



NeuroAssist

Guiding the Path to Brain Recovery



Topic: Neurotech & AI



Our Group:



Avanti



Leon



Anthony



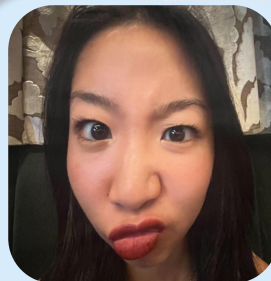
Ava



Gloria



Ally



Cassidy



HeadHero

Overview

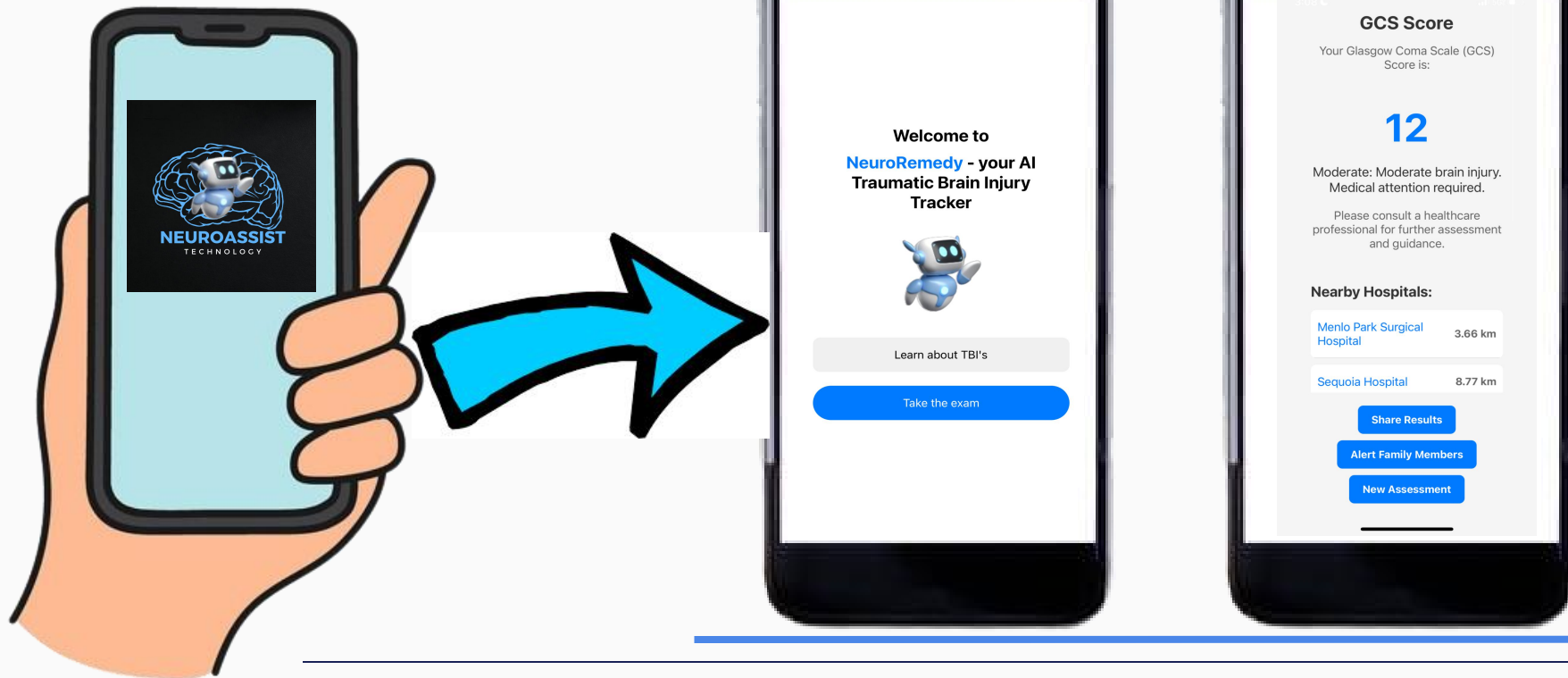
- What a TBI is
- Statistics
- Effects of TBI on your brain
- Need Statement
- Glasgow Coma Scale
- NeuroAssist Chatbot
- Demonstration!!
- Future goals and ambitions



Our Website!



Meet Our App

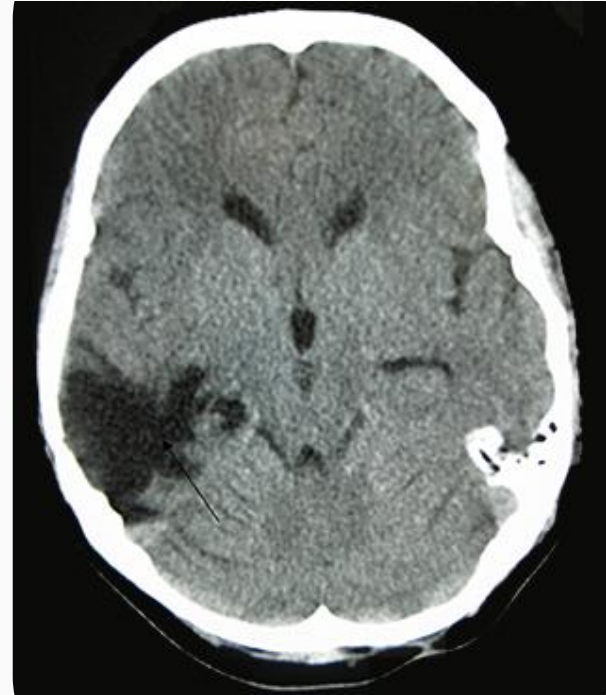


What is a TBI?

A traumatic brain injury (TBI) is an injury usually caused by a blow or injury to the head that results in damage to the brain, affecting how it works

Examples of Symptoms

- Mild
 - Headache
 - Confusion
 - Blurred vision
 - Ringing in the ears
 - Dizziness
- Moderate to Severe
 - Worsening headache
 - Profound confusion/memory problems
 - Loss of vision



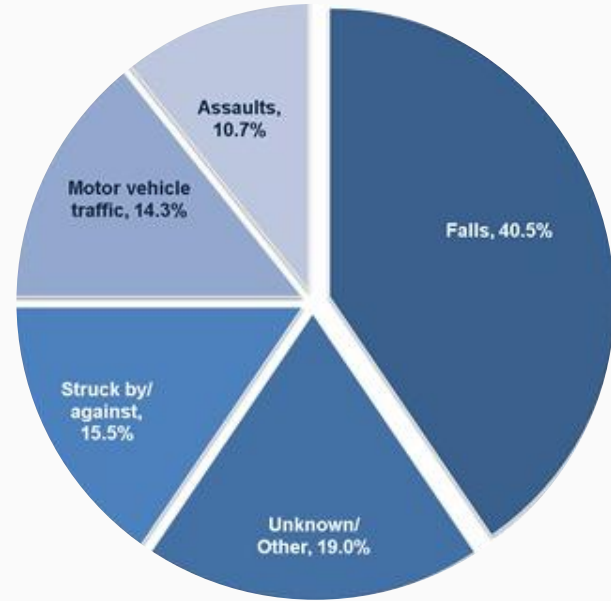
Leading Causes & Statistics

Common Causes



US Statistics

- Approximately each year **1.7 million people** sustain a traumatic brain injury (TBI)
- **275,000 of 1.7 million** are admitted to the hospital and **52,000 die**
- Older adults, 75 or older have the highest rates of TBI-related hospitalization and death, predominantly due to falls
- Between 2.5 - 6.5 million citizens live with TBI-related disabilities



Financial Cost of TBI's

Lawrence and colleagues (2018) conducted a study on lifetime cost estimation for TBIs that occurred in 2012

Data Set: 2,123,120 TBIs recorded in that year

The estimated lifetime costs totaled **\$758 billion**

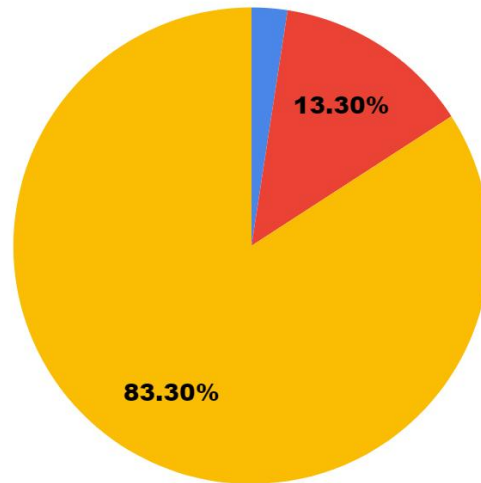
Total Lifetime costs

- Estimated that 2.4 percent was direct costs
- 13.3 percent was for work loss
- 83.3 percent (\$631 billion) was for quality of life lost

AMAZON makes \$574.78 billion in 2023

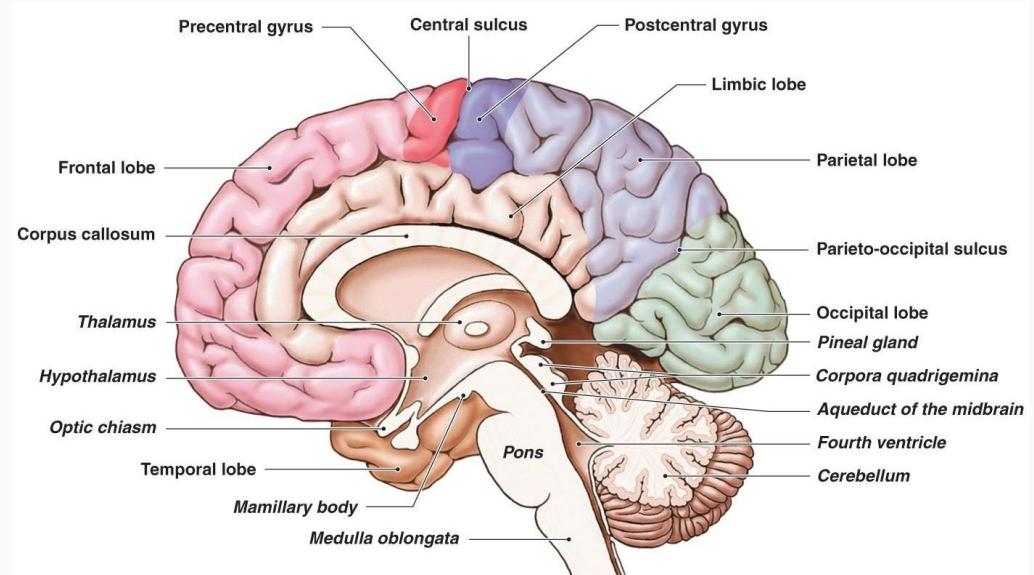
Lifetime Costs of TBI

● Direct Costs ● Work Loss ● Quality of Life Lost



The effects of a TBI by area

- **Cerebral Cortex**
 - Confusion, slurred speech
- **Frontal Lobe**
 - Problems with concentration, emotional regulation, etc
- **Hippocampus**
 - Memory problems
- **Basal Ganglia**
 - Irregular movement patterns
- **Diencephalon**
 - Thalamus: headache, insomnia, fatigue, etc.
 - Hypothalamus: variations in body temperature, hypothyroidism
- **Cerebellum**
 - Apraxia, challenges with balance, changes in language & cognition
- **Corpus Callosum**
 - Impaired working memory, cognitive deficits
- **Brainstem**
 - Changes in consciousness



Our Need Statement:

Caregivers of people with traumatic brain injuries need a way to **assess the severity of the injury** because they need to know **pathways for treatment** or **whether it is life threatening**



Early intervention is key for minimizing long-term effects of TBIs!

- Average ER wait time in US: 2 hr 25 min
- Average ER wait time in CA: 3 hr



Who Are We Helping?



Athletes



Patients



Schools



Coaches



Caregivers



Parents



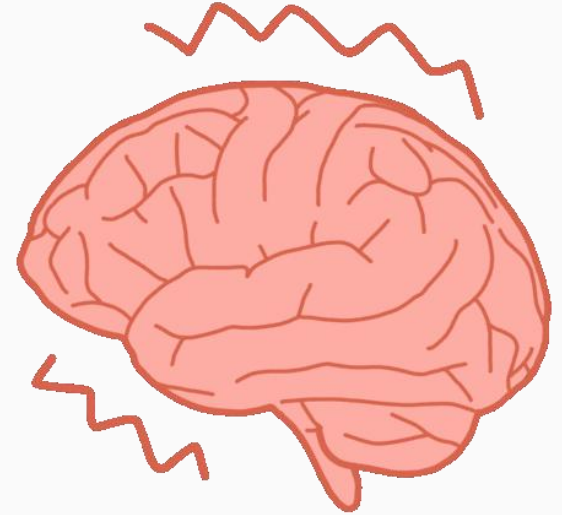
Complications

Long term Effects



Post-Concussion Syndrome:

- 10-15% TBI patients will develop PCS
- Symptoms persist longer than 3-6 months after injury
- Symptomatic patients at 3 months have a 54% chance of having a disability
- Our app will quickly identify injury to prevent further damage
- Treatment
 - Occupational therapy
 - Physical therapy
 - Speech Therapy



Glasgow Coma Scale (GCS)

Determine patient level of consciousness by assessing eye, verbal, and motor responsiveness.



Eye opening

4: spontaneous

3: to sound

2: to pressure

1: none

NT: eyes closed by local factor,
non-testable



Verbal response

5: orientated

4: confused

3: words

2: sounds

1: none

NT: other factor interferes with
communication, non-testable



Motor response

6: obeys commands

5: localising

4: normal flexion

3: abnormal flexion

2: extension

1: none

NT: other factors interferes with
motor response, non-testable

RATE the patient according to highest responses observed (summation of scores)

3-8: Severe

9-12: Moderate

13-15: Mild

The NeuroAssist Chatbot



To ease and guide the user into helping treat TBIs

- Treating a traumatic brain injury can be one of the most stressful experiences of someone's life, so designing a user-friendly system is important for effectiveness of the chatbot
- Using a chatbot enhances the user-experience through interaction

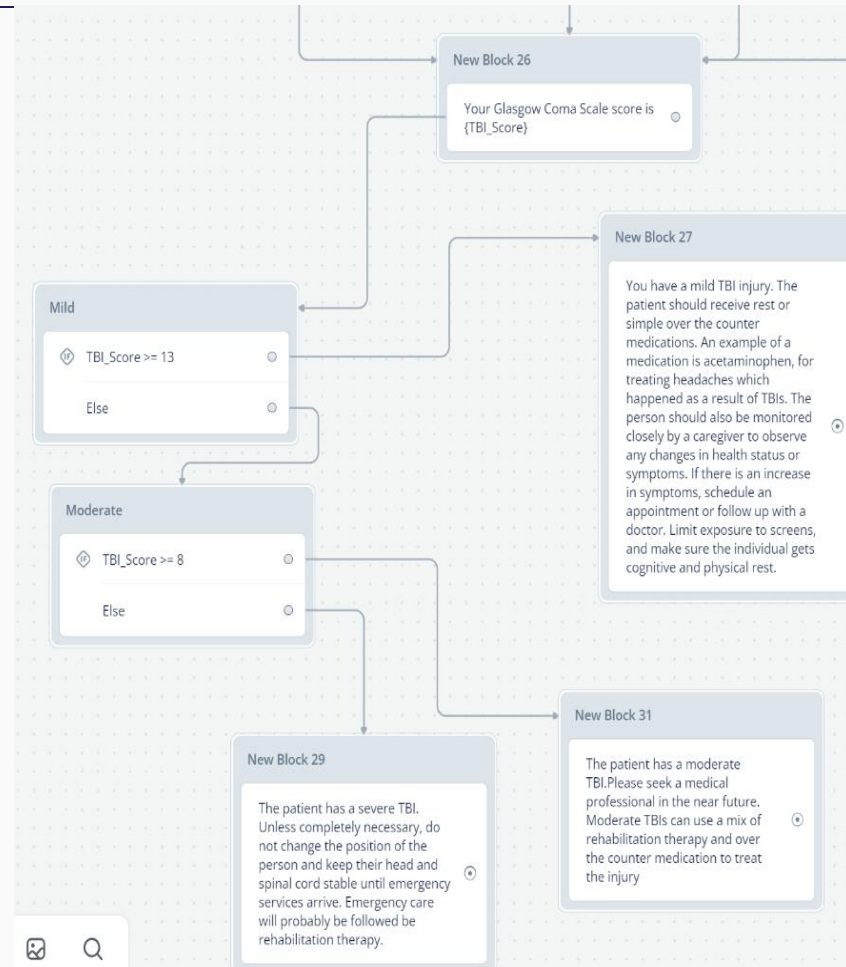
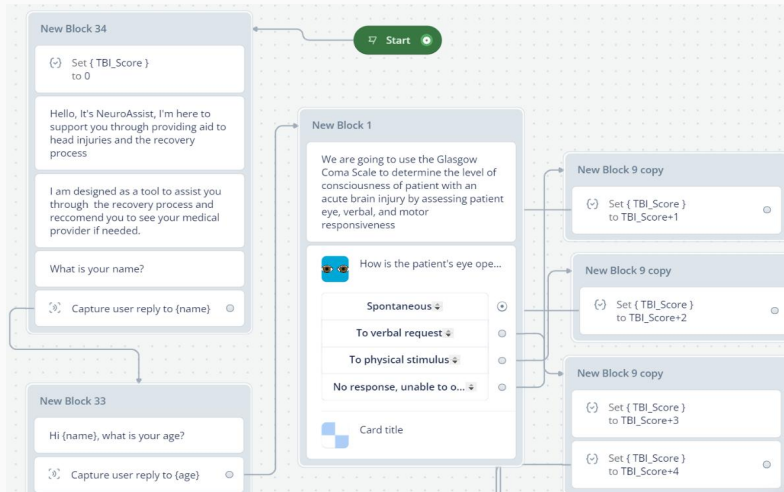


To assess risk through the Glasgow Coma Scale

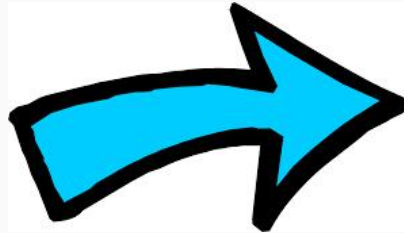
- Assessing severity of the TBI is vital in making a decision about whether to seek emergency healthcare or other treatments like over the counter medication
 - Provides actionable tests to assess patient health
-

How was the chatbot made?

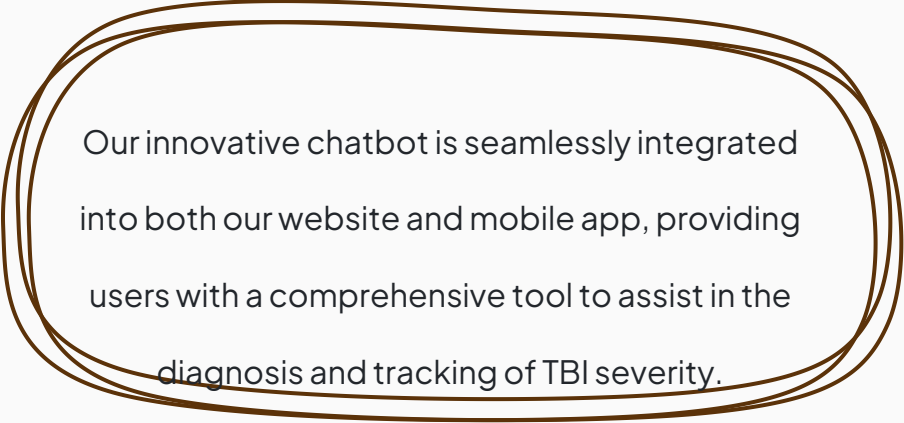
- The chatbot was made using voiceflow
- All of the responses are pre-written
- The chatbot takes user input and gets user data such as name and age, as well as their GCS score



Meet NeuroAssist



Our Implementation



Our innovative chatbot is seamlessly integrated into both our website and mobile app, providing users with a comprehensive tool to assist in the diagnosis and tracking of TBI severity.

Key Features:

- User-friendly interface
 - Glasgow Coma Scale Assessment
 - Personalized Insights
 - Multilingual Support
-

Hello, It's NeuroAssist, I'm here to support you through providing aid to head injuries and the recovery process

I am designed as a tool to assist you through the recovery process and recommend you to see your medical provider if needed.



What is your name?

THIS STUNT IS PERFORMED BY TRAINED PROFESSIONALS ONLY. **DO NOT TRY THIS AT HOME!**

Hello, It's NeuroAssist, I'm here to support you through providing aid to head injuries and the recovery process

I am designed as a tool to assist you through the recovery process and recommend you to see your medical provider if needed.



What is your name?

Cassidy



Hi cassidy, what is your age?

17

THIS STUNT IS PERFORMED BY TRAINED PROFESSIONALS ONLY. **DO NOT TRY THIS AT HOME!**



How is the patient's eye opening response?

Spontaneous

To verbal request

To physical stimulus



No response, unable to open

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How is the patient's eye opening response?

Spontaneous

To verbal request

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No response, unable to open

To verbal request

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How is the patient's verbal response?

Oriented and Conversational

Disoriented and Conversational

Intelligible single words

Moans and Grumbles

No response



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How is the patient's verbal response?

Oriented and Conversational

Disoriented and Conversational

Intelligible single words

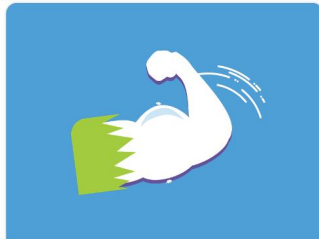
Moans and Grumbles

No response



Intelligible single words

THIS STUNT IS PERFORMED BY TRAINED PROFESSIONALS ONLY. **DO NOT TRY THIS AT HOME!**



How is the patient's motor response?

Obeys two-step commands

Motor response to localised physical stimulus

Bends arm at elbow rapidly

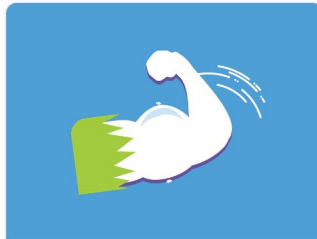
Only able to bend arm at elbow slowly

Only able to extend arm at elbow



No motor response

THIS STUNT IS PERFORMED BY TRAINED PROFESSIONALS ONLY. **DO NOT TRY THIS AT HOME!**



How is the patient's motor response?

Obeys two-step commands

Motor response to localised physical stimulus

Bends arm at elbow rapidly

Only able to bend arm at elbow slowly

Only able to extend arm at elbow



No motor response

Motor response to localised physical stimulus

THIS STUNT IS PERFORMED BY TRAINED PROFESSIONALS ONLY. **DO NOT TRY THIS AT HOME!**

Your Glasgow Coma Scale score is 11

The patient has a moderate TBI. Please seek a medical professional in the near future. Moderate TBIs can use a mix of rehabilitation therapy and over the counter medication to treat the injury



THIS STUNT IS PERFORMED BY TRAINED PROFESSIONALS ONLY. **DO NOT TRY THIS AT HOME!**



NeuroAssist: assessing head injury severity

NeuroAssist is here to provide you with information and resources about traumatic brain injuries (TBIs). Our AI chatbot can help you assess the severity of one's TBI, then provide recommendations for how to proceed with patient care. If the patient is experiencing seizures, intense vomiting, excessive bleeding, or trouble breathing, **call 911**.



You've been invited to
have a conversation
with **NeuroAssist**

Start Conversation

Type a message...



TBI Information

What is a Traumatic Brain Injury (TBI)?

Traumatic Brain Injuries (TBIs) are injuries caused by a blow or injury to the head -- commonly from falls, vehicle collisions, or blunt trauma -- and result in damage to the brain. TBIs are often associated with memory issues, light/noise sensitivity, nausea, headaches, and difficulty concentrating. The severity of TBIs can vary greatly. TBIs can also impact social communication and discourse abilities in the long-term, which in turn affect employment, social relationships, and quality of life. However, they can be treated with therapy: physical therapy (regaining balance and movement), speech therapy (regaining memory and language), or neuropsychological therapy (navigating symptoms). In general, "brain rest" is recommended for all forms of recovery and includes limiting screen time and intense cognitive workload.



How do I determine the severity of a Traumatic Brain Injury?

The initial severity of a TBI is typically assessed using the **Glasgow Coma Scale (GCS)**. This scale looks for problems with the functions of the central and peripheral nervous systems. It determines a person's level of consciousness by evaluating patient responsiveness to stimuli. Consciousness is rated on a scale of 3-15, with 3 being extremely low and 15 being fully awake, responsive and have no problems with thinking ability or memory. The calculation of one's score is based on three criterion: eye opening, verbal response, and best motor response. The caregiver will evaluate each section individually, then sum up the highest scores from each to determine the patient's total score. A score of 3-8 is severe, 9-12 is moderate, and 13-15 is mild.

Calculating severity using the Glasgow Coma Scale

Eye opening

Testing reflex responses to pressure

- 4: Eyes open before stimulus (spontaneous)
- 3: Eyes open after spoken or shouted request (to sound)



Additional Resources

If an injured individual seems to be in severe pain or unconscious, please reach out to emergency services at your local hospital or by dialing 911.

Have questions about Traumatic Brain Injuries?

Reach out to your doctor. For more information, review these trusted sources.

[Center of Disease Control and Prevention](#)

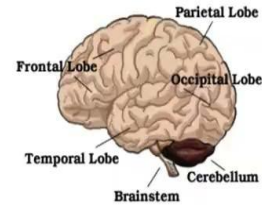
[Mayo Clinic](#)

[Brain Injury Association of America](#)

[Brainline](#)



Brain Functions



Brain Stem

Involuntary functions essential for survival

- Breathing
- Arousal (e.g. heart rate, blood pressure)
- Consciousness
- Reflexes (e.g. seeing and hearing)
- Sleep and wake cycles

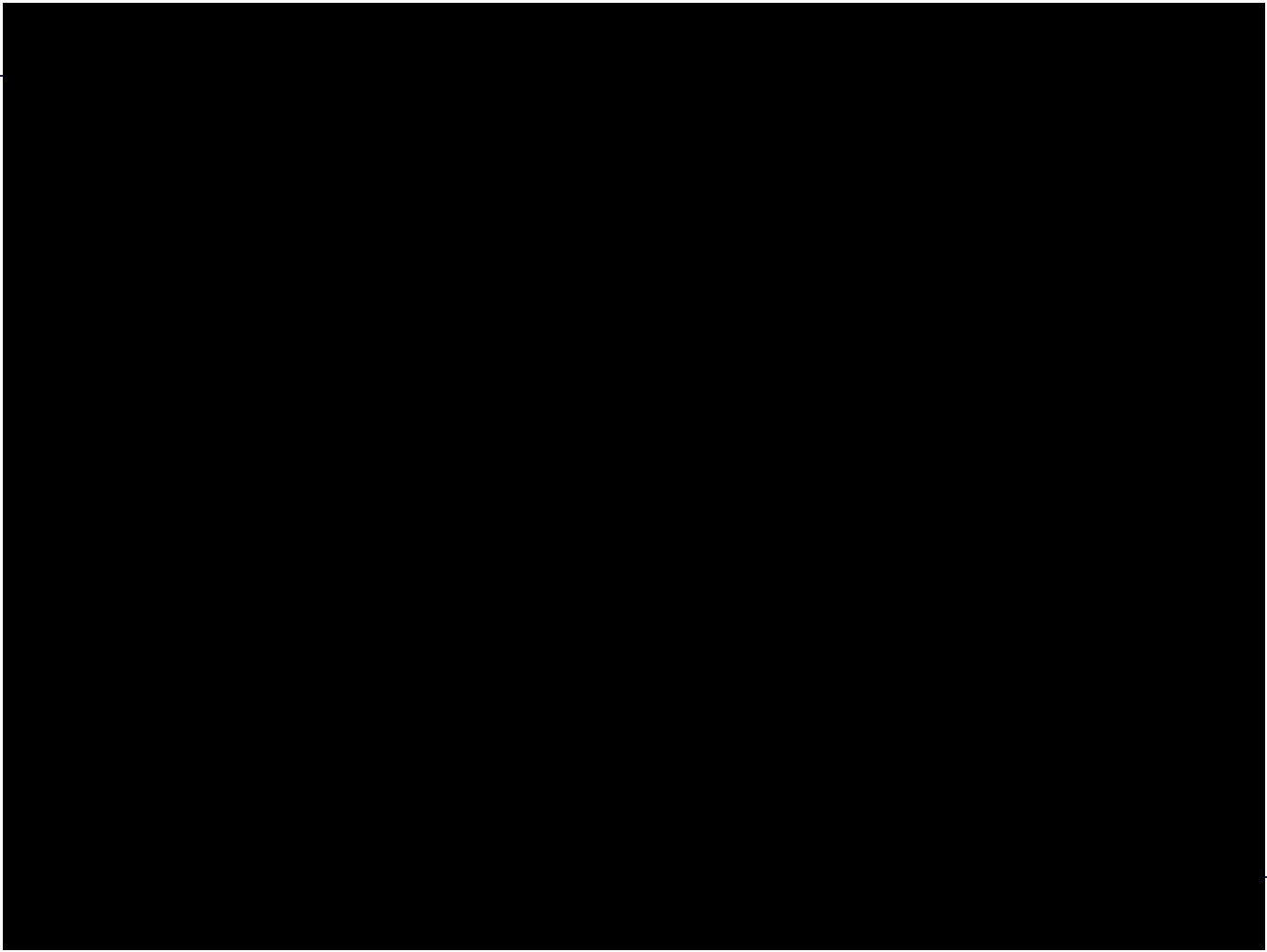
Cerebellum

Balance, movement and coordination

- Balance and coordination
- Motor activity
- Visual perception

Frontal Lobe





How did we refine our design

Data collection

- We plan to collect data on the use of the product under different environments, such as in extreme conditions
 - Data will be collected from athletes in our community to determine efficacy

Getting feedback


- Feedback form and encouraging reviews
- Approved and reviewed by healthcare professionals to refine our model
 - Neurology
 - Computer science

What sets our design apart


- Compared to the Chat GPT Glasgow Coma Scale feature, our design has a chatbot paired with a website to make the evaluation of the patient's score clearer
- The chatbot asks for the patient's name and age for user input and data
- The chatbot has interactive elements, where when you press down the level of consciousness for each section, it calculates the total score automatically
- After the score is calculated, the chatbot tells you next steps that should be done for the patient



Your Glasgow Coma Scale score is 13



You have a mild TBI injury. The patient should receive rest or simple over the counter medications. An example of a medication is acetaminophen, for treating headaches which happened as a result of TBIs. The person should also be monitored closely by a caregiver to observe any changes in health status or symptoms. If there is an increase in symptoms, schedule an appointment or follow up with a doctor. Limit exposure to screens, and make sure the individual gets cognitive and physical rest.



Our future plans

Integration into healthcare



- Integration of NeuroAssist into hospitals and healthcare systems can improve the speed of neurological assessments
- Use of NeuroAssist for first responders in emergency situations

Gaining more funding



- Perform extensive clinical trials to improve the accuracy of our product
- Attract the attention of researchers, other investors, and administrative staff

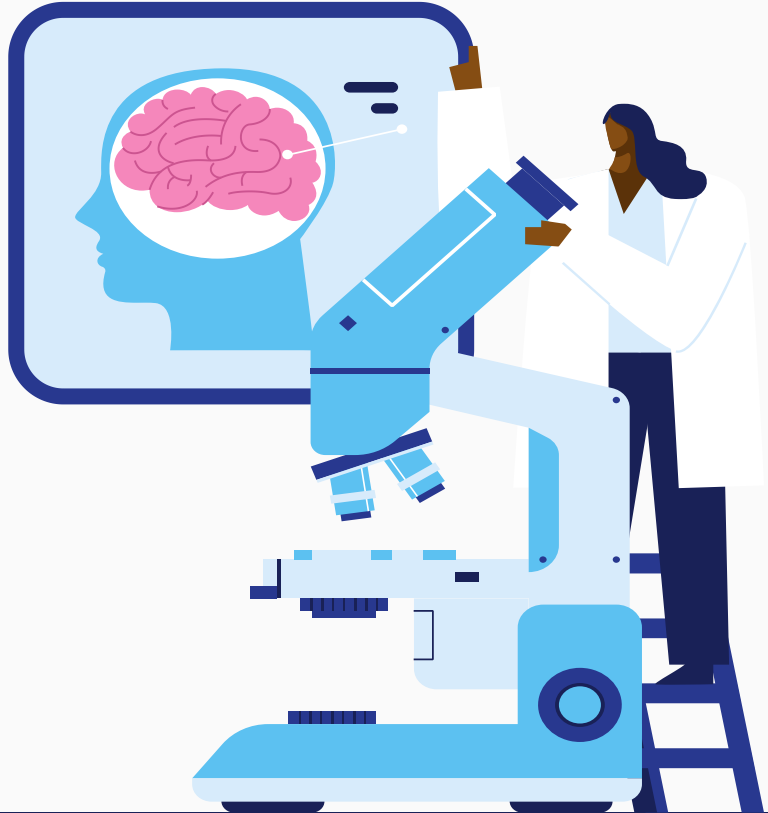
Increase accessibility of NeuroAssist



- Simplify layout of app and website
 - Integration of voice commands into NeuroAssist
 - Improved multilingual support
-

Thank you!

Questions?



Resources

Axios. (2023, September 15). Average ER wait time in San Francisco. Retrieved from <https://www.axios.com/local/san-francisco/2023/09/15/er-wait-time-average-hospital#>

Benefit News. (n.d.). 10 states with the longest ER wait times. Retrieved from <https://www.benefitnews.com/list/10-states-with-the-longest-er-wait-times#:~:text=The%20average%20wait%20time%20for,from%20The%20Schiller%20Kessler%20Group.>

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Flint Rehab. (n.d.). Areas of the brain most vulnerable during a traumatic brain injury. Retrieved from <https://www.flintrehab.com/areas-of-the-brain-most-vulnerable-during-a-traumatic-brain-injury/>

Resources

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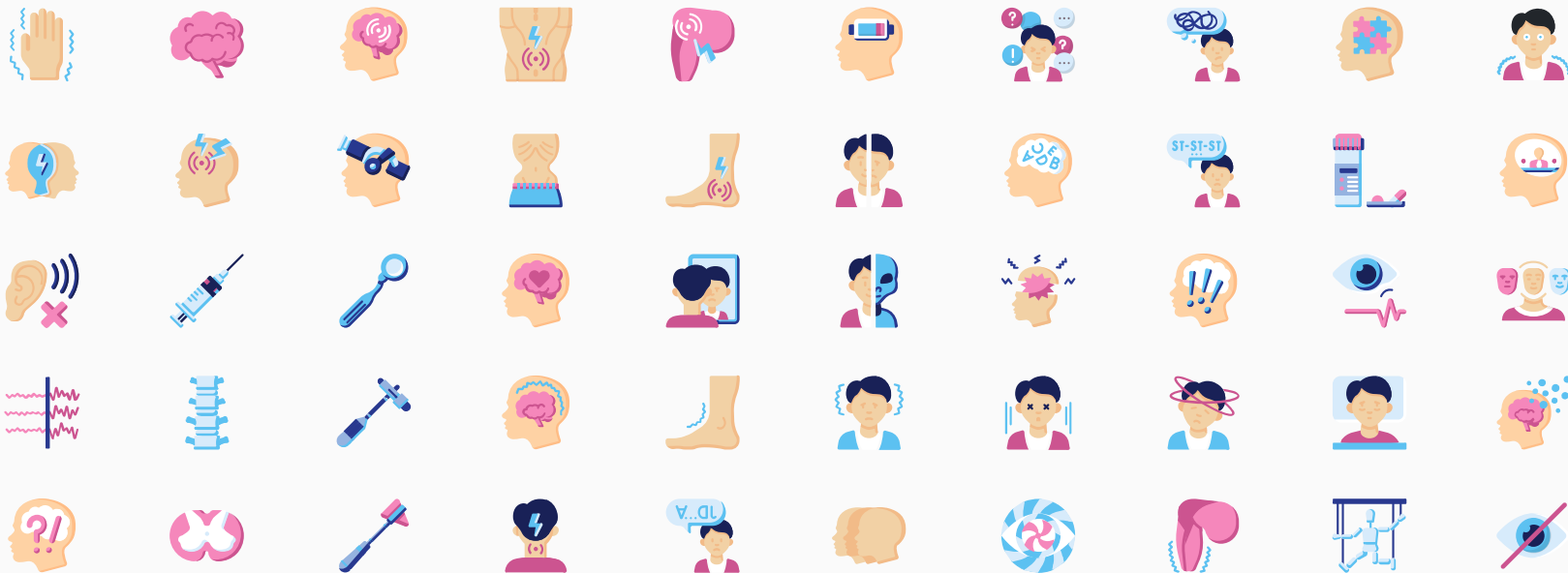
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Shepherd Center. (n.d.). Statistics and causes of brain injury. Retrieved from <https://www.myshepherdconnection.org/abi/Introduction-to-Brain-Injury/Statistics-and-Causes#:~:text=Statistics%20and%20Causes&text=Children%20under%20the%20age%20of,Falls%3A%2040.5%25>

Icon pack



Alternative resources

Here's an assortment of alternative resources whose style fits that of this template:

Vectors

- Scientific research concept
- Flat design science concept with microscope
- Hand drawn flat world stroke day illustration

