Maryland
DEPARTMENT OF HEALTH

State Traumatic Brain Injury Advisory Board

2025 Report

Health-General § 13–2105 (6)

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Table of Contents

Executive Summary

Brain injury is the leading cause of injury-related death and disability in the United States.[1] Brain injury may occur from a traumatic or a non-traumatic cause. Thirty percent of Marylanders have experienced a hospitalization related to a head or neck injury in their lifetime.[2] Data from the Maryland Health Services Cost Review Commission show that Traumatic Brain Injury (TBI), is one of the leading causes of hospital admissions and emergency room visits for non-fatal injuries in Maryland. TBI-related deaths have increased between 2016 and 2021. Marylanders age 75 and older have the highest number of TBI-related hospitalizations. Firearms are the most common cause of TBI-related deaths followed by falls and motor vehicle crashes.

Injuries to the human brain occur from traumatic and non-traumatic causes, also known as acquired brain injury. The degree or extent of brain tissue damage determines the severity and classification of the injury into mild, moderate, or severe. Symptomatic presentation and recovery vary widely among individuals with brain injury despite the severity. Symptoms can include headaches, fatigue, mood disorders, post-traumatic epilepsy, impaired mobility, coordination, dexterity, memory, learning, attention, behavior changes, sleep, hearing, vision, taste, and smell.[3] Symptoms can worsen with time and may not be apparent until weeks, months, or even years post-injury.

Maryland has an array of services available to individuals with disabilities; however, few are specialized for the needs of individuals living with brain injury. A State Resource Guide developed by the National Association of State Head Injury Administrators (NASHIA) provides an overview and comparison of brain injury programs across the country. Service gaps in Maryland largely revolve around the lack of coordination and linkage to available services and supports, limited acute and post-acute rehabilitation services, and misdiagnosis or under-identification of brain injury by educators, behavioral health professionals, and correctional staff.

To address these challenges and improve outcomes for individuals with brain injury, the Advisory Board is required to issue an annual report to the Governor and, in accordance with § 2–1257 of the State Government Article, the General Assembly by November 30 each year. This report must summarize the actions of the Advisory Board and include recommendations for improving oversight of State and federal funding dedicated to brain injury services, building provider capacity and training to meet the unique needs of this population, and enhancing coordination across systems of care. Additionally, the report must provide data on the number of individuals served and the types of services delivered in the preceding fiscal year.

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[1] "Facts about TBI." *Traumatic Brain Injury & Concussion*, Centers for Disease Control and Prevention (CDC), 29 Apr. 2024, www.cdc.gov/traumatic-brain-injury/data-research/facts-stats/index.html#:~:text=TBI%20is%20a%20major%20cause%20of%20death%20and%20disability,-There%20were%20over&text=1%20That%27s%20about%20190%20TBI,health%20problems%20after%20the%20injury.

[2] "BRFSS Questions Configuration Selection." Maryland Department of Health Data Query System, Behavioral Risk Factor Surveillance System, Maryland Department of Health, ibis.health.maryland.gov/ibisph-view/query/selection/brfss/BRFSSSelection.html. Accessed 1 Oct. 2024.

[3] "Living with Traumatic Brain Injury (TBI)." *Model Systems Knowledge Translation Center (MSKTC)*, MSKTC, 2024, msktc.org/TBI.

The TBI Advisory Board's (TBIAB) recommendations for Maryland addresses utilizing state and federal funding dedicated to services for individuals with brain injuries, building provider capacity and provider training that address their needs , and improving the coordination of services for individuals with TBI. The recommendations are intended to address these service gaps and reduce the public health burden of brain injury through appropriate resource linkage, training, effective screening practices, and the availability of specialized services.

Introduction and Overview

Injuries to the human brain occur from traumatic and non-traumatic causes, broadly known as Acquired Brain Injury (ABI). Traumatic Brain Injury is caused by external forces to the brain. Well known causes are contact sports and blast injuries. Additional causes include:

- Penetrating gunshot wounds to the head,
- Assaults resulting in hits to the head,
- Motor vehicle and bicycle crashes,
- Falls,
- Intimate partner violence,
- Childhood physical abuse,
- Lead poisoning,
- Drug overdose(s),
- Infections of the brain resulting in long-term neurocognitive and neuropsychiatric conditions such as long COVID.

The degree or extent of brain tissue damage determines the severity and classification of the injury into mild, moderate, or severe. In addition, the individual's neurologic signs and symptoms, duration of loss of consciousness (LOC), length of amnesia (memory loss), and brain scans facilitate the determination and measurement of the degree of damage. Appendix B shows the classification based on the Degree of Damage to the Brain.

Symptoms and Recovery

Symptomatic presentation and recovery vary widely among individuals with brain injury despite the severity. Symptoms can include headaches, fatigue, mood disorders, post-traumatic epilepsy, impaired mobility, coordination, dexterity, memory, learning, attention, behavior changes, sleep, hearing, vision, taste, and smell.[4] Symptoms can worsen with time and may not be apparent until weeks, months, or even years post-injury.

The functional deficits in cognition, physical abilities, and behavioral health vary from person to person and depend on various factors; including age at the time of injury, appropriate and timely access to medical care, as well as medical support and services.

In mild traumatic brain injury cases, most individuals recover within weeks; some individuals, however, experience a difficult recovery course, particularly those with multiple mild brain injuries. Multiple mild brain injuries are common in individuals who were in the armed forces, athletes, victims of intimate partner violence, and children exposed to abuse. Long-term negative outcomes are rare in a single case of mild TBI. However, multiple occurrences can result in increased levels of disability with each mild injury incurred, especially within close proximity.

[4] Supra, note 3.

Adverse Effects of Brain Injury

History of brain injury is associated with challenges in obtaining and maintaining employment, interpersonal relationships, difficulties in school, the onset of mental illness and substance use disorders, an increased risk of incarceration and involvement with the criminal justice system, dementia, and early death. Research from the TBI Model Systems estimates that individuals living with moderate to severe brain injury have a reduced life span of nine years compared to their uninjured peers.

In 2024, the Centers for Medicare and Medicaid Services (CMS) recognized TBI as a chronic health condition.[5] The addition of TBI to the list of chronic conditions was included in a final rule published by CMS in the June 2024 Federal Register with an effective date of January 1, 2025. The CMS chronic condition designation for TBI is a significant step toward validating the ongoing needs that individuals with brain injury face each day. In March 2025, the National Academies of Sciences, Engineering and Medicine convened a two-day meeting, "Examining Traumatic Brain Injury as a Chronic Condition: A Workshop." This public workshop brought together researchers, medical experts, persons living with brain injury, caregivers and state and federal partners to discuss the evidence base for designating TBI as a chronic condition. A full report of the proceedings is expected to be published by the National Academies in 2026.

Caregivers of people with brain injury also report stress, grief, and loss. They may also experience adverse health effects, including stress-related disorders and depression.[6] In addition, in taking on the role of caregiver, family members can experience a loss of income as they may drop out of the workforce to provide unpaid care to their loved ones.[7]

Preventing Brain Injury

The TBI Advisory Board supports effective brain injury prevention strategies[8] to reduce the likelihood of sustaining a brain injury, including;

- The use of seatbelts in motor vehicles,
- Wearing of helmets or appropriate headgear in contact sports, and while biking, motorcycling, snowmobiling or riding a scooter,
- Evaluating fall risk factors for older adults, and
- Ensuring play areas are safe for children.

Other equally important prevention efforts include:

- Substance abuse and overdose prevention efforts,
- Intimate partner violence resources,
- Infection prevention,

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[5] "Centers for Medicare and Medicaid Services Officially Recognizes Brain Injury as a Chronic Condition." Brain Injury Association of America, Brain Injury Association of America, 31 July 2024, www.biausa.org/public-affairs/public-awareness/news/centers-for-medicare-and-medicaid-services-officially-recognizes-brain-injury-as-a-chronic-condition.

[6] Brickell, Tracey A. DPsych; Lippa, Sara M. PhD; Wright, Megan M. MA; Varbedian, Nicole V. BS; Tippett, Corie E. MA; Byrd, Anice M. BS; French, Louis M. PsyD; Lange, Rael T. PhD. Is Traumatic Brain Injury Severity in Service Members and Veterans Related to Health-Related Quality of Life in Their Caregivers?. Journal of Head Trauma Rehabilitation 37(6):p 338-349, November/December 2022. | DOI: 10.1097/HTR.0000000000000802

[7] Sabella, Scott A. PhD; Suchan, Christopher S. MS. The Contribution of Social Support, Professional Support, and Financial Hardship to Family Caregiver Life Satisfaction After Traumatic Brain Injury. Journal of Head Trauma Rehabilitation 34(4):p 233-240, July/August 2019. | DOI: 10.1097/HTR.0000000000000471

[8] "Traumatic Brain Injury (TBI)." *Maryland Department of Health Injury and Violence Prevention*, Maryland Department of Health, health.maryland.gov/phpa/OEHFP/Injury/Pages/TBI.aspx. Accessed 1 Oct. 2024.

- Pedestrian safety awareness,
- Suicide prevention efforts,
- Promotion of firearm safety storage practices,
- Individualizing practices within behavioral health professionals to screen for a lifetime history of brain injury, and
- Targeted prevention and outreach to individuals with brain injury that would reduce the rate of substance abuse among individuals with brain injury and reduce the chance of overdose-related brain injuries.

Data, Trends, and Findings

National Surveillance Data

According to the Centers for Disease Control (CDC), nationally, there were approximately 214,110 TBI-related hospitalizations in 2020 and 69,473 TBI-related deaths in 2021.[9]

- This represents more than 586 TBI-related hospitalizations and 190 TBI-related deaths per day.
- These estimates do not include the many TBIs that are only treated in the emergency department, primary care, urgent care, or those that go untreated.
- Individuals aged 75 years and older had the highest numbers and rates of TBI-related hospitalizations and deaths. This age group accounts for about 32% of TBI-related hospitalizations and 28% of TBI-related deaths.
- Males were nearly two times more likely to be hospitalized (79.9 age-adjusted rate versus 43.7) and three times more likely to die from a TBI than females (28.3 versus 8.4).

Maryland Surveillance Data

Maryland Environmental Public Health Tracking (EPHT) Data Portal reflects the following TBI-related trends in 2022:[10]

- More than half of Maryland's TBI-related emergency department (ED) visits, hospitalizations, and deaths were caused by falls, firearm-related injuries, and MVT-related injuries
- Falls continue to make up more than half of all of Maryland's TBI-related hospitalizations
- TBI-related deaths due to firearm-related injuries continue to increase in Maryland: In 2022, 2 out 5 TBI-related deaths were related to firearm injuries
- Maryland's older adult population (75+ years old) continues to have the highest age-adjusted rates for TBI-related hospitalizations and deaths, while youth (15-24 years old) continue to have the highest age-adjusted rates for TBI-related ED visits
- Maryland's male population continues to have higher age-adjusted rates of TBI-related ED visits, hospitalizations, and mortality than females; more specifically, the rate of hospitalization for males is double the rate of hospitalization for females, while the rate of mortality for males is four times the rate of mortality for females
- TBI disproportionately affects different racial and ethnic groups, but more data is needed to compare rates among other racial and ethnic minority groups

TBI-related death, hospitalization, and emergency department trends can be found in Appendix C.

Prevalence of Marylanders with a Lifetime History of Brain Injury

[9] "TBI Data." Traumatic Brain Injury & Concussion, Centers for Disease Control and Prevention (CDC), 16 May 2024, www.cdc.gov/traumatic-brain-injury/data-research/index.html.
[10] Maryland Department of Health (MDH). "Traumatic Brain Injury." Environmental Public Health Tracking (EPHT). Accessed August 28, 2025. https://maps.health.maryland.gov/ephtportal/tbi

Maryland included a set of questions related to lifetime history of brain injury in its 2021 Behavioral Risk Factors Surveillance Survey (BRFSS).[11] These data indicate the prevalence of Maryland adults who have a lifetime history of brain injury.

- 29.7% had been hospitalized for a head or neck injury in their lifetime.
- 45.7% of those individuals who had been hospitalized for a head or neck injury were living with one or more disabilities.

Recommendations

The Maryland Traumatic Brain Injury Advisory Board met six times in 2025. The 36 voting members each volunteer their time, energy, and expertise to the TBIAB, initially introduced in 2005 by Senate Bill 395, Chapter 306 of the Laws of Maryland. Board members review available data and publications, and promising practices from other states. The Board values the input of individuals who are living with a brain injury-related disability and family members who are caring for individuals with brain injury. The information and recommendations in this report are intended to educate policymakers and influence state policy. They do not necessarily reflect the current views of the state agencies involved.

The TBIAB's recommendations for Maryland address utilization of state and federal funding dedicated to services for individuals with brain injuries, build provider capacity and provider training that address the needs of individuals with traumatic brain injuries; and improve the coordination of services for individuals with traumatic brain injuries. The recommendations are intended to address these service gaps and reduce the public health burden of brain injury through appropriate resource linkage, training, effective screening practices, and availability of specialized services.

I. Reduce adverse long term consequences of untreated brain injury by implementing brain injury screening/identification within schools, behavioral health service systems, and correctional facilities.

As of January 1, 2025, the Centers for Medicaid and Medicare Services (CMS) identified TBI as a Chronic Condition. For Marylanders impacted by TBI, this designation validates the need for appropriate care, resources, support and treatment required to survive and thrive post injury, no matter at what age or stage of life the injury occurred. As is considered standard care for individuals living with other chronic conditions, such as diabetes, the expectation among brain injury rehabilitation and healthcare providers is that needs change throughout the life span for individuals with a history of TBI. What may seem like a full recovery from TBI in childhood may put an individual, as an older adult, at risk of developing earlier than typical neurodegenerative disease, endocrine and orthopedic issues, and risk of unintentional injuries and subsequent TBI's. Having a history of TBI, at any age, but especially in childhood, raises the risk of developing mental health and substance use disorders and increases an individual's chances of involvement with the criminal justice system. Implementing standard screening that captures a lifetime history of TBI throughout the life span is critical to knowing if someone is at risk of adverse somatic and behavioral health conditions related to a remote or recent TBI or TBIs. Understanding that a history of TBI is part of an individual's medical history, is the first step towards mitigating the adverse consequences

[11] Supra, note 2.

that are all too often the result of the misperception that TBI is a “one-and-done” event in an individual's life. Research has shown that the consequences of TBI can unfold over a lifetime.[12]

Brain injury often has a significant impact on the development and functioning of an individual. This is especially true in the developing brains of children and adolescents. Difficulties with problem-solving, impulsivity, memory, new learning, and self-regulation are some of the common sequelae of brain injury and represent just some of the serious and potentially lifelong consequences of TBI. The CDC 2018 Report to Congress[13] includes information and tools for healthcare providers, educators, parents, and students to assist with acute medical management of brain injury in children as well as recommendations for long-term monitoring and transition to school. The report demonstrates evidence of the relationship between long-term disability and behavioral health conditions that impact functional achievements in adulthood; highlighting the importance of timely, appropriate intervention with children.

The under-identification of students with lasting TBI is an issue across the country. Several states are taking steps to address this problem. "According to the Maryland Department of Health (MDH), in 2023 alone, there were 4,192 ED visits and 211 hospitalizations for Marylanders ages 0–19 years old with a diagnosis of TBI." This total does not capture the full extent of brain injury among this population, as it does not include those seen by private practitioners, in urgent care facilities, or those who did not seek medical care following a brain injury. It also most likely does not capture most incidences of “mild” brain injury, even though the effects from these types of brain injuries can have long-term impacts on an individual’s cognition and functioning. Despite the number of severe brain injuries reported among school-aged children, there are currently only 189 Maryland students identified as requiring special education services as the result of a traumatic brain injury, according to the Maryland State Department of Education.[14]

Under-identification of brain injury in students may occur because TBI symptoms can be misinterpreted as other disabilities, such as emotional disabilities and learning disabilities, which may lead to inappropriate individualized education plans with goals and objectives that do not fully address the student’s actual needs, as well as inappropriate services, intervention, accommodations and so forth. Improved opportunities for proper identification of TBI through the creation and use of identification tools will help increase the likelihood that: (1) students who were not previously identified as having a brain injury will receive further assessments to determine their need for additional services, supports, and accommodations; (2) screening evidence will guide and inform the selection of appropriate assessments for students identified as having a TBI; and (3) services, supports, and accommodations will be individually determined based on an appreciation of the students’ history of TBI and an interpretation of their assessment results.

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[12] Recognition of Traumatic Brain Injury as a Chronic Condition: A Commentary John D. Corrigan, Flora M. Hammond, Angelle M. Sander, and Kurt Kroenke Journal of Neurotrauma 2024, 41:23-24, 2602-2605 https://www.liebertpub.com/doi/full/10.1089/neu.2024.0356

[13] Centers for Disease Control and Prevention. (2018). Report to Congress: The Management of Traumatic Brain Injury in Children, National Center for Injury Prevention and Control; Division of Unintentional Injury Prevention. Atlanta, GA.

[14] Maryland Early Intervention and Special Education Services Census Data & Related Tables. October 1, 2024.

Individuals who sustain a brain injury have an increased risk of developing a mental illness, a substance use disorder, becoming incarcerated, and/or experiencing homelessness. Most individuals who sustain a brain injury in Maryland will not receive services from a specialized brain injury program or provider. Most will either receive no services or receive services from systems or programs that are designed for other diagnoses or disabilities.

Research suggests that awareness of a possible brain injury in someone's history, and implementation of simple strategies and supports, can greatly enhance treatment outcomes.

MDH has implemented both brain injury screening and accommodations training for behavioral health providers. Since early 2017, the department has incorporated a brief brain injury screening into the online authorization process for certain billable behavioral health services, including psychiatric rehabilitation and mobile treatment, as well as some grant-funded programs managed by local behavioral health authorities. The answers to these questions are predictive of future onset of mental illness, substance misuse, and legal offenses. BHA has created a resource page on its website with information for behavioral health providers about screening for a lifetime history of brain injury.[15] The brief screening questions are based on the Ohio State University TBI Identification Method (OSU TBI-ID) quick screen. These questions are currently optional and should be required for these services as well as other publicly funded behavioral health services. The screening questions are:

- Ever knocked out or lost consciousness? (yes, no, not screened)
- Longest time knocked out? (less than 30 minutes, 30 minutes-24 hours, more than 24 hours)
- When were you first knocked out or lost consciousness? (Age in years: 1-99)

II. Expand availability of services offered through the Maryland Brain Injury Waiver to underserved areas of the state

Maryland's Brain Injury Waiver was created twenty-one years ago in response to a class action lawsuit. MDH created the program as a resource for adults with TBI who were ready to discharge from state psychiatric hospitals but lacked community discharge resources. Due to the specialty nature of these services, as well as the cost , enrollment in the program has historically been limited to individuals transitioning from certain institutional settings; including state psychiatric hospitals, certain chronic hospitals, and out-of-state facilities serving Marylanders with brain injury whose care needs could not be supported by programs in the state. MDH expanded access to this program in 2023 to individuals residing in Maryland nursing facilities.

Maryland's Brain Injury Waiver program, initially budgeted to serve 10 individuals in FY2004, has steadily expanded over the past two decades and is now budgeted to serve 175 people. However, participant enrollment is consistently below the budgeted number of waiver slots and provider participation has been stagnant, with only five approved providers. Multiple factors contribute to low enrollment including limited provider capacity, lack of referrals, as well as limitations with eligibility criteria.

[15] "Traumatic Brain Injury." Maryland Department of Health Behavioral Health Administration, Maryland Department of Health (MDH), health.maryland.gov/bha/Pages/Traumatic-Brain-Injury.aspx. Accessed 1 Oct. 2024.

In 2025, MDH began a provider recruitment process and plans to enroll at least one new Brain Injury Waiver provider by the end of Fiscal Year 2026. Recruitment efforts include targeted outreach and prospective provider information sessions. The first of these sessions was held in June 2025 and was attended by 23 interested providers. MDH also submitted a waiver amendment that creates two additional services, intended to help individuals transition from nursing facilities into the program, as well as those enrolled in the waiver program who are at risk of entering a nursing facility.

The TBI Advisory Board commends the MDH on its responsiveness to stakeholder feedback that has led to programmatic eligibility changes throughout the years, and recommends that MDH continues to focus on provider recruitment and expansion of service delivery to the regions of the state currently without specialty brain injury providers. Ensuring rate sufficiency will be a crucial part of provider expansion efforts.

III. Increase funding to allow implementation of the Maryland Brain Injury Trust Fund program.

The TBI Advisory Board recommends exploring the development of a system of Brain Injury Resource Facilitation[16] and Support services for people with brain injury who are not eligible for Maryland's Brain Injury Waiver Program through the exploration of funding options and implementing a system to provide services set forth in statute.

Pursuant to HG § 13–21A–02(i), MDH is required to submit a report on the State Brain Injury Trust Fund, including the number of individuals served, and the services provided in the preceding fiscal year using the fund. Since the passage of Senate Bill 632, Chapter 511 of the Acts of 2013, MDH has accrued, as of August 2025, $411,205.37 through the voluntary vehicle registration donation program. The Maryland Department of Transportation (MDOT) created a voluntary donation option for vehicle registration transactions completed via kiosk or online. Monthly revenue into the fund increased beginning in April 2021, when the MDOT changed the $1 donation increment to any dollar amount, per the recommendation of the TBI Advisory Board and the Trust Fund Advisory Committee.

The TBI Advisory Board is appreciative of the efforts of legislators and state leaders at MDOT and MDH for the creation of a revenue source for Maryland's Brain Injury Trust Fund and for the change in allowable donation amounts. Donations are transferred to Maryland's Brain Injury Trust fund, managed by MDH–BHA. Revenues are not yet sufficient to support the types of services identified in the law.

MDH has established a Trust Fund Advisory Committee to advise and assist with developing a list of covered services, service descriptions, program and provider requirements, and conditions for client participation. The BHA has created an implementation plan to include selection of a vendor to provide two of the required services, case management (referred to as resource facilitation) and neuropsychological screening. A Request for Applications from eligible vendors was released in August

[16]"Brain Injury Resource Facilitation: A Consensus of Best Practices." National Association of State Head Injury Administrators (NASHIA), NASHIA, 2024, www.nashia.org/resources-list/birf-consensus-report.

2025 via eMaryland Marketplace Advantage (eMMA) and it is anticipated that this vendor will be selected within the 2025 calendar year.

If adequately funded, this fund would provide services to individuals with a medically documented brain injury with incomes ≤ 300% of the federal poverty level, who are in need of case management and other support services and not otherwise eligible for services under Maryland's Brain Injury Waiver.

Twenty-eight states have implemented Brain Injury Resource Facilitation services; Maryland has not yet done so.[17] Increasing funding for this program would allow Maryland to implement this best practice.

IV. Establish a central, publicly available repository of TBI surveillance data and ensure that Marylanders who sustain brain injuries and their families are provided information and linkage to available resources and assistance.

Under Maryland Health-Gen. § 20–108, established more than 25 years ago, each Maryland hospital is required to report to MDH within seven days of the occurrence of a "reportable condition," such as a TBI. Further, MDH, within 15 days of receiving a report of an individual with a reportable condition, is to notify the individual or the individual's parent or guardian of any assistance or services that may be available from the State, and of the eligibility requirements for such assistance or services. This unfunded mandate has not been fully operationalized, and it is important to examine current state resources to determine an effective way to ensure that TBI surveillance data is captured and that individuals in need of resources are linked to them.

The Maryland TBI Advisory Board commends the MDH for establishing a central, publicly available repository of TBI surveillance data, information, and resources on the Department of Health Injury and Violence Prevention website. This is a significant accomplishment.

While websites with this information are important, it is a passive way of providing information. Family members of people who sustain brain injuries are often overwhelmed at the time of injury and need more direct linkages with resources and assistance. The TBI Advisory Board still believes there is a gap in terms of linkage with available resources and feels the Department needs to develop materials that can be disseminated to patients treated in hospitals and EDs. This can be achieved more easily than in the past because the resources can become a part of the electronic health systems in hospitals, so that consistent information is provided by all facilities statewide. At a minimum, Marylanders experiencing a brain injury should be linked with the Brain Injury Association of Maryland. Founded in 1983, the Brain Injury Association of Maryland is a 501(c)3 non-profit organization that provides information, assistance, resources, education, and outreach to Marylanders with brain injuries, their families, and the professionals who work with this population. The Brain Injury Association of Maryland (www.biamd.org, 1.800.221.6443, info@biamd.org) is the primary brain injury information and referral source in the State of Maryland, and the only organization in the state solely dedicated to this population. It is the designated brain injury subject matter expert for information and resources for Maryland Access Point, the Maryland "No Wrong Door" system for accessing long-term services and support, www.marylandaccesspoint.info. This designation makes the organization uniquely eligible to receive certain federal funds.

[17] Supra, note 23..

The BHA's Trust Fund implementation, noted above, will help to improve this gap by offering resource facilitation, a service that will help Marylanders impacted by brain injury connect with available resources.

V. Maryland should explore ways to improve access to, or modify, the acute rehabilitation requirement related to three hours of rehabilitation per day for individuals recovering from severe brain injury, in order to improve clinical outcomes and reduce long-term-care stays in skilled nursing facilities.

All individuals who are recovering from a brain injury, regardless of payor source, should have greater access to intensive therapy, better clinical outcomes, reasonable potential for functional improvement, and discharge to a community setting; versus extensive stays in a skilled nursing facility with little to no rehabilitation, poorer functional outcomes, and an overreliance on Medicaid reimbursable institutional services.

Additionally, Maryland should ensure that individuals who experience a brain injury have access to resource facilitation to educate, advocate, and advise them and their families about available rehabilitation programs. This includes assisting individuals, who have been admitted to subacute rehabilitation facilities, access acute rehabilitation when they are medically able to benefit from it. This highlights the importance of recommendations III & IV in this report.

Research suggests that a significant percentage of patients recovered consciousness during inpatient rehabilitation.[18] The National Academies of Sciences, Engineering, and Medicine found that the 'level of effort' made by TBI patients undergoing inpatient rehabilitation had a positive effect on outcomes, but that "compliance with the 3-hour policy did not."[19] This underscores that fixed therapy dosing requirements may hinder access, especially for patients who can't tolerate three hours/day but can still benefit from rehabilitation with high engagement.[20]

Specifically, Maryland should explore modifying the acute rehabilitation criteria related to requiring three hours of therapy per day for individuals recovering from a severe brain injury. People with a severe brain injury experience extended disorders of consciousness and/or other comorbid medical conditions impacting stamina.

The TBI Advisory Board surveys its members and other brain injury stakeholders each year about resource gaps and needs. A concerning issue is the limited access to specialized brain injury rehabilitation

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[18] Kowalski RG, Hammond FM, Weintraub AH, Nakase-Richardson R, Zafonte RD, Whyte J, Giacino JT. Recovery of Consciousness and Functional Outcome in Moderate and Severe Traumatic Brain Injury. JAMA Neurol. 2021 May 1;78(5):548-557. doi: 10.1001/jamaneurol.2021.0084. PMID: 33646273; PMCID: PMC7922241.

[19] National Academies of Sciences, Engineering, and Medicine; Health and Medicine Division; Board on Health Care Services; Board on Health Sciences Policy; Committee on Accelerating Progress in Traumatic Brain Injury Research and Care; Matney C, Bowman K, Berwick D, editors. Traumatic Brain Injury: A Roadmap for Accelerating Progress. Washington (DC): National Academies Press (US); 2022 Feb 1. 6, Rehabilitation and Long-Term Care Needs After Traumatic Brain Injury. Available from: https://www.ncbi.nlm.nih.gov/books/NBK580075/

[20] Supra, note 19.

following a severe brain injury. According to data available through the Maryland Trauma Registry, in 2023, the vast majority of people treated in a trauma center for TBI were discharged home. Of those discharged to in-patient rehabilitation, almost as many patients were discharged to a skilled nursing facility (459) as to a specialized acute rehabilitation program (549).

An ad hoc committee, consisting of representatives from acute rehabilitation programs, trauma care, long-term services and supports, individuals impacted by brain injury, and families, was created to study this issue. The committee met four times in 2024 and created a survey for individuals impacted by brain injury to ask about the factors that affected their ability to access and benefit from brain injury rehabilitation services. Forty-two people responded to the survey between October 2024 and June 2025, including people with brain injury, family members, physicians, rehabilitation professionals, and employees of skilled nursing facilities. The results of the survey indicate that the following are barriers to accessing specialized brain injury rehabilitation in Maryland:

- Payor/insurance limitations,
- Acute rehabilitation admission criteria that require three hours of participation in skilled therapy per day; thereby, limiting rehabilitation opportunities for individuals who have extended disorders of consciousness or other comorbid medical conditions impacting stamina,
- Geographic access to specialty programs, with all CARF-accredited rehabilitation programs being located in the Baltimore/Washington Corridor with no specialty programs in the rural areas of the state, and
- Lack of knowledge among family advocates of the difference between acute rehabilitation and subacute rehabilitation when discharge options are presented for their loved ones.

This committee will continue to review available data, best practices in other states, and federal policy changes such as the declaration by CMS that brain injury is a chronic condition. It will also strive to make recommendations that will optimize the rehabilitation potential for all Marylanders impacted by brain injury, improve their quality of life, and potentially decrease rising long-term care costs for individuals impacted by this chronic condition.

Next Steps

The Maryland TBI Advisory Board will continue to meet six times per year. It has several standing subcommittees that meet to study the issues and develop recommendations, such as those included in this report.

Conclusions

Created in 2006, Maryland's Traumatic Brain Injury Advisory Board has been an effective mechanism to provide oversight in acquiring and utilizing state and federal funding dedicated to services for individuals with traumatic brain injuries; build provider capacity and provider training that address their needs ; and improving the coordination of services for individuals with traumatic brain injuries. The TBI Advisory Board annual report includes important recommendations. Many have been implemented throughout the

years to include the implementation of a Brain Injury Trust Fund,[21] expansion of Maryland's Brain Injury Waiver[22] Program eligibility, and establishment of a central, publicly available repository of TBI surveillance data to ensure that Marylanders who sustain these injuries and their families are provided information and linkage to available resources and assistance.[23]

It is the hope of the TBI Advisory Board that Maryland will continue to consider the recommendations of this diverse board so that all Marylanders who experience a brain injury will have access to the services and resources they need.

[21] "You Can Help Make a Difference: By Donating To The Maryland Brain Injury Trust Fund." Maryland Department of Health Behavioral Health Administration, Maryland Department of Health, health.maryland.gov/bha/Pages/maryland-brain-injury-trust-fund.aspx. Accessed 1 Oct. 2024.
[22] Supra, note 15.
[23] Supra, note 10.

Appendix A: TBI Advisory Board Membership

- Gil Abramson, Esq., Baltimore, MD
- Samantha Adams, Brain Injury Association of Maryland, Harford County, MD
- Jeronica Baldwin, Office of Long Term Services and Supports, Maryland Department of Health
- Sandra Bastinelli, Representing Individuals with, Brain Injury, Carroll County
- Jody Boone, Division of Rehabilitation Services
- Paige Bradford, M.Ed., Section Chief Specialized Instruction, Division of Special Education/Early Intervention Services, Maryland State Department of Education
- Joan Carney, Ed.D., Brain Injury Association of Maryland, Baltimore City, MD
- Laurie Elinoff, Representing Individuals with Brain Injury, Statewide Independent Living Council, Anne Arundel County, MD
- Janet Furman, Developmental Disabilities Administration, Maryland Department of Health
- Thomas Gallup, Representing Families and Caregivers of Individuals with Brain Injury, Montgomery County, MD
- Amanda Gallagher, MA, CCC-SLP, Professional, Baltimore City, MD
- Andrew (Drew) H. Gantt III, Brain Injury Association of Maryland, Baltimore County, MD
- Martin Kerrigan, Chair, Brain Injury Association of Maryland, Howard County, MD
- Lorri Irrgang, Representing Individuals with Brain Injury, Anne Arundel County, MD
- Norda Kittrie, Representing Families and Caregivers of Individuals with Brain Injury Montgomery County, MD
- Cory Kovacik, OTR/L, Sinai Hospital, Baltimore City, MD
- Claudette Mathews, RN, Office of Genetics and People with Special Health Care Needs, Maryland Department of Health
- Stefani O'Dea, Behavioral Health Administration, Maryland Department of Health
- Audrey Sellers, Disability Rights Maryland, Baltimore, MD
- Caitlin Exline Starr, Brain Injury Association of Maryland, Baltimore County, MD
- Lt. Stephen Thomas, Law Enforcement, Anne Arundel County, MD
- Adrienne Walker-Pittman, Representing Individuals with Brain Injury, Baltimore City, MD
- Heather Walenga Wheeler, PT, DPT, University of Maryland Rehabilitation and Orthopedic Institute, Baltimore County, MD
- Jasmine Williford, Center for Preventative Health Services, Baltimore County, MD
- Elizabeth Marie Wooster PhD, RN, MSN, MSE, MsEM, Trauma and Injury Specialty Care Program, Maryland Institute for Emergency Medical Services Systems

Maryland Legislative Appointments (ex-officio)

- Senator Nancy J. King, Democrat, District 39, Montgomery County
- House of Delegates, Vacant

Staff to the TBI Advisory Board

- Elena Janetopoulos, Maryland Behavioral Health Administration, Maryland Department of Health

Appendix B: Severity of Injury

"Severity of injury" refers to the degree or extent of brain tissue damage. Brain injury may be classified as mild, moderate, or severe, depending on the individual's neurologic signs and symptoms.[24] The degree of damage is estimated by measuring the duration of loss of consciousness and coma, length of amnesia (memory loss), and brain scans.[25]

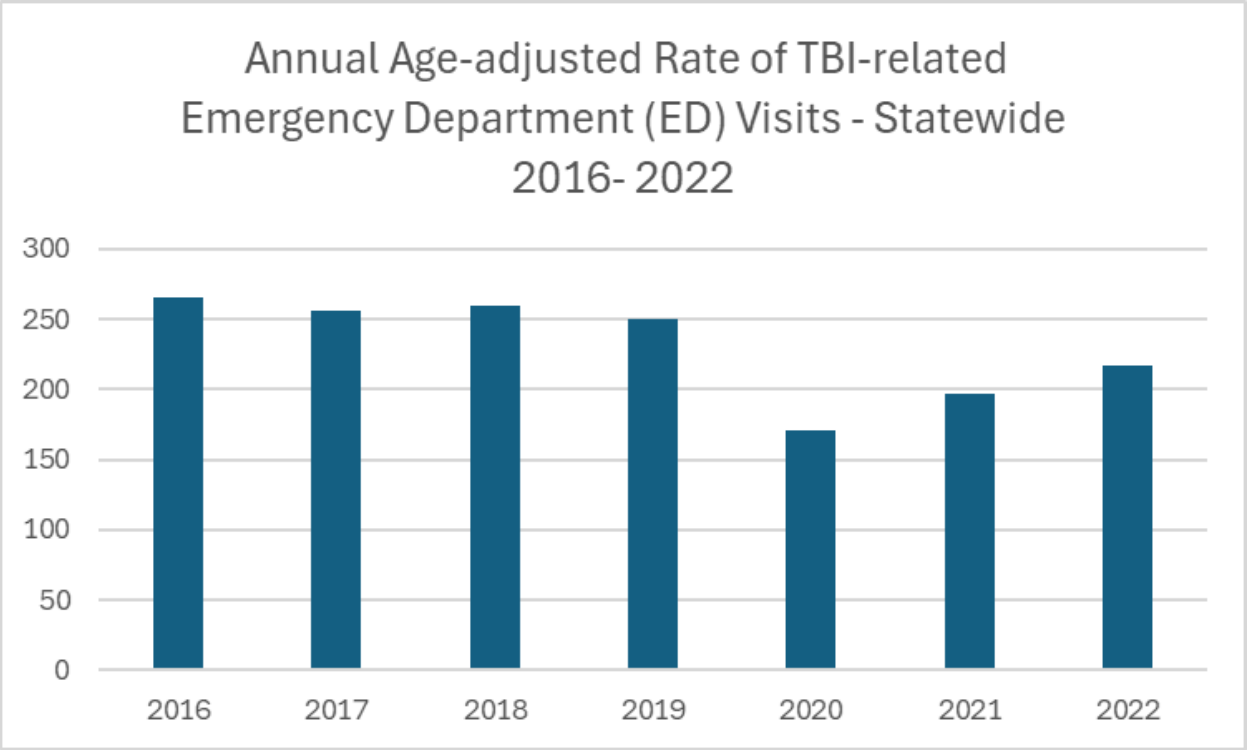
Degree of Damage to the Brain

Severity of Injury	Percentage Affected	Signs and Symptoms
Mild TBI or concussion	80% of all brain injuries- characterized by no loss of consciousness or a loss of consciousness (LOC) of less than 30 minutes and/or a period of confusion referred to as post traumatic amnesia (PTA) of less than 60 minutes	● Vomiting,dizziness, lethargy ●Memory loss for the period immediately, before and after the injury and difficulty attending to and learning new information during this time period (PTA)
Moderate TBI	10–13% of all brain injuries-characterized by LOC of 30 minutes to 24 hours, and PTA of 1–24 hours	●Signs of brain injury including bleeding, contusions ●Period of time (PTA) where memory and learning are impacted is longer than after a mild TBI ●Signs of brain injury evident on a CAT scan or other neuroimaging assessments
Severe TBI	7–10% of all brain injuries-characterized by LOC and PTA greater than 24 hours	●Unconsciousness (coma) for over 24 hours, can last days, weeks, months, or years ●No sleep/wake cycle during period of coma ●Signs of brain injury evident on a CAT scan or other neuroimaging assessments

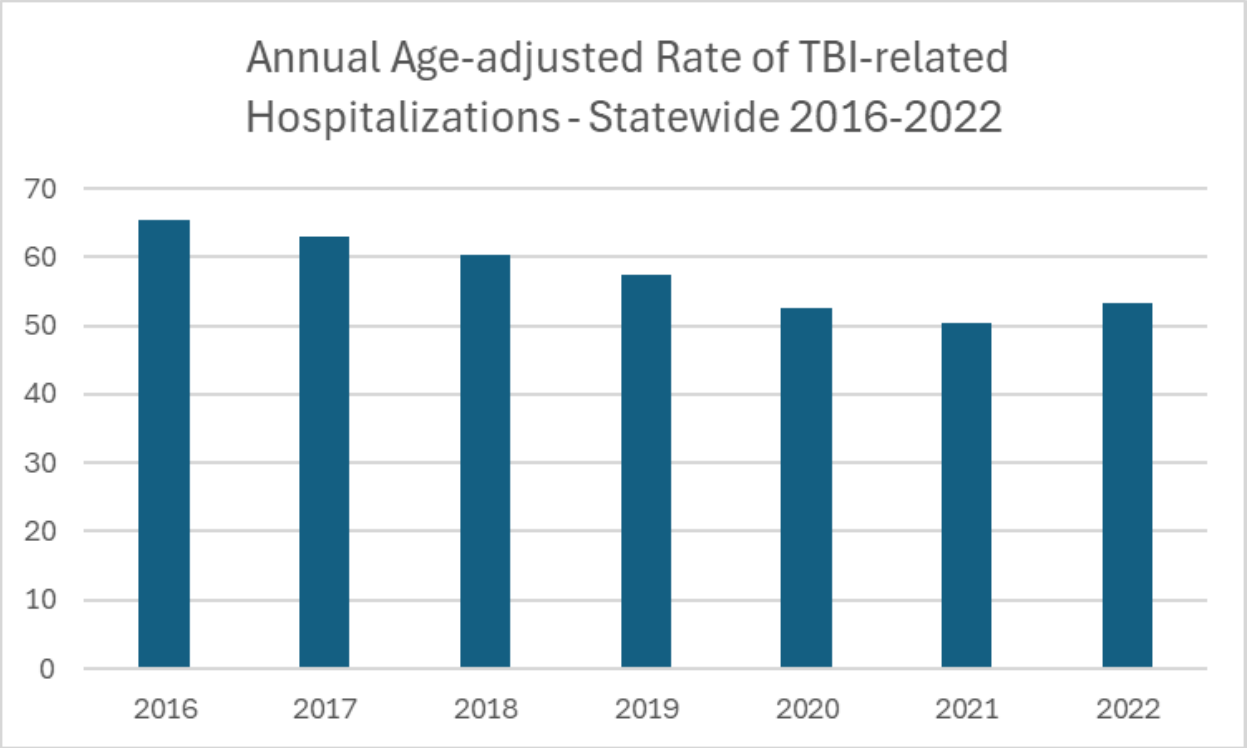
[24] Supra, note 3.
[25] "Brain Injury Severity." Brain Injury Diagnosis, Brain Injury Association of America, www.biausa.org/brain-injury/about-brain-injury/diagnosis/injury-severity. Accessed 1 Oct. 2024.

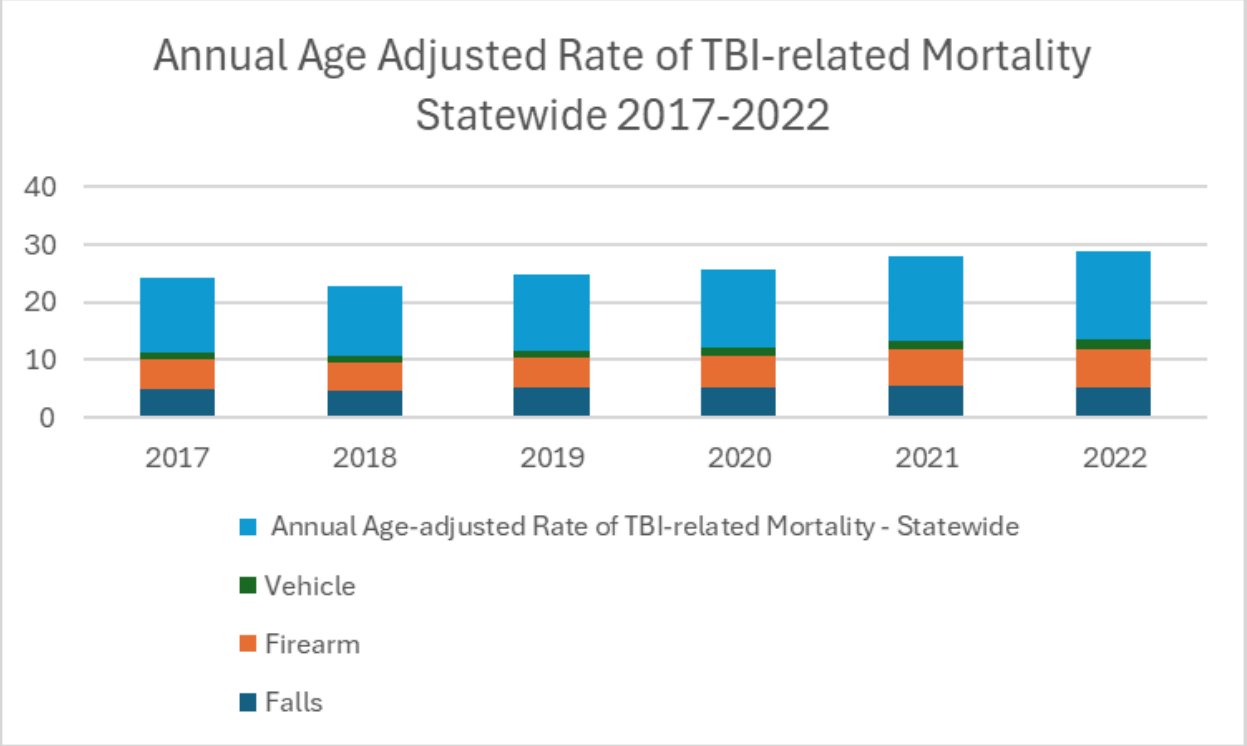
Appendix C: TBI Related Deaths, Hospitalizations, and Emergency Department Visits

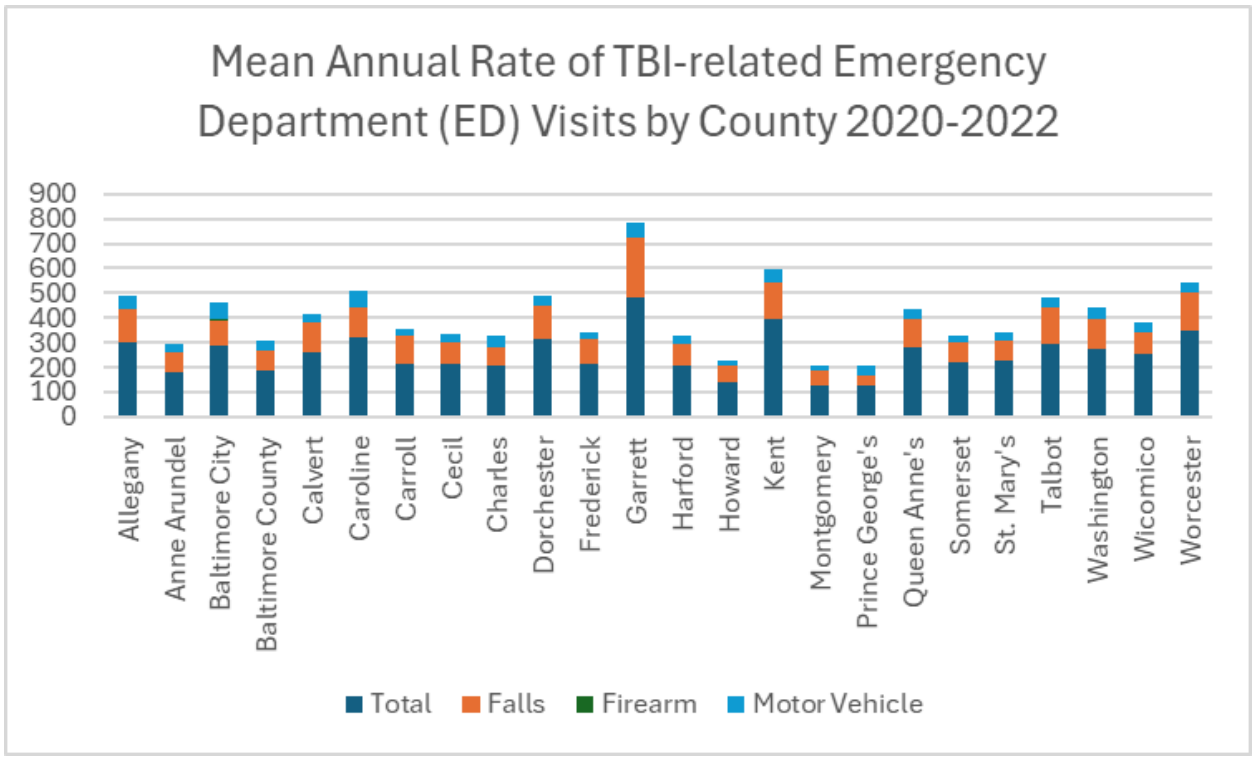
The Maryland Department of Health Environmental Public Health Tracking[26] utilizes hospital billing data from inpatient discharges and emergency department encounters to summarize the current status of traumatic brain injury in Maryland and examine the distribution of the burden of traumatic brain injury in Maryland.

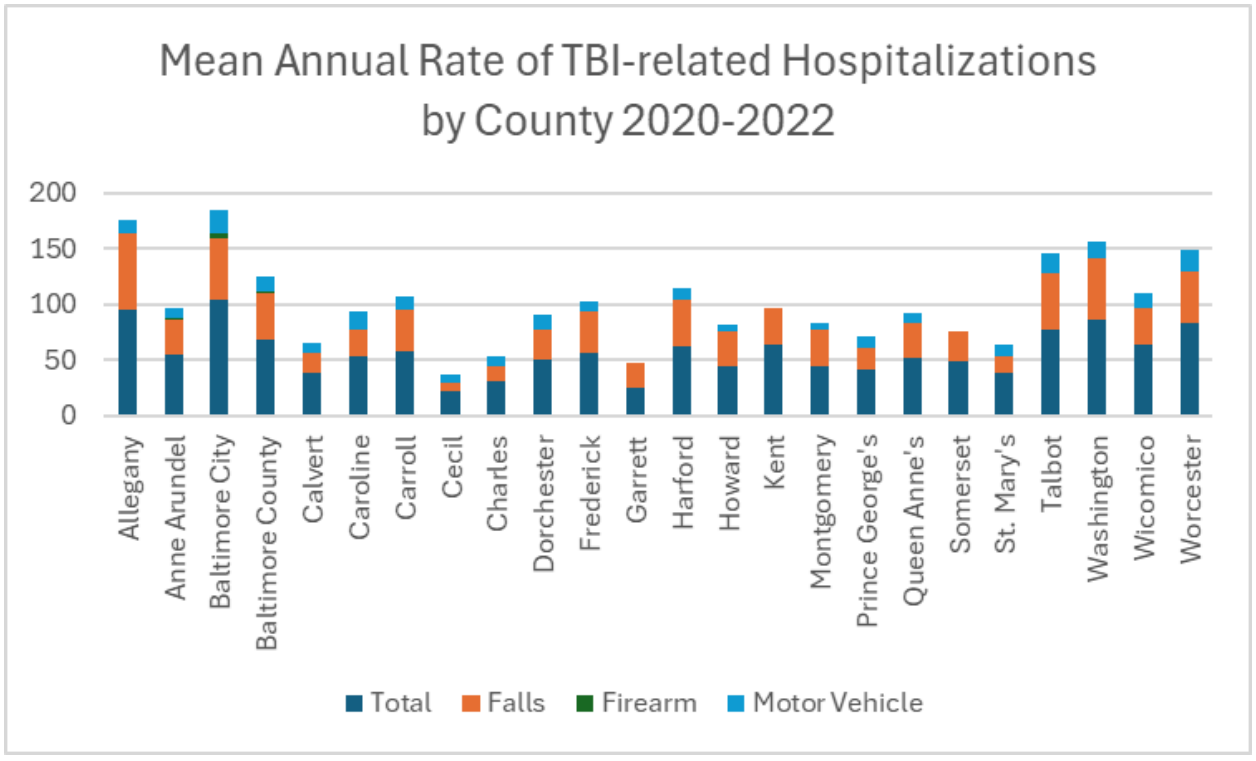


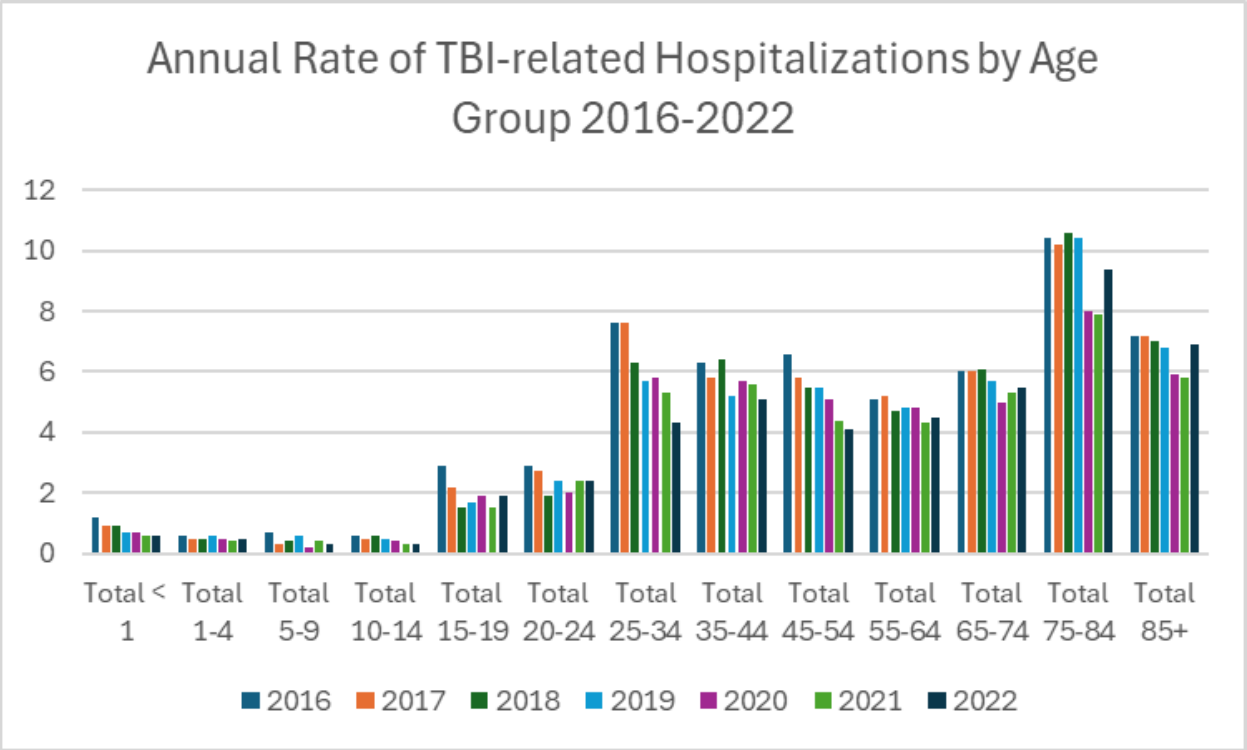
[26] See 10


Annual Age-adjusted Rate of TBI-related Hospitalizations - Statewide 2016-2022
70
60
50
40
30
20
10
0
2016
2017
2018
2019
2020
2021
2022


Annual Age Adjusted Rate of TBI-related Mortality Statewide 2017-2022
40
30
20
10
0
2017
2018
2019
2020
2021
2022
Annual Age-adjusted Rate of TBI-related Mortality - Statewide
Vehicle
Firearm
Falls


Mean Annual Rate of TBI-related Emergency Department (ED) Visits by County 2020-2022
900
800
700
600
500
400
300
200
100
0
Allegany
Anne Arundel
Baltimore City
Baltimore County
Calvert
Caroline
Carroll
Cecil
Charles
Dorchester
Frederick
Garrett
Harford
Howard
Kent
Montgomery
Prince George's
Queen Anne's
Somerset
St. Mary's
Talbot
Washington
Wicomico
Worcester
Total
Falls
Firearm
Motor Vehicle


Mean Annual Rate of TBI-related Hospitalizations by County 2020-2022
200
150
100
50
0
Allegany
Anne Arundel
Baltimore City
Baltimore County
Calvert
Caroline
Carroll
Cecil
Charles
Dorchester
Frederick
Garrett
Harford
Howard
Kent
Montgomery
Prince George's
Queen Anne's
Somerset
St. Mary's
Talbot
Washington
Wicomico
Worcester
Total
Falls
Firearm
Motor Vehicle


Annual Rate of TBI-related Hospitalizations by Age Group 2016-2022
12
10
8
6
4
2
0
Total < 1
Total 1-4
Total 5-9
Total 10-14
Total 15-19
Total 20-24
Total 25-34
Total 35-44
Total 45-54
Total 55-64
Total 65-74
Total 75-84
Total 85+
2016
2017
2018
2019
2020
2021
2022