the questions we specifically asked physicians…

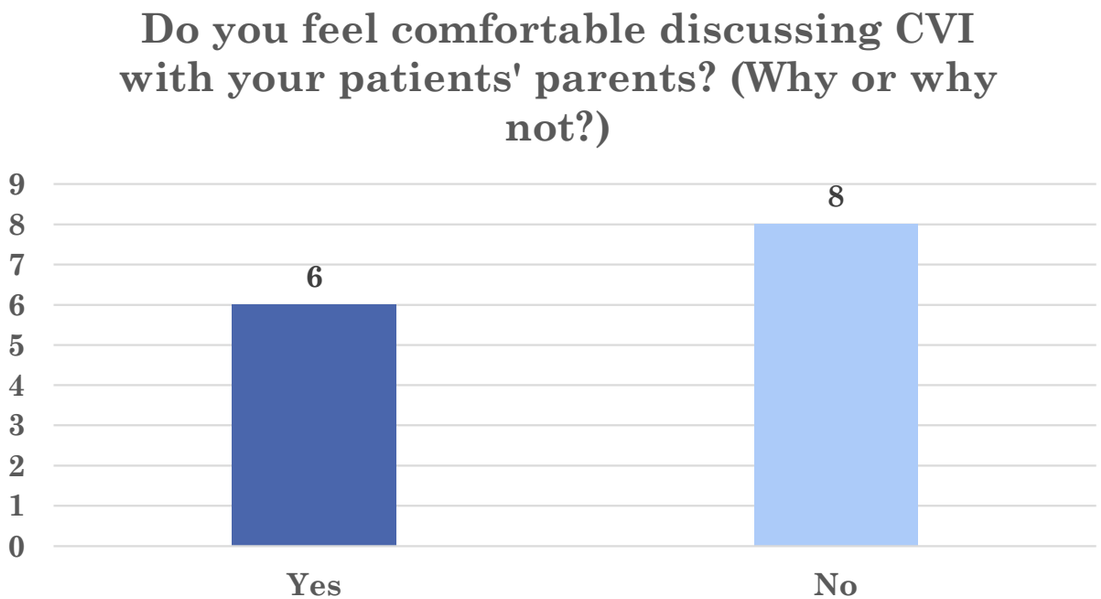


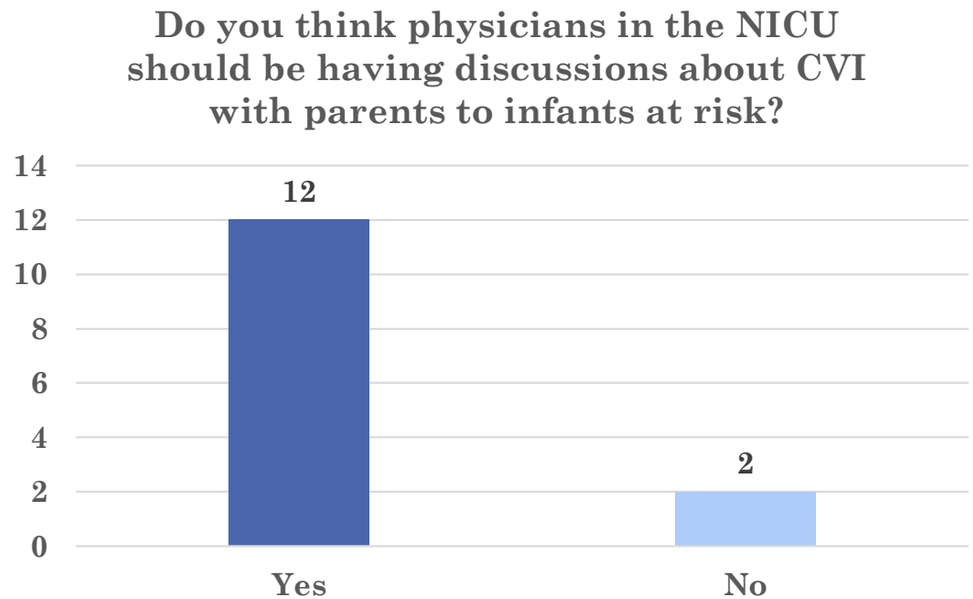


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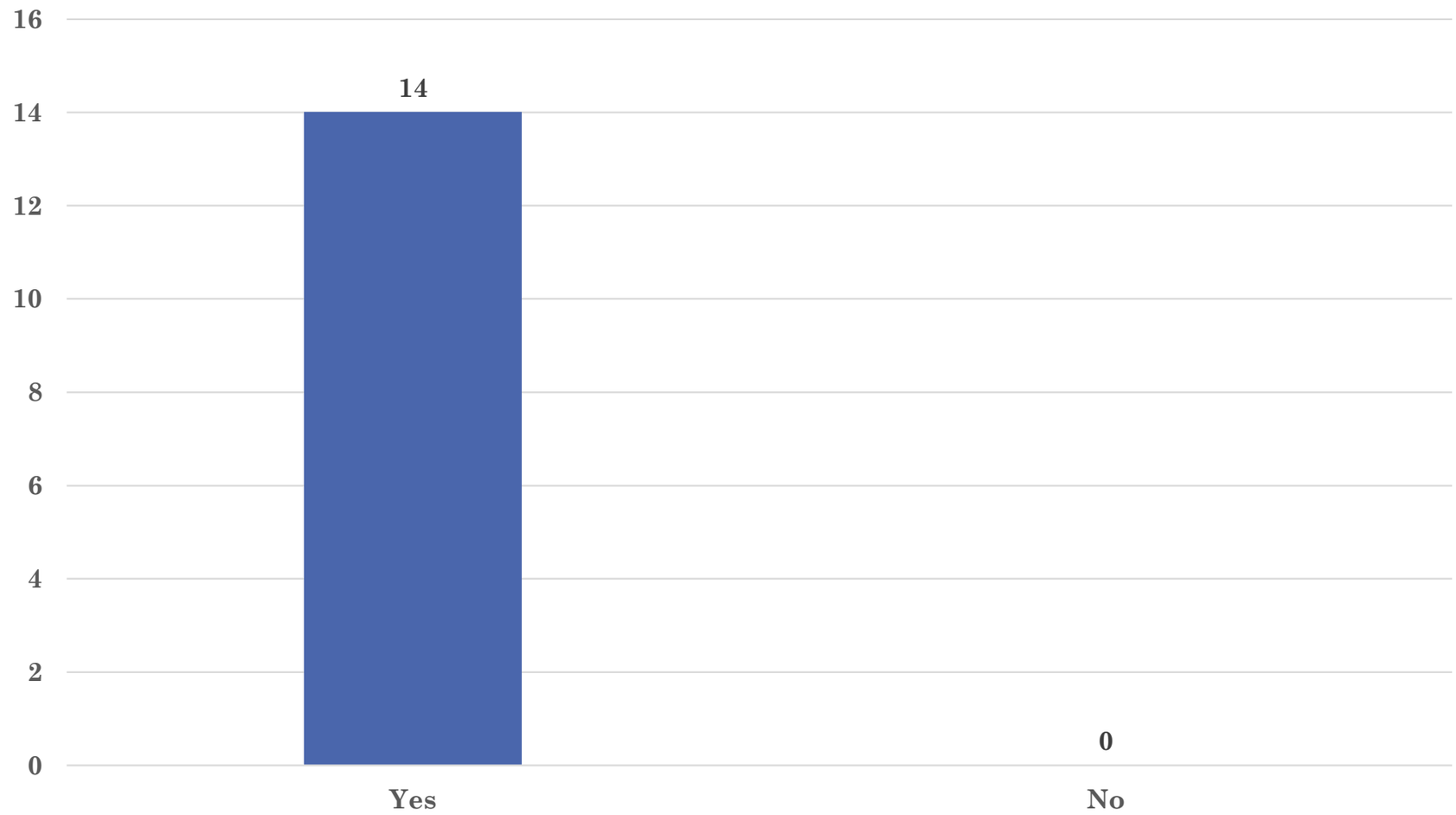


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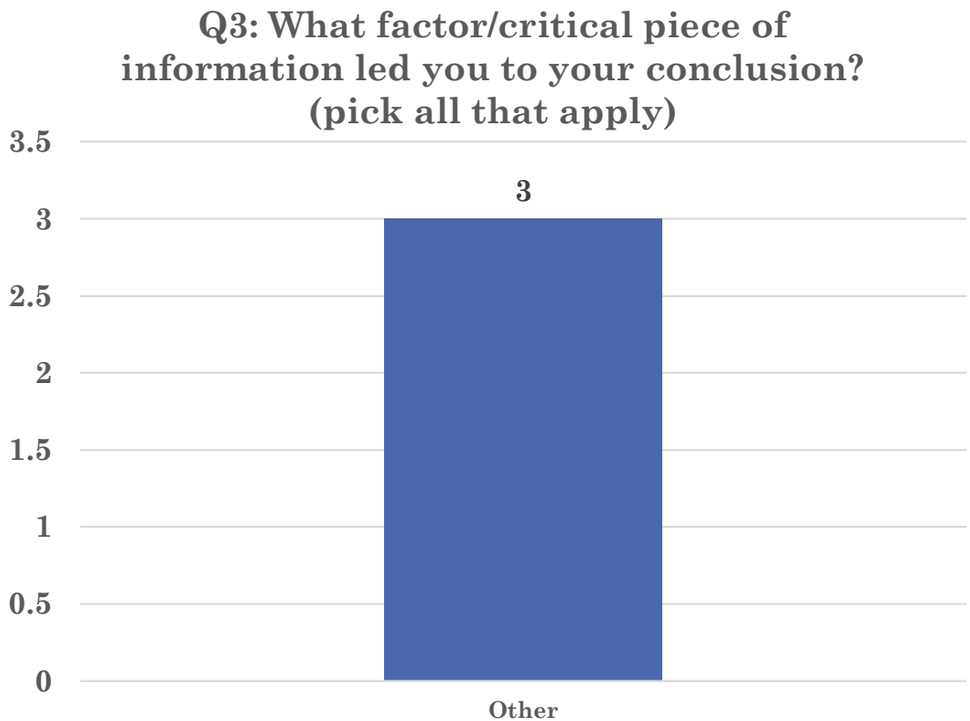


Do you think there should be a guideline to help determine what a patient's risk for CVI is and instruct on how physicians should proceed based on that risk?



Appendix 1. What were the other responses?

Case Study 2: There is an ex 26-weeker who was delivered in the setting of chorioamnionitis. The baby was intubated for 3 days, then went to CPAP till 32 weeks PMA. Serial cranial ultrasound did not show any hemorrhage, but term equivalent age showed small areas of punctate white matter injury.



If other, please explain:
Gestational age at delivery
gestational age/chorioamnionitis
Prematurity

Conclusion

These results give us a glimpse into the current knowledge of CVI within the NICU here at BWH. It is imperative that we follow up with access to resources that educate staff about this relevant issue, so that it can be better addressed.

Next Steps

1. **We will gather credible resources highlighting current knowledge of CVI**
2. **We will distribute those resources to providers and NICU staff about.**
3. **We will create a CPG that details the protocol that should be followed when an infant with elevated risk of CVI is identified.**

Appendix 2. What is CVI?

Damage to part of the brain that process vision

The brain is not able to recognize signals, cue from the brain. There is nothing wrong with the eyes

I had not heard of this diagnosis before receiving the email to take this survey.

Brain-based visual impairment

cortical visual impairment that impacts an infant's ability to engage in functional, ocular motor skills expected for one's age. Often times, these infants have a difficult time engaging in age-expected visual tasks/skills, such as fixating & tracking. Most infants need a multi-sensory approach to complete such tasks (i.e. a toy that produces auditory paired with visual stimuli, light up toy that makes noise). Functionally, long term impairments lead to concerns with one's ability to navigate the world around them safely (i.e. visual engagement, bilateral coordination tasks, motor delays, visual motor skills, etc.) & require specialized services, including OT specializing in visual impairments, environmental modifications, high-contrast materials, etc.

cortical visual impairment

Visual impairment due to injury to the visual cortical area

Injury to part of the brain that processes vision

Visual impairment

Cerebral/cognitive visual impairment

unsure

Educated guess - brain injury/trauma in the occipital lobe that can lead to deficits in vision

Appendix 2. What is CVI?

I would have to research it
cortical visual impairment - brain based visual impairment associated with high medical risk during the perinatal period
Cerebral visual impairment
Visual impairment from HIE
brain based visual impairment
Cerebral/Cortical Visual Impairment
Cerebral/Cortical Visual Impairment
difficulty processing visual stimuli due to some interruption in the optho-neurological connection?
Visual impairment due to injured brain parenchyma or vision pathways in the brain
vision problems relating to brain injury not eye issues/injury
Visual impairment arising from cerebral pathway injury
CVI is when the vision is impacted by the brain processing of visual images.
cerebral visual impairment- vision issues due to neurological damage
Cerebral/cortical visual impairment.
cerebral/cortical visual impairment

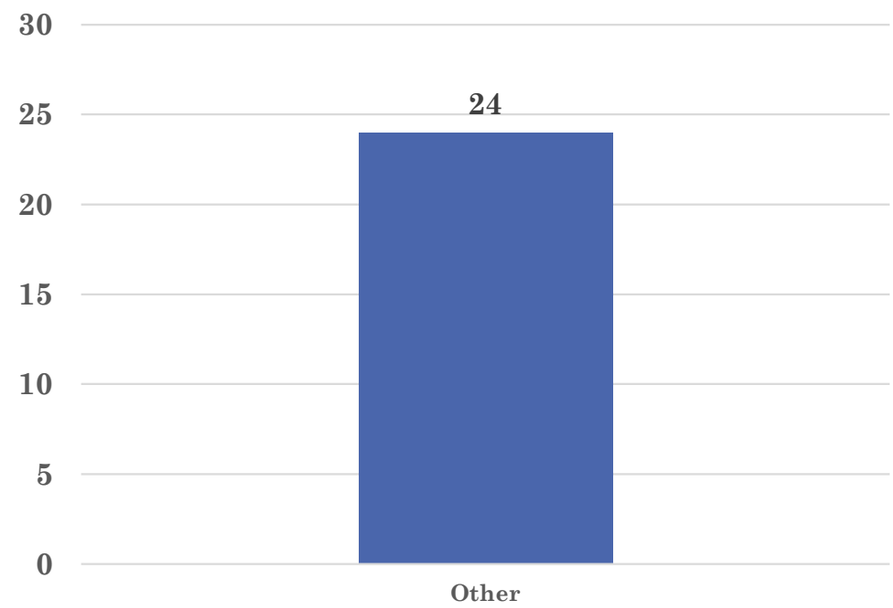
Appendix 2. What is CVI?

visual impairment
Cortical visual impairment; impaired ability to interpret visual inputs despite intact ophthalmic structure and function
damage to the brain cortex (or optic tracts) can cause visual impairment/blindness, even if the eyes /retina are working properly.
Cerebral/Cortical Visual Impairment. I know now from the email
issues in the brain that can cause visual accuity issues/depth perception/ focus issues
the barain has trouble processing visual images
Cortical visual impairment
Cerebral Visual Impairment
Cerebral Vascular Incident
cerebral/visual impairment
do not know
Visual impairment
Cortical Visual Impairment -Impacts how brain processes visual information
Cortical visual impairment
a test done to check for ROP ?

Appendix 2. What is CVI?

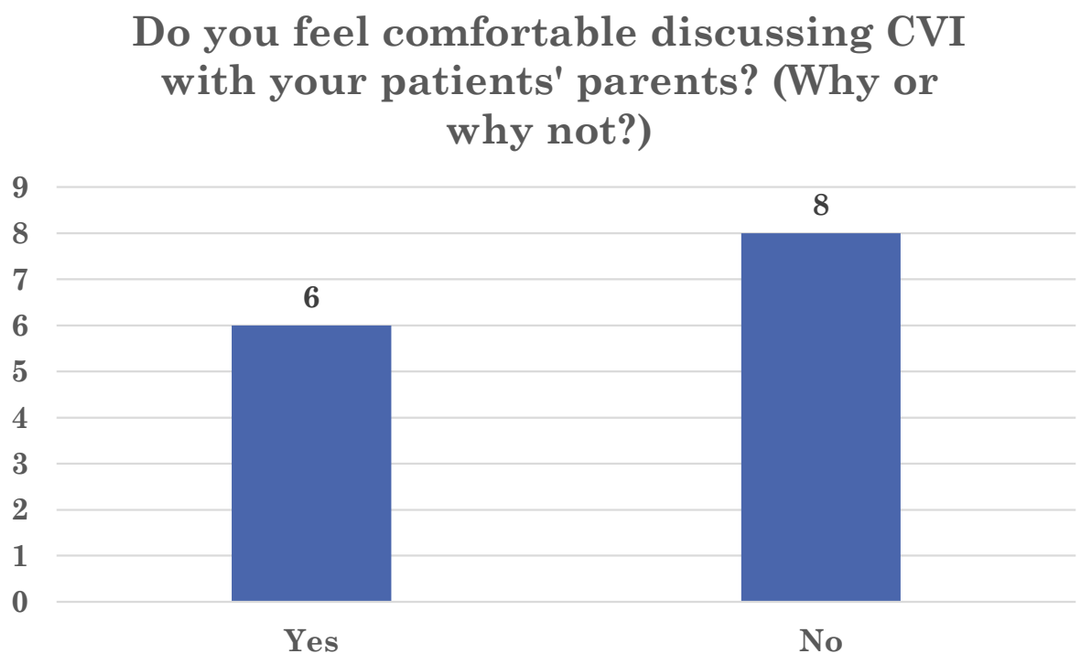
Cortical Visual Impairment
When an injury occurs in the brain's blood vessels before, during, or after birth
cerebral/cortical visual impairment
unsure have never heard of it
Cerebral/cortical visual impairment --not sure I know much else about it but it is risk of preterm birth and perinatal injury including HIE
cerebral visual impairment
cerebral visiual impairment
visual impairment due to affects on certain area of brain
cerebral visual impairment
Chronic venous insufficiency or cerebral /corticol visual impairment
cerebral visual impairment
a form of visual imparment that results from dysfunction in brain-based processing of visual input (distingushed from visual impairment resulting from dysfunction in the way the eye / optic nerves receive and transmit visual input to the brain)
Visual impairment that is neurologic based
Do not know much, except some risk factors.

Appendix 3: What were the other responses?



I made an educated guess for all the questions asked regarding this diagnosis. I have no prior knowledge/experience with it even though I have my RNC-NIC.	quick google search
prior work experience at a school for children with multiple disabilities	don't know too much about it. have heard of it and know its a possibility post brain injury
Clinical learning/teaching	In the email that was just sent
Friend within special needs group	From this survey!
CEU's	through this survey
This is the first time im hearing about it	Presentation
unit education, school	never
I need to know more.	I have not learned
training and seeing patients with this condition	i dont know much about it
right now in this email	Articles

Appendix 3. Why or Why Not?



Need to understand risk factors so can counsel appropriately
Have done some conversations with select families but would love to learn more
I am learning about it and am getting more comfortable in discussing it.
Lack of knowledge
Need to learn more on this topic
not enough knowledge
I don't have enough knowledge
I understand that brain injuries can affect all parts of the body.
Integrated as part of prenatal counseling, inpatient family meetings and discharge counseling
Do not know enough about it
One of risks parents should know about
Uncertainty about degree of risk for most individual patients, how to balance benefits of testing / monitoring vs. burdens to the family in terms of time and worry about something that may never occur amist all the other well-established (more evidence based) medical and developmental needs for the child
Would need to learn about it, the predisposition, manifestation, how to diagnose, how to monitor and how to treat. Also, if there any prevention?