

ANNUAL REPORT

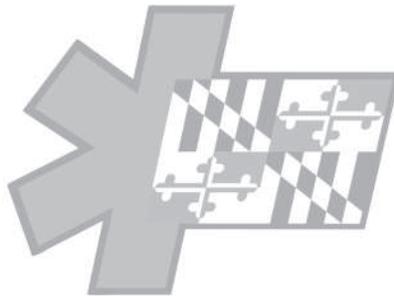
2021-2022



**Maryland Institute for
Emergency Medical Services Systems**

MIEMSS

The Maryland Institute for Emergency Medical Services Systems (MIEMSS) oversees and coordinates all components of the statewide EMS system (including planning, operations, evaluation, and research), provides leadership and medical direction, conducts and/or supports EMS educational programs, operates and maintains a statewide communications system, designates trauma and specialty centers, licenses and regulates commercial ambulance services, and participates in EMS-related public education and prevention programs. MIEMSS provides the executive support for the EMS Board in reviewing and approving the budgets for agencies receiving funds from the EMS Operations Fund, developing and promulgating regulations and protocols, proposing EMS system legislation, licensing/certifying and disciplining EMS clinicians, and conducting other EMS Board business. MIEMSS also provides the administrative and staff support for the State-wide EMS Advisory Council (SEMSAC) and five EMS regional councils.



2021-2022 ANNUAL REPORT

CONTENTS

Mission, Vision, and Key Goals.....	ii	<i>Out-of-State Adult Trauma Center</i>	
Maryland EMS Regions.....	ii	MedStar Washington Hospital Center.....	49
From the Maryland EMS Board Chair.....	iii	<i>Adult Burn Centers</i>	
From the Executive Director.....	iv	Johns Hopkins Bayview Medical Center.....	49
MIEMSS Departmental Reports		MedStar Washington Hospital Center.....	51
Administration.....	1	<i>Pediatric Trauma Centers</i>	
Aeromedical Operations.....	2	Johns Hopkins Children’s Center.....	51
Attorney General’s Office.....	3	Children’s National Hospital.....	54
Clinician Services.....	3	<i>Pediatric Burn Centers</i>	
Commercial Ambulance Licensing and Regulation.....	4	Johns Hopkins Children’s Center.....	56
Communications Engineering Services.....	6	Children’s National Hospital.....	57
Compliance Office.....	9	<i>Eye Trauma Center</i>	
Educational Support Services.....	9	Wilmer Eye Institute at The Johns Hopkins Hospital.....	59
Emergency Medical Services for Children.....	11	<i>Hand/Upper Extremity Trauma Center</i>	
Emergency Preparedness and Operations.....	15	Curtis National Hand Center, MedStar Union Memorial Hospital.....	62
EMRC/SYSCOM.....	18	<i>Neurotrauma Center</i>	
Government Affairs.....	19	R Adams Cowley Shock Trauma Center.....	65
Health Care Facilities and Special Programs.....	20	<i>Rehabilitation Services</i>	68
Information Technology and Data Management...	24	Maryland-National Capital Region	
Medical Director’s Office.....	28	Emergency Response System	69
Quality Management.....	31	Department of Emergency Health Services, University of Maryland Baltimore County	72
Maryland Trauma and Specialty Referral Centers ...	32	Maryland Poison Center, University of Maryland School of Pharmacy	72
Designated Trauma Center Categorization	33	National Study Center for Trauma and EMS	74
Maryland EMS System Trauma and Specialty Center Reports	34	Maryland EMS Statistics	77
<i>Primary Adult Resource Center</i>		Maryland Trauma and Burn Statistics	83
R Adams Cowley Shock Trauma Center.....	34	Age Distribution of Patients Treated at Pediatric or Adult Trauma Centers.....	83
<i>Level I Adult Trauma Center</i>		Adult Trauma Statistics.....	83
The Johns Hopkins Hospital.....	38	Adult Burn Statistics.....	89
<i>Level II Adult Trauma Centers</i>		Pediatric Trauma Statistics.....	92
Johns Hopkins Bayview Medical Center.....	40	Pediatric Burn Statistics.....	96
University of Maryland Capital Region Medical Center.....	42	Maryland EMS Board and Statewide EMS Advisory Council	100
Sinai Hospital.....	43		
Suburban Hospital – Johns Hopkins Medicine.....	45		
<i>Level III Adult Trauma Centers</i>			
Meritus Medical Center.....	45		
TidalHealth Peninsula Regional.....	46		
UPMC Western Maryland.....	47		

MISSION, VISION, AND KEY GOALS

MISSION

Consistent with Maryland law and guided by the EMS Plan, to provide the resources (communications, infrastructure, grants, and training), leadership (vision, expertise, and coordination), and oversight (medical, regulatory, and administrative) necessary for Maryland's statewide emergency medical services (EMS) system to function optimally and to provide effective care to patients by reducing preventable deaths, disability, and discomfort.

VISION

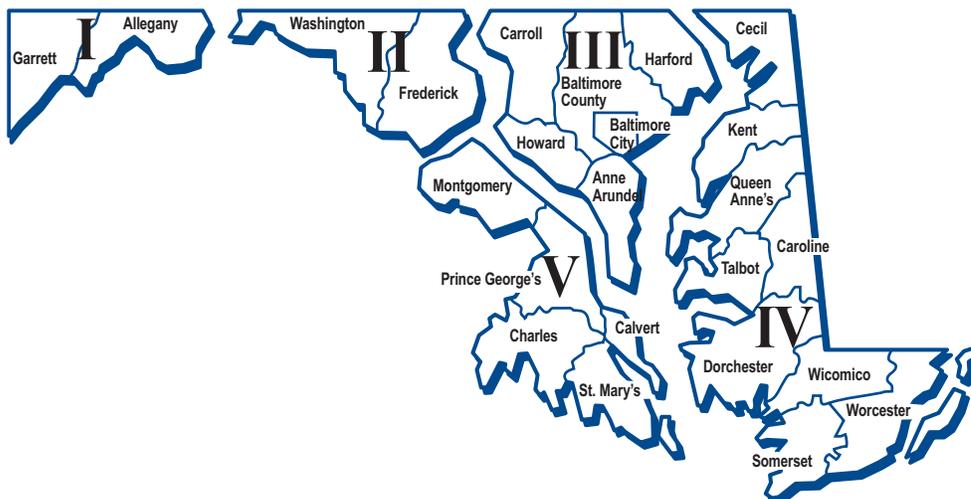
To be a state EMS system acknowledged as a leader for providing the highest quality patient care and that is sought out to help other EMS systems attain the same level of quality care.

KEY GOALS

- Provide high quality medical care to individuals receiving emergency medical services.
- Maintain a well-functioning emergency medical services system.

MARYLAND EMS REGIONS

Maryland's EMS system is composed of five regions. Each region has a Regional EMS Advisory Council composed of members who have an interest in EMS. Council responsibilities are defined by regulation, and council meetings typically cover a range of topics, including grants, training, EMS policies and protocols, legislation, and communications. Input from each Regional EMS Advisory Council is provided to the Statewide EMS Advisory Council for recommendation to the EMS Board. MIEMSS' regional administrators support the councils, facilitate communication, and address regional EMS issues.





*Clay B. Stamp, NRP
Chairman, EMS Board*

FROM THE MARYLAND EMS BOARD CHAIR

On behalf of the Emergency Medical Services (EMS) Board, I thank the MIEMSS team, our partner agencies and organizations, and each of our EMS and critical care clinicians who ensure our statewide emergency medical services system performs at its best, “getting the right patient to the right care in the right amount of time.”

The uniqueness of our Maryland EMS system is a perfect combination of factors, including broad citizen support echoed by the elected officials at the state and local levels of government, which open doors to policy and resource support, coupled with highly dedicated career and volunteer emergency responders, physicians, nurses, and technicians that deliver a high level of care.

I would also like to specifically recognize the Emergency Medical Services Operations Fund (EMSOF) partners. These are organizations that work closely together to deliver support to the EMS system across Maryland and include the Maryland Institute for Emergency Medical Services Systems (MIEMSS), the Maryland Fire and Rescue Institute (MFRI), the Maryland State Police Aviation Command, the Maryland Shock Trauma Center, and the Maryland State Firemen’s Association (MSFA).

Again, I thank you for your ongoing commitment to cooperative excellence, which is a bedrock to facilitating our collective successes, and which will be realized optimally by our following the Maryland EMS System “Vision 2030” EMS Plan, an excellent roadmap for the future which was built from the work of many of our system stakeholders.





*Theodore R. Delbridge, MD, MPH
Executive Director, MIEMSS*

FROM THE EXECUTIVE DIRECTOR

Each year, this report provides a glimpse into Maryland's emergency medical services (EMS) system and what it has accomplished for citizens of all ages in our state. What is difficult to convey adequately is the commitment and dedication of more than 20,000 EMS clinicians who strive to improve the lives of others on what are often their worst days. This report provides some detail about the more than 500,000 people taken by EMS clinicians to hospital emergency departments and trauma centers in the past year. What it cannot sufficiently describe are the challenges of all sorts that were inherent in caring for those patients, and how they were met in each case.

The COVID-19 pandemic continued to dominate Maryland's health care system, including EMS, for parts of the year. If ever there has been demonstration of the importance of EMS to overall health care delivery, the past two years have made the point. EMS clinicians effectively screened patients for the potential for self-care at home, using the Viral Syndrome Pandemic Triage Protocol, which has been adopted in other states. They administered more than 100,000 SARS-CoV-2 vaccines to the general public. This, in part, led to legislation extending authorization of paramedics to administer vaccines for influenza and the virus causing COVID-19 to the public for an additional two years.

In some cases, the opportunity for innovative approaches has run its course. Among them was the option to develop provisional EMS clinicians. There were nearly 1,500 EMTs and paramedics who were nearing the end of their training, or who re-instated their certificates/licenses after expiring. Our objective then became to create a path forward to keep them engaged. The shortage of EMS clinicians throughout the U.S. is well known. Maryland is no exception. It is a problem no doubt exacerbated by the COVID-19 pandemic and resulting limited access to education and practical experiences. Thus, in addition to credentialing and retaining provisional clinicians, and extending the credentials of otherwise expiring EMTs and paramedics, Maryland initiated a limited program to provide a stipend to EMT students. Made possible by a federal grant, the stipend intends to offset expenses and incentivize up to 500 EMT students to complete their coursework and pass the national certification examination. To date, the response from students has been excellent, and we await the results to determine the difference it made.

The Critical Care Coordination Center (C4) is also continuing, for the time being, with the support of a federal grant. It represents a confluence of dedication and expertise among EMS clinicians (critical care coordinators), critical care physicians, and pediatric specialists (emergency physicians, hospitalists, and intensivists) to match patients needing critical care with available resources in our state and beyond. Since going live in December 2020, C4 has fielded more than 3,200 cases. Many times, the C4 physician can help to manage the patient where he or she is, obviating the need for transfer and resulting in substantial resource conservation. In most other cases, patients are matched with available resources at the most appropriate level for their needs. Occasionally, that entails going outside of Maryland. The C4 staff and physicians have been invited to take part in discussions in other states that are trying to emulate, in some way, what has been accomplished here.

Among the "big wins" this year was receipt of revenue resulting from the Emergency Transporter Supplemental Payment Program (ESPP), the product of an incredible collaboration between MIEMSS and the Maryland Department of Health. Essentially, it allows Maryland to take advantage of a federal opportunity to help offset the difference between what it cost to care for a Medicaid beneficiary and what Medicaid compensates EMS for the service. That difference is substantial. This year, 13 jurisdictional EMS programs shared more than \$80 million. A goal over the next two years is to ensure that every jurisdiction qualifies to participate and does so.

We continue to be guided by our plan for Maryland's EMS system, Vision 2030. Adopted by the EMS Board in August 2020, it resulted from the collaborative work of more than 200 EMS stakeholders. It compels us to think forward. The pages of this report convey a story of the year gone by. With each graph, table, and section, however, there exist opportunities and a call to forward action for each of us.

On behalf of more than 20,000 EMS clinicians, our partners throughout the EMS system, and especially my colleagues at the Maryland Institute for Emergency Medical Services Systems, thank you for taking interest in our work.

MIEMSS DEPARTMENTAL REPORTS

ADMINISTRATION

Mission

To provide comprehensive accounting, personnel, and administrative resources in compliance with all applicable state laws, regulations, and policies in support of MIEMSS operations and overall mission.

Administration is responsible for the accounting, procurement, grant administration, and human resources functions of MIEMSS. All human resources functions are currently assigned to the Maryland Department of Budget and Management’s Personnel Unit, under the guidance of MIEMSS’ Chief Administrative Officer.

The Accounting Unit provides guidance to management on various fiscal and budgetary matters. The staff develops the budget, tracks and monitors expenditures, processes accounts payable and receivable, maintains employee leave and payroll records, and deposits cash receipts. They also administer special, federal grant, and reimbursable fund appropriations.

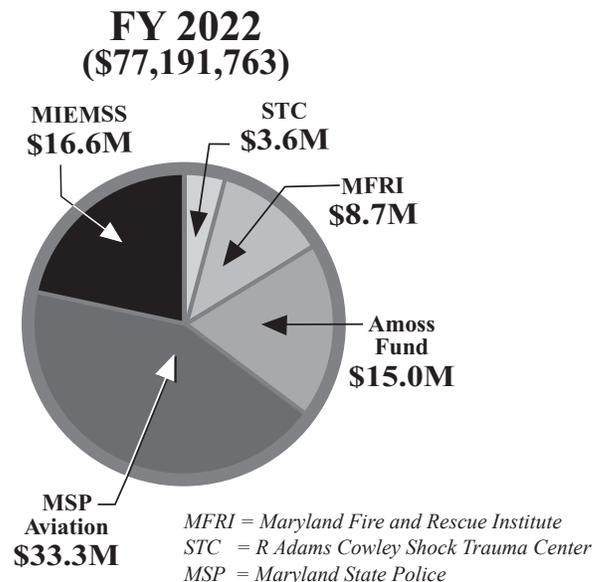
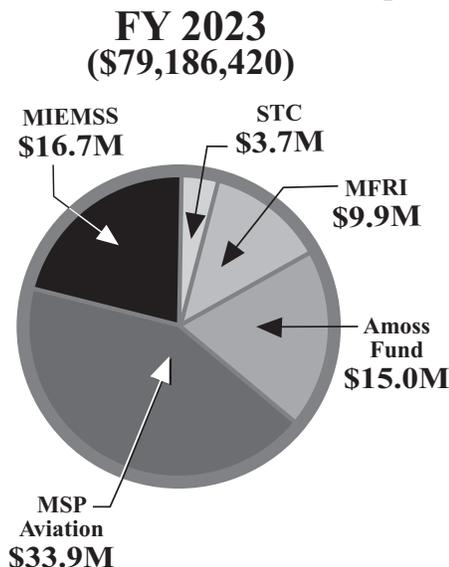
The Procurement Unit obtains all necessary supplies, materials, and services required by MIEMSS to fulfill its mission in accordance with all applicable state procurement laws and regulations. The unit is also responsible for contract and grant administration. Administration is also responsible for inventory control, fleet management, travel services, and building operations and maintenance.

MIEMSS budget information is displayed by state object code in the chart to the right. The distribution of EMS operations funds statewide is shown below.

MIEMSS FY 2022 Expenditure by Object Code (Includes All Funds)

FY 2022	Actual
Salaries and Wages.....	\$9,958,729
Technical/Special Fees.....	3,815,334
Communication.....	2,121,392
Travel.....	627,465
Fuel and Utilities.....	140,365
Motor Vehicle Operations and Maintenance.....	298,845
Contractual Services.....	2,659,721
Supplies and Materials.....	653,813
Equipment—Replacement.....	264,795
Equipment—Additional.....	88,895
Fixed Charges.....	179,624
Grants.....	717,911
Land and Structures.....	0
Total Expenditure.....	\$21,526,889

EMS Operations Fund





AEROMEDICAL OPERATIONS

Mission

To provide the physician medical support necessary to the Maryland State Police Aviation Command to meet the emergency helicopter needs of Maryland's citizens. State Aeromedical Director Douglas J. Floccare, MD, MPH, FACEP, is actively involved in ongoing training and verification of skill proficiency for state police flight paramedics. Dr. Floccare provides around-the-clock consultation support to SYSCOM for medevac requests and medical direction and is actively involved in the development of new patient care protocols and the oversight of ongoing care.

In FY 2022, the Maryland State Police Aviation Command (MSPAC) transported 1,848 patients. Of these patients, 1,834 (99%) were transported from the scene at the request of the local emergency services and 14 (1%) were transported between hospitals to a higher level of care.

Types of calls included the following:

• Motor vehicle crashes	931
• Falls	422
• Pedestrians	70
• Burns	52
• Gunshot wounds	77
• Stroke	40
• Assaults	32
• Cardiac	32

• Stabbings	26
• Drowning	16
• Industrial injuries	13

The MSPAC saw continued successful use of the AugustaWestland 139 (AW-139) model of aircraft as an excellent platform for its multiple missions. Equipped with the most current safety technology as recommended by the National Transportation Safety Board, the AW-139 aircraft are powerful enough to carry two patients and two EMS clinicians despite the challenging heat and humidity of the summer months. The acquisition of an FAA-certified Flight Training Device has allowed significant hours of pilot training to be conducted under simulated conditions, not only saving aircraft flight hours but also allowing the simulation of in-flight emergencies not able to be performed in an actual flying aircraft.

The COVID-19 pandemic continued to present unique challenges to providing patient care in FY 2022, as well as a prolonged period of diminished call volume. Sophisticated transport ventilators continued to add to our treatment capabilities for our sickest patients in FY 2022, allowing early initiation of lung-protective ventilation while using cutting-edge strategies to maintain blood pressure until patients could reach the operating room.

FY 2022 also saw the continued participation of the MSPAC in the adult and pediatric rapid sequence intubation (RSI) programs as defined in The Maryland Medical Protocols for Emergency Medical Services. Designed to address the needs

of patients with severe head injuries, these RSI protocols allow MSPAC flight Paramedics to use neuromuscular blocking agents in the field to provide endotracheal intubation for patients who are not breathing adequately. To verify advanced skill proficiency, scenario-based simulation training was used. These exercises, also used for recertification in Advanced Cardiac Life Support and Pediatric Advanced Life Support training, enabled lifelike simulation of patient care situations as would be faced by MSPAC flight Paramedics in the course of their normal duties.

ATTORNEY GENERAL'S OFFICE

Mission

To provide legal advice to the EMS Board, the Statewide EMS Advisory Council, and MIEMSS in connection with all aspects of EMS, the ongoing administrative functions of the agency, and the regulation of commercial ambulance services. The Attorney General's Office also serves as the administrative prosecutor for cases involving allegations of prohibited acts by EMS clinicians before the EMS Provider Review Panel, the EMS Board, the Office of Administrative Hearings, and the courts.

During the past fiscal year, the Attorney General's Office continued to support MIEMSS in promulgating and implementing the agency's regulations, procurement, personnel matters, and contracts, including technology initiatives. The office also assisted in the administration of several state and federal grant programs.

Support provided by the Attorney General's Office in FY 2022 included handling 50 cases of alleged prohibited acts by EMS clinicians and applicants. Additionally the Attorney General's Office has continued to provide legal advice and support to the State Office of Commercial Ambulance Licensing and Regulation in all compliance matters, including contested cases, and provides support to the Commercial Ambulance Services Advisory Committee.

Assistant attorneys general also help the Office of Hospital Programs to monitor specialty referral centers for compliance with their requirements and the Office of Licensure and Certification to enforce EMS education program standards, as well as requirements for licensure and certification.

The assistant attorneys general also provided advice and support for actions taken by MIEMSS and the EMS Board under Governor Larry Hogan's emergency declarations. Additionally, the Attorney General's Office assisted in the promulgation of regulations necessary to manage the transition of provisional clinicians credentialed during the emergency to full licensure and certification.

Assistant attorneys general worked with MIEMSS in FY 2022 to amend various regulations, including updating standards for Adult Trauma Centers, Pediatric and Adult Burn Centers, and Eye Trauma Centers.

Other tasks completed included reviewing and providing advice concerning designation of trauma and specialty referral centers and base stations as well as preparing responses to public information act requests and subpoenas. Additionally, the assistant attorneys general provide support to the Data Access Committee in responding to requests for data and preparing documents for research projects. They also provided advice on the Maryland Public Access Defibrillation program and the AED Registry. The Attorney General's Office also participated in the development of an online course for Quality Assurance Officers and contributed the module on legal matters relevant to quality assurance.

The Maryland Orders for Life-Sustaining Treatment (MOLST) program, which provides patients with the legal means for communicating medical care wishes to EMS and other health care professionals, is supported by the Attorney General's Office. The MOLST form may be downloaded by the public for use, and MIEMSS provides copies to individuals without access to the Internet. MIEMSS also provides plastic bracelets for use with any MOLST insert to the public, free of charge. Additionally, MIEMSS routinely responds to phone calls and emails from the public for assistance in obtaining and using the MOLST form. MIEMSS also serves as a resource for health care clinicians regarding implementation of MOLST.

CLINICIAN SERVICES

Mission

To coordinate a variety of services to protect the public and promote and facilitate the development of knowledgeable, skilled, and proficient prehospital professionals who deliver emergency care in the Maryland EMS system.

Maryland EMS Clinicians and Education Programs

■ **FY 2022 EMS Clinician Data.** The Office of EMS Clinician Services had a steady workload in FY 2022, processing 9,607 applications, issuing 1,382 initial prehospital clinician certifications and licenses, and renewing 6,055 certifications and licenses. The vast majority of new entrants into Maryland EMS are through an initial emergency medical technician (EMT) clinician course. Although the numbers fluctuate, hundreds of EMTs enter the Maryland EMS system each year. Upon gaining EMT certification, many subsequently transition to the advanced life support (ALS) level. While most remain in the Maryland EMS system, some explore opportunities in other healthcare professions.

The number of Maryland clinicians is shown below. During FY 2022, the number of licensed/certified clinicians declined at each level, as has been a pattern for several years, with the exception of FY 2021. The increase last year was likely due to the nearly 1,500 provisional clinicians created to assist in the COVID-19 pandemic crisis.

The Office of EMS Clinician Services works with other

MIEMSS departments to supply clinician data and trends (e.g., clinician numbers by affiliation and NREMT pass rates) to various statewide committees for analytical purposes.

■ **MIEMSS Online Training Center.** The Online Training Center, MIEMSS’ distance learning management system, received a big upgrade and a fresh new look in FY 2022. The Online Training Center reached over 58,000 registered users in FY 2022. Of those registered users, 14,403 clinicians were active in the Online Training Center during the same period. The Online Training Center hosted 83 active courses in FY 2022. The Center hosted the 2022 Miltenberger/Winterfest EMS Conference virtually, due to the COVID-19 pandemic and prevented it from being cancelled. The Online Training Center also offers the examination for the Hospital Base Station Courses to be conducted from a distance, which has been helpful given the constraints of the COVID-19 pandemic. Also, we have been able to offer monthly Professional Development for Instructors’ requirements established by MICRB, with an average of 22 in attendance each month, and a BLS Orientation Course. The Office of EMS Clinician Services, in conjunction with ImageTrend® and MIEMSS’ Information Technology Department, enhanced the functionality of the Online Training Center to capture clinician continuing education records in the Licensure system. This allows clinicians to take a course in the Online Training Center and, within 24 hours, it syncs to their education report in the Licensure system. With the current year’s annual updates coming to a close, MIEMSS is moving forward with a planned upgrade to some new modules in Licensure which will bring new features and functionality for MIEMSS as well as the Education Programs and Services, improving the way we communicate and send correspondence regarding education and training.

Maryland Clinician Registry for Licensure and Certification

MIEMSS continues to implement critical improvements to the electronic Licensure/Certification System that will support

seamless processing and enhance functionality. The number of users in the Licensure System continues to increase. The system allows for more efficient processing and the ability to communicate electronically to clinicians across the spectrum. With continual feedback from the EMS community at large, the Office of EMS Clinician Services is making great progress on improving system functionality, while meeting the needs of its stakeholders.

Further system enhancements, coupled with quality management, have made it possible to process with greater efficiency while providing faster turnaround times.

COMMERCIAL AMBULANCE LICENSING AND REGULATION

Mission

To provide leadership and direction to support the operations and growth of Maryland’s commercial ambulance industry. Protecting the health, safety, and welfare of persons using these services is achieved through the development and modification of statewide requirements for commercial ambulance services and vehicles and the uniform and equitable regulation of the commercial ambulance industry throughout Maryland.

At the conclusion of FY 2022, 37 commercial ambulance services and 464 commercial ambulance units held licenses issued by the State Office of Commercial Ambulance Licensing and Regulation (SOCALR). (See page 81 for additional statistics on SOCALR licensing and operations.)

To fulfill its own mission, SOCALR remains efficient and responsive in providing service and vehicle licensure, and offers sound leadership and direction to the industry while ensuring patient and clinician health, safety, and welfare. In doing so, SOCALR remains continually committed to MIEMSS’ organizational mission and vision. The department continues to seek opportunities to streamline internal business processes and develop strategies to enhance records management.

Based on continuous positive feedback from licensed com-

Number of EMDs, EMRs, EMTs, CRTs, and Paramedics [Includes Current, Extended, and Military Status; Excludes Lapsed (Inactive and Expired)]

Level	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022*
EMD	1,320	1,377	1,066	1,110	1,210	1,052
EMR	1,589	1,136	662	603	652	464
TOTAL	2,909	2,513	1,728	1,713	1,852	1,516
EMT	16,069	15,485	14,853	14,875	15,501	14,763
CRT	619	587	575	546	509	441
Paramedic	3,336	3,278	3,491	3,573	3,787	3,724
TOTAL	20,024	19,350	18,919	18,994	19,797	18,928

*July 1, 2021-September 1, 2022; all other years reported are shown by fiscal year.

Efforts to Increase the Number of EMS Clinicians

Throughout the US and in Maryland, the EMT attrition rate exceeds recruitment and has been exacerbated by the COVID-19 pandemic. Diminishment of the workforce strains the EMS system and its ability to respond to more than the one million calls for help each year in Maryland.

Increasing the EMS Workforce Through Education Stipends

To help increase the number of certified EMTs in Maryland, entice additional students to enroll in EMT courses and reduce attrition from EMT classes, in 2022, MIEMSS offered a stipend program for EMT students who began their EMT education after January 1, 2022. Up to 500 students were offered stipends of \$2,000 distributed in escalating payments during the course training:

- \$200 after successful completion (> 70%) of their first assessment (Module 1 or equivalent);
- \$300 after successful completion (> 70%) of their second assessment/halfway point (Module 2);
- \$300 after successful completion (> 70%) of their EMT course;
- \$200 after completing the MIEMSS internship package; and
- \$1,000 after passing the National Registry of EMT cognitive exam within three attempts (required for certification in Maryland).

There has been great interest in the stipend program since its inception in early 2022. To date, 500 individuals have been approved to participate in the stipend program, and, if these individuals complete all the required milestones, the available stipend grant funds will be fully used. If participating individuals fail to meet the required milestones, available grant funds will be redirected to other individuals who have indicated interest in participating in the stipend program. To date, 80 individuals participating in the stipend program have fully completed the EMT training course and passed the National Registry of EMT examination.

The grant program is funded by the Maryland Department of Health's Office of Preparedness and Response through support provided by the Centers for Disease Control & Prevention and will conclude in 2023.

Augmenting the EMS Workforce During COVID-19

On March 19, 2020, the Governor declared a State of Emergency and catastrophic health emergency and subsequently issued a series of Executive Orders. Executive Order #20-03-30-02, "Augmenting Emergency Medical Services," authorized the MIEMSS Executive Director and State EMS Board Chair to suspend the effect of certain provisions of Maryland's EMS laws and regulations. Suspension of these provisions were to be based upon a finding that suspension would not endanger public health, welfare, or safety; would augment the EMS workforce; and would improve the State's response to the state of emergency and catastrophic health emergency. The Executive Order also permitted additional, revised, or supplemental procedures or protocols to be issued concerning licensure, certification, or scope

of practice as necessary to appropriately respond to the state of emergency and catastrophic health emergency. The Executive Order was to remain in effect until the state of emergency was terminated and the proclamation of the catastrophic health emergency was rescinded.¹

Over the next several months, the Executive Director and EMS Board Chair issued these Public Notices specific to the EMS workforce:

Public Notices #1 and #4

- Created over 1,300 provisional EMS clinicians at all levels of EMS, as well as a path for these personnel to become fully licensed/certified. Provisional clinicians included those who had been inactive or whose certification or licensure had expired; EMS students who had completed specified portions, but not all, of their education requirements; and personnel licensed/certified in another state.

Public Notice #3

- Waived certain crew requirements for commercial ambulances.

Public Notice #5

- Re-ordered the sequence of EMT exam components to make it easier for EMT candidates to complete the certification process.

Public Notice #6

- Permitted Paramedics and EMTs to vaccinate the public under appropriate supervision. Subsequently, from the time the COVID-19 vaccine became available (early 2021) through September 1, 2021, Maryland EMS clinicians administered approximately 100,000 COVID-19 vaccinations – over 80,000 vaccinations to members of the public and over 21,000 vaccinations to State, county, and local government personnel. The vast majority of the vaccines were administered by Paramedics, with EMTs performing other, necessary tasks associated with vaccine administration. EMS vaccine administration included the Moderna mRNA vaccine, Pfizer-BioNTech mRNA vaccine, and Johnson & Johnson Jansen's Viral Vector vaccine.

Public Notice #7

- Permitted EMS clinicians to provide non-EMS care at state-facilitated COVID-19 alternative care sites.

Public Notice #8

- Extended all EMS clinician licenses and certification (that would have otherwise expired in April or June 2021) to October or December 2021, depending on clinician level.

Public Notice #9

- Allowed commercial ambulance services to use non-certified (no medical qualification) personnel to drive a Basic Life Support ambulance.

¹The Order was rescinded on August 15, 2021.

mercial services, SOCALR continues to maintain a year-round licensure renewal schedule. SOCALR continues to use the Commercial Ambulance Inspection Program (CAIP), a web-based application implemented in FY 2019, to conduct these vehicle inspections. The web-based Commercial Ambulance Licensing System (CALs) continues to serve as the platform in which both initial and renewal applications are processed and commercial service data is stored. The system provides a real-time snapshot of the commercial resources in Maryland, resulting in expedited data retrieval. Work is underway to update and enhance both of these applications to provide better productivity and reporting capabilities.

In addition to yearly unit renewal inspections, SOCALR also conducts random unit inspections throughout the year. For FY2022, SOCALR personnel were on the road conducting random surveys on 89 days, visiting 481 sites and inspecting 79 units. Base surveys of the licensed commercial services are also conducted. These surveys are conducted by a team of personnel from SOCALR, who provide follow-up reports outlining any corrective actions necessary to maintain COMAR Title 30.09 compliance.

The SOCALR team remains committed to supporting the MIEMSS Field Operations Support Team (FOST), assisting with emergency operations efforts throughout the state, and coordinating commercial resources when disasters strike. One such disaster last year was the Larkin Chase Nursing Home explosion and fire, where nine commercial services provided 17 ambulances to transfer 87 residents to other facilities, completing the task in less than 10 hours – a monumental undertaking.

SOCALR continues to work closely with commercial services and third-party ePCR vendors to ensure the smooth import of data from those platforms. Reports are randomly reviewed for completeness, and to verify the receipt of data from services that import from third-party vendors.

In May 2021, under the Governor’s Emergency Declaration, SOCALR implemented a regulatory change that allowed Commercial BLS ambulances to be driven by non-EMS licensed drivers. The program utilizes a waiver program that allows approved commercial services to utilize these drivers on BLS units. Following the expiration of the emergency declaration, this program was approved by the EMS Board and adopted into COMAR. There are currently 11 commercial services approved for the waiver, with 160 approved non-EMS licensed drivers.

In January 2022, SOCALR developed the Maryland Hospital Commercial Ambulance Request System, or MH-CARS, in response to concerns from hospital systems about long delays and unavailability of commercial ambulances. This system allows a hospital to post a request for a commercial ambulance when their regular vendor is unavailable or significantly delayed. This request is then sent out automatically to all of the commercial services in Maryland. Available commercial services then accept the request.

COMMUNICATIONS ENGINEERING SERVICES

Mission

To provide the equipment, support, and expertise necessary to operate the statewide EMS communications systems and to support public safety interoperability.

Communications Upgrade Project (CUP)

Since the approval of the Detailed Design Review (DDR) in June 2019, Overland Contracting Inc. (OCI) has been working with their subcontractors to procure the equipment and services to begin the Phase 1 deployment in MIEMSS Region V, which covers Frederick, Montgomery, Prince George’s, Calvert, Charles, and St. Mary’s Counties. Delays in development of the core patching systems software led MIEMSS to alter the original deployment schedule to keep the project moving. This change allowed OCI to begin deploying the Radio-over-IP (ROIP) adapters that convert analog UHF Base Stations to the digital system and connect EMRC to the various county radio systems in Regions I, II, and III. New microwave and network connectivity has been developed to all Maryland Region V hospitals and hospital connectivity in Regions I and III as we work to develop the core patching system’s reliability and functionality.

Public Safety Microwave System

The MIEMSS Communications Engineering Services Department continues its leadership role in the design, implementation, and maintenance of the Statewide Public Safety Microwave System, a critical component of EMS communications in Maryland. In addition to supporting MIEMSS, this microwave system supports state public safety agencies such as the Maryland State Police (MSP); Maryland Department of Natural Resources (DNR); Maryland State Highway Administration (SHA); many county public safety radio systems; and numerous other state and federal partners, including the statewide 700 MHz radio system project (MFiRST). During this year, MIEMSS has replaced many key microwave links outside of the CUP project that directly enhance the reliability and resiliency of the current and planned communication systems. These microwave paths include new high availability Ethernet-capable radios in key locations that provide the native Ethernet transport required by the CUP project. The upgrade of these microwave links across the states allows for a more robust and reliable backhaul required to keep the EMS communications system reliable for years to come. Notable microwave path replacements that expand the native Ethernet network and enhance connectivity for the CUP project include:

1. Owings Mills tower to Hereford SHA tower
2. Hereford SHA tower to Madonna tower
3. Madonna tower to Hickory tower
4. Hickory tower to Stoney Forest tower
5. Stoney Forest tower to Lapadum tower
6. Lapadum tower to JFK tower



7. Ocean City tower to Berlin tower
8. Berlin tower to Central Site tower
9. Central Site tower to Snow Hill water tank
10. Snow Hill water tank to Klej Grange tower
11. Central Site tower to Naylor Mill tower
12. Central Site tower to Pittsville tower
13. Central Site tower to Nassawango tower
14. Central Site tower to Princess Anne MSP tower
15. Princess Anne MSP tower to Marion tower
16. Bressler Research Building to Solley tower
17. Elk Neck tower to Fair Hill tower

Other notable microwave work which was accomplished during this reporting period included:

1. Re-routing the traffic from the Bressler Research Building to the Rt. 40 SHA tower microwave link, allowing the replacement of defective waveguide. This is a key backbone link leading to Western Maryland from Baltimore.
2. Berlin tower to Ocean City microwave antenna relocation, required to mitigate tree blockage in the path.
3. The relocation of the Waldorf tower's two microwave links to a new shelter, required by the transfer of the old barrack garage to Charles County.
4. The replacement of the rotting stick-built shelter at Hanover SHA resulted in the transfer of the existing microwave equipment into the new concrete shelter. This was especially important since the Maryland Department of Emergency Management (MDEM) has taken up residence on the property for the next two years as

part of a renovation of the Camp Fretard location.

Hospital Relocations and Verizon Copper Retirement

While the new facility at University of Maryland Capitol Region Medical Center (UMCRMC) opened during the last reporting period, the residual effects of closing the old Prince George's Hospital and relocating miles away required a redesign of the current backhaul connectivity. MIEMSS worked with Prince George's County to keep the old Prince George's Hospital microwave connectivity intact until a replacement link was created from the District Heights tower to the Cobb SHA tower. This was critical to keeping the new Capitol Region Hospital, Doctors Hospital, and Laurel Hospital connected to the EMS system.

The University of Maryland Shore Medical Center opened a new facility, replacing the old Dorchester General Hospital located in Cambridge. MIEMSS worked with the new hospital to develop temporary connectivity into the EMS system to allow for a seamless transition from the old location. As part of the CUP project's Phase 3, this temporary connectivity will be bolstered by a high-reliability microwave link.

Delays in the CUP project have made MIEMSS more vulnerable to the planned Verizon Copper Retirement program approved by Maryland's Public Service Commission. This year, the department worked with Verizon to transition Baltimore Washington Medical Center from the legacy radio circuit to a new T1-based circuit. Montgomery General was moved over to a microwave connectivity developed under the CUP project ahead of the Phase 1 final acceptance date. In both cases, MIEMSS

worked to maintain connectivity to our existing systems.

Maryland FiRST: Statewide 700 MHz Radio System

MIEMSS remains an active partner in the Maryland First Responder Interoperable Radio System Team (MFiRST) program. MIEMSS serves as a member of the Radio Control Board, which is responsible for coordinating the operation and maintenance of the Statewide Public Safety Interoperability Radio System. The agency also participates on the state's Radio Control Board's Operations Committee.

MIEMSS has the necessary interfaces to the MFiRST radio system to enable all Maryland jurisdictions to leverage the MFiRST system for medical consultation. These interfaces support field clinicians operating on the MFiRST system, allowing them to obtain medical direction via EMRC. The MFiRST's final phase, in Southern Maryland, was projected to be complete in 2021 but has been delayed due to network reliability concerns with the Motorola design. This final phase is still in progress, with an anticipated completion date in 2023.

While it is expected that MSP aviation communications will migrate completely to the MFiRST system, it will be at least another year before there is statewide coverage for medevac helicopters. MIEMSS continues to support the VHF low-band system to allow MSP aviation to communicate across the state. MIEMSS and MSP ESD successfully promoted the creation and adoption of aviation talkgroups (AVTacs) on MFiRST, which are utilized to create a common gateway between Maryland counties and aviation resources. To date, Talbot, Caroline, Carroll, Cecil, Queen Anne's, Kent, Harford, Allegany, Garrett, Dorchester, Somerset, Washington, Wicomico, and Worcester Counties have adopted the use of the AVTac talkgroups, greatly benefitting the EMS continuum of care. Many other counties are considering or have committed to adopting these talkgroups as the MFiRST system completes its deployment.

Public Safety Interoperability Network (PSInet)

Communications Engineering Services continues to deploy, administer, and maintain the Public Safety Interoperability network (PSInet), a statewide, private IP-based public safety network composed of fiber, microwave, and wireless links that support critical data and voice communications managed by MIEMSS. PSInet is the foundation upon which the EMS communications system upgrade to an IP-based EMS system being implemented through the CUP Project is built, and it is vital to MIEMSS' future operations. Deployed across the state, the network provides connectivity into MSP barracks, MIEMSS regional operating centers, jurisdictional emergency operations centers (EOC), public safety answering points (PSAP), state and jurisdictional health departments, hospitals, and other allied agencies. Applications that currently operate on PSInet in addition to MFiRST include Digital Emergency Medical Services Telephone (DEMSTEL); Central Maryland Area Radio Communications (CMARC); other systems monitoring/controlling

the state's public safety microwave network, and tower infrastructure. In concert with the communication upgrade project, MIEMSS continues its strategic plan to replace older equipment in key locations in support of the Communications Upgrade Project (CUP).

Communications Systems Maintenance and Improvements

While analog technologies have served the EMS communications system and MIEMSS reliably since the early 1990s, most of the critical technology systems supporting this system have become outdated and, correspondingly, increasingly prone to failure. The risk of system failure is further exacerbated by difficulty in securing vendor support for these critical, outdated systems. The Communications Upgrade Project (CUP) will remove many of these vulnerabilities.

While Communications Engineering Services is leveraging newer communications systems such as MFiRST, a large portion of departmental responsibilities and resources involves maintaining or improving current systems to provide the best service possible to EMS clinicians and the public.

MIEMSS continues to expand its network monitoring and alarm monitoring systems to enable staff to be more efficient and to effect system repairs quickly and decisively. Work continues to integrate the MFiRST system alarms into the MIEMSS master alarm system, providing daily insight into maintenance and performance issues that allow rapid identification and diagnosis of system problems. This integration leverages the state's investment in the master alarm system and enables a comprehensive, overall view of MIEMSS, DNR, SHA, and the MFiRST radio infrastructure. This year, the department installed enhanced alarm monitoring at many additional MIEMSS' tower sites.

Communications Engineering Services upgraded numerous microwave power and battery systems throughout the state to ensure reliable backup power for critical systems and established remote control and monitoring capabilities for the power systems and other system components.

MIEMSS has worked with Calvert County to interface their new P25 Radio System's talkgroups into our current and future EMS system, allowing their field clinicians access to EMRC resources using their county-assigned portable and mobile radios. Once the subscriber programming is complete, this new connectivity will be available to their units.

In support of the CUP project, the Towson Fire Headquarters and Hagerstown SHA towers were structurally remediated to allow for the addition of microwave antennas necessary for connectivity to GBMC, St. Joseph, and Meritus Hospitals.

Backup Center

For many years MIEMSS has been searching for a new Backup Center location that would be capable of fully supporting the current Emergency Medical Resource Center (EMRC)

and System Communication (SYSCOM) operations in the event of the primary communications center becoming unusable due to a building infrastructure failure, disaster, or other unplanned events. In April 2022, MIEMSS realized this goal in partnership with the Harford County Department of Emergency Services, who has offered space in their 9-1-1 center to MIEMSS operations. In the coming year, this new location will allow MIEMSS to fully realize the creation of a Backup Center that is geographically diverse from MIEMSS HQ, allowing for a better Continuity of Operations (COOP) plan as we begin to deploy equipment in this new space. Most of the microwave upgrades in Harford County this year were directly targeted to take advantage of this goal.

Challenges

MIEMSS will continue to migrate systems to new, more resilient technologies that enhance services provided to the EMS community. As in past years, none of this year’s successes would be possible without the dedicated staff in Communications Engineering Services and our public safety partners.

In FY 2021, MIEMSS lost critical staff members due to retirement and other job opportunities, leaving three vacancies out of 11 staff members. The loss of any communications staff that responds statewide would be crippling enough, but added to the additional responsibilities required to keep the CUP project moving, it has made this an incredibly difficult year.

Without the dedication of the remaining staff, MIEMSS would not have been able to keep up and make progress in many areas. Of great note this year, as in many years in the past, were the monumental efforts of the department’s Deputy Director, Charles Rollman, who not only performed his duties beyond measure but also filled in as part of the technical staff.

As in years past, the department continues to struggle with meeting an increased workload with a decreased staffing level exacerbated by the inability to attract qualified people. The continuing challenge that we face as we move into the new fiscal year is finding the skilled and dedicated individuals that are necessary to support the EMS communications system.

COMPLIANCE OFFICE

Mission

To ensure the health, safety, and welfare of the public as it relates to the delivery of emergency medical services by Maryland-licensed and certified EMS clinicians. The Compliance Office assists in assuring the quality of patient care by investigating complaints and allegations of prohibited conduct.

The Compliance Office works closely with the EMS Board, the Attorney General’s Office, the Incident Review Committee (IRC), the Peer Review Panel (PRP), and EMS operational program (EMSOP) quality assurance officers statewide. The PRP is a 13-member panel comprised of physicians representing the Maryland Board of Physicians, Maryland Medical Chirurgi-

cal Society, and EMSOP medical directors. All levels of EMS clinicians are also represented on this panel. The PRP reviews complaints, as well as the results of the investigations presented by the Compliance Office, and recommends corrective and disciplinary actions to the EMS Board. The State EMS Medical Director and MIEMSS Executive Director serve as ex-officio members on the PRP.

■ **FY 2022 Compliance Office Activity**

- Provisional applicant background investigations completed 1,963
- Initial and renewal background investigations completed 19,796
- **Total background investigations completed 21,759**
- IRC investigations conducted 65
- IRC complaints forwarded to PRP 32
- Complaints forwarded to EMS Board 32

■ **EMS Board Action**

- Reprimands 6
- Probation 21
- Suspensions 1
- Revocations 2
- Remedial training 4
- Surrenders 0
- Evaluations 0
- Applications denied 0
- Random testing 7
- Case Resolution Conferences 5
- OAH hearings conducted 2
- OAH hearings defaulted 1
- Settlement agreements 2

EDUCATIONAL SUPPORT SERVICES

Mission

To contribute to MIEMSS’ vision of eliminating preventable death and disability by providing to the public essential information on how to recognize an emergency, summon an EMS response, and incorporate injury prevention methods in their daily lives, as well as designing and developing educational programs for EMS clinicians through state-of-the-art technology.

Educational Support Services (ESS) provides education and information to Maryland’s EMS community and the public through various modes of media and communication. The department develops, designs, and produces instructional training modules and informative programs that are distributed statewide.

Print Projects

The department is responsible for the design, photography, and editorial content of the MIEMSS Annual Report, MIEMSS

website, and the *Maryland EMS News* monthly newsletter, which can be downloaded from MIEMSS' website and is posted on Facebook and Twitter. It is also emailed to hospital, pre-hospital, and emergency services personnel, and printed copies are sent to volunteer stations throughout the state. The newsletter keeps EMS personnel in touch with local, state, and national EMS issues. COVID-19-related information has received significant coverage since the start of the pandemic. In FY 2022, *Maryland EMS News* covered other various topics, including:

- COVID-19-specific guidance and EMS response;
- MIEMSS' Licensure System;
- EMS-related legislation during the 2022 Session of the Maryland General Assembly;
- EMS clinician health and wellness;
- Regional EMS events, educational opportunities, and other highlights;
- Adult and pediatric injury prevention news and information; and
- EMS protocol updates and information.

Collaboration with other emergency services partners helps to support the dissemination of information to broader audiences. Departmental staff contributes content to *The Maryland Fire Dispatch* and *The Trumpet*, published by the Maryland State Firemen's Association (MSFA).

Each year, ESS staff produces *The Maryland Medical Protocols for Emergency Medical Services*, in collaboration with the Medical Director's Office, including editing, layout, and design. The complete 2022 protocol manual was printed and made available on MIEMSS' website. The printed pocket version and 5"x7" spiral-bound version of the protocols were also designed and edited by department staff. A copy of the pocket version is distributed to every Maryland EMS clinician statewide.

Media Events and Social Networking

Media Events and Social Networking Media events, press releases, and social networking applications were used during the year to reach target audiences on many EMS-related issues. MIEMSS engages the EMS community and the public through Facebook, Twitter, Instagram, and YouTube. Social media messaging reached thousands of EMS clinicians and members of the public throughout the year. As of June 30, 2022, more than 13,100 users were following MIEMSS' Facebook page and 1,800 users were following its Twitter feed. Posts on Facebook during this period had a total reach of over 615,000, meaning MIEMSS' activity was seen at least that many times by users through news feeds, subscriptions, likes by other people, or shares. Since its late-2019 launch, MIEMSS' Instagram account has amassed more than 750 followers. Across platforms, MIEMSS posted social media messages on various topics of interest to EMS clinicians, including important messages specifically for Maryland clinicians as well as illness and injury prevention messages intended for the public. Information about COVID-19 pandemic updates, as well as safety reminders and

tips were shared on social media throughout the year.

Training Support

In FY 2022, the department produced the EMS Update 2022 training video, required viewing for Maryland EMS clinicians and hospital base station personnel, which included educational content as well as changes and additions to the 2022 EMS protocols. The videos were made available to BLS and ALS clinicians through the MIEMSS' Online Training Center and the MIEMSS YouTube channel. Department staff also produced a version of the training for hospital base station personnel, which was posted to the MIEMSS website and YouTube channel.

Other videos produced by ESS during the past year included the Maryland Fire-Rescue Memorial Foundation annual Line of Duty induction ceremony and the annual memorial service program for the Maryland State Firemen's Association (MSFA) Convention. An EMS Week video message from MIEMSS Executive Director Dr. Ted Delbridge thanked EMS clinicians for their commitment to caring for others and highlighted their hard work during the pandemic. Filming and production of various topics for educational lectures and programs were developed for the MIEMSS On-Line Training Center, including presentations for:

- Extraglottic Airway Management
- EPI Administration
- Albuterol Administration
- EMS Clinician Wellness
- Use of the Pelvic Binder
- Management of Indwelling Ports
- Legal Issues for EMS Clinicians, and
- OB Emergencies.

ESS also produced video updates on COVID-19 and related issues, such as vaccine administration. Several online webinars were edited and made available; topics included:

- The WHY of Seatbelts and Car Seats
- How to Conduct a Car Seat Tolerance Screen
- Slim-Fit Car Seat Demonstration
- Vehicular Heatstroke, and
- Pediatric Stroke.

The MIEMSS Clinician Stipend Financial Assistance Project was also completed by producing a clinician awareness video, various posters, and messaging through social media outlets. Additionally, the EMS Stroke Routing Pilot Study III was highlighted through an instructional video lecture for EMS clinicians.

ESS also assists with conference planning and provides technical and audiovisual support to regional and MIEMSS-sponsored in-person continuing education programs. Department staff designs and generates high-quality printed media, photographs, and video productions. The department contributes a variety of services to MIEMSS' educational programs, which are critical to the continuing education learning process for pre-

hospital and hospital personnel. Staff also provides assistance and support with in-house web conferencing, video conferencing, and teleconferencing.

Maryland EMS Awards

Again, this year, the annual Maryland EMS awards ceremony was postponed. Nominations for the EMS for Children's Right Care When It Counts Awards and the Maryland Stars of Life Awards were collected, collated, and reviewed by a statewide committee to determine the award winners. Award winners were recognized during individual presentations around the state. Dr. Ted Delbridge, EMS Board Chairman Clay Stamp, State EMS Medical Director Dr. Timothy Chizmar, Associate State EMS Medical Director for Pediatrics Dr. Jennifer Anders, and EMS-C Program Director Cyndy Wright-Johnson traveled to various locations to honor those who were chosen for their outstanding efforts in assisting Maryland's citizens.

Outreach and Prevention

ESS provides support, including photography, design, and fabrication for MIEMSS exhibits that disseminate information about the EMS system and topics in injury and illness prevention at both EMS and hospital workshops, conferences, and seminars. In FY 2022, the department collaborated on many injury prevention projects with the Maryland EMS for Children Department, developing and fabricating displays, designing and printing educational materials, and producing videos, including car seat safety and bike safety messages for the public. Weekly social media activities include many injury risk topics and feature state and national resources to be utilized in the local community. An all-ages approach is designed to move Maryland towards the "Zero Death" goals shared with other state agencies. Printed materials, banners, and public service announcements featured Maryland's prehospital and hospital personnel in prevention messages.

Educational Support Services works collaboratively on multiple prevention projects and messages with other state and local government agencies. In FY 2022, the department collaborated on statewide injury prevention initiatives with the Maryland Department of Transportation's Occupant Protection Emphasis Area Team, the Pedestrian/Bicycle Emphasis Area Team, the Impaired Driver Emphasis Area Team, the Maryland Chapter of the American Trauma Society, and the Maryland Committee on Trauma. In partnership with the Maryland Highway Safety Office (MHSO), a page in *Maryland EMS News* has been included to inform EMS clinicians of highway safety and prevention efforts from MHSO's Zero Deaths toolkit and website. Throughout the year, the department works with the Maryland State Firemen's Association and Ladies Auxiliary to distribute health promotion, injury prevention, and mental health awareness resources. In 2022, the annual convention was held in person, with the department preparing posters and signage for the EMSC "Steps to Safety" education for families and clinicians.

EMERGENCY MEDICAL SERVICES FOR CHILDREN

Mission

To provide the leadership, direction, and expertise in the coordination of resources that focus on the unique needs of children and their families in a manner that facilitates the efficient and effective delivery of out-of-hospital, hospital, and restorative care throughout the state. These resources include injury and illness prevention, clinical protocols, standards of care and facility regulation, quality improvement and data analysis initiatives, interagency collaboration, and initial and continuing education for professionals across the continuum of care that will promote the health and well-being of children, youth, and their families in Maryland.

The Emergency Medical Services for Children (EMS for Children) Department is responsible for a multitude of services related to emergency care for children and their families across Maryland, including:

- Coordinating the state Pediatric Emergency Medical Advisory Committee;
- Developing statewide guidelines, regulations, and resources for pediatric care;
- Conducting pediatric emergency care quality assurance and improvement through the Maryland Pediatric Quality Improvement Committee and Data Analysis and Research Team (DART);
- Providing EMS for Children representation at regional and national levels and through interagency collaboration;
- Implementing Pediatric Base Station, Pediatric Trauma, and Pediatric Burn Center regulations and designation;
- Coordinating pediatric education programs and activities for prehospital and hospital professionals with a focus on train-the-trainer and regional EMS and ED conferences;
- Managing state and federal grants related to pediatric emergency care, injury prevention, and EMS for Children research;
- Supporting the Maryland EMSC Family Advisory Network (FAN) through the EMS for Children State Partnership Grant;
- Promoting pediatric injury prevention activities and trainings through Maryland Highway Safety Office grants, Safe Kids Maryland state coalition, and Maryland Risk Watch in partnership with the MSFA Fire & Injury Prevention Committee.

Program Activities

The State Pediatric Emergency Medical Advisory Committee (PEMAC) meets bimonthly and during the past year have met through web-based participation. Committee task forces meet regularly to update documents and procedures for EMS protocols, interfacility transport and transfer, and pediatric facil-

ity designation. PEMAC has five standing subcommittees: Pediatric Protocol Development, Pediatric Education, Pediatric EMS Champions, Pediatric Data & Research, and Family Advisory Network (FAN) Council. Additional committees and workgroup focus on injury prevention and pediatric disaster emergency medicine and preparedness.

Jennifer F. Anders, MD, FAAP, is the Associate State EMS Medical Director for Pediatrics. She serves on MIEMSS' Protocol Review Committee (PRC) revising current medical protocols for EMS clinicians, reviewing new protocols, and recommending modifications founded on evidence-based practices. She also chairs the MIEMSS' Pediatric Quality Improvement Committee (QIC) and the Data Analysis Research Team (DART). One of the functions of the Pediatric QIC is to coordinate the Pediatric Base Station Course for emergency department healthcare teams at Children's National Hospital and Johns Hopkins Children's Center, Maryland's two designated Pediatric Base Stations, which provide statewide coverage for online and offline pediatric medical direction and community education. In 2020, this course was modified to meet the learning needs of pediatric and neonatal transport team members and was recorded to be converted to an online platform. The Pediatric QIC is involved in ongoing QI activities, making recommendations that directly impact protocol development, revision, and advancement, as well as targeted pediatric education at conferences and seminars.

Pediatric DART has four ongoing data projects: 1) pediatric rapid sequence intubation conducted by Maryland State Police and other EMS agencies, in partnership with the Johns Hopkins Hospital and Children's National Hospital; 2) data collected on the pediatric sepsis protocol for EMS clinicians; 3) cardiac arrest occurrence and Cardiac Arrest Registry to Enhance Survival (CARES) outcome reports; and 4) development of a pediatric EMS dashboard of calls and transports. Dr. Anders presented "A Novel Method to Improve Prehospital Pediatric CPR Quality: Simulated Based Assessment" at the National Association of EMS Physicians conference in January 2022 and received the best pediatric research award. Dr. Anders currently chairs the American Academy of Pediatrics PEPP Steering Committee and worked closely with Maryland faculty to plan the 4th edition rollout courses.

In October 2021, Dr. Anders led the expansion of the C4 (Critical Care Coordination Center) to include Pediatric patients – "C4-Pediatrics". C4-Pediatrics provides 24/7 statewide phone access consultation and facilitate the transfer of patients requiring a Pediatric Intensive Care Unit and Pediatric Acute Care Unit. In the first eight months, many hospitals called for assistance in locating a PICU bed for a critically ill child. While fewer hospital EDs are aware C4-Pediatrics will also assist in finding an inpatient pediatric bed for a child that needs to be admitted over night or for a few days. Less than half of Maryland hospitals have inpatient pediatric capabilities in 2022. The Central Advisor Pediatric Physician (CAPP) is a pediatric emergency medicine or a pediatric critical care physician with knowledge of the levels of care available and the support of the C4 Paramedic

Coordinators who have access to the bed availability throughout the state and neighboring states.

Cynthia Wright-Johnson, RN, MSN, is the EMS for Children's director at MIEMSS, leading a team of grant-funded projects and the state pediatric committees and task forces. She represents the National Association of State EMS Officials' (NASEMSO) Pediatric Emergency Care Council as liaison to the American Academy of Pediatrics (AAP) Committee on Pediatric Emergency Medicine. She continues to serve as the NASEMSO representative to the advisory board of the EMSC Innovation and Improvement Center Pediatric Recognition Collaborative. She chairs the Institute for Quality Safety and Injury Prevention (IQSIP) committee for the Maryland Emergency Nurses Association (ENA) and is appointed to the Maryland State Child Fatality Review Committee. Maryland EMS for Children continues to participate in NASEMSO projects that focus on safe transport of children in ambulances through representation on the Safe Transport of Children Committee and the Highway Incident Traffic Committee.

EMS for Children continues to support the Maryland ENA Council, three local ENA chapters, and the western Maryland SIG by providing Certification in Pediatric Emergency Nursing (CPEN) review courses and supporting the wider distribution of ENPC courses.

In recognition of the specialized care required for pediatric emergencies, EMS for Children Day information was shared on social media and nominations for the Right Care When It Counts award were solicited from across the state. Due to response and mitigation to COVID-19 pandemic, the state awards ceremonies for 2022 were held in May and June at local EMS/Fire stations, EMS Operational Program headquarters, and at the EMS Care 2022 Conference. Six children received Right Care Awards and were featured in the July 2022 issue of *Maryland EMS News*.

Maryland EMS for Children State Partnership Grant

MIEMSS has a current EMS for Children State Partnership Grant from the Maternal and Child Health Bureau/Health Resources Services Administration of the US Department of Health and Human Services. These 18 years of consecutive grant funding have focused on the continued integration of pediatric EMS into the Maryland EMS system, using both the federal Maternal Child Health Core Performance Measures and the federal EMS for Children Performance Measures, and supported pediatric education for prehospital and hospital emergency healthcare professionals (see Pediatric and EMS Hospital Education, below).

The grant focuses on three new measures:

1. NEMSIS data reporting statewide which Maryland has achieved with 100% reporting in eMEDS® from all public safety agencies;
2. Creating and supporting Pediatric EMS Champions in each EMS agency, with 25 Champions participating at this time from across all five EMS regions;
3. Promoting pediatric EMS education in both skills and

scenario-based training that is offered at EMS conferences and quarterly through in person workshops and online webinars or Learning Management System continuing education.

The other federal measures remain unchanged and focus on pediatric medical and trauma ED readiness, interfacility transportation, and integration of EMSC at the state and local level. The federal EMSC EMS Survey was conducted in 2022 and requested all EMS Agencies to respond to the EMS performance measures with 100% participation by Maryland EMS Operational Programs. Maryland's grant continues to also support FAN Council activities and pilot QI projects through the Pediatric QIC & DART describe above. The FAN Council annually promotes the "Right Care When it Counts" awards and "Steps to Safety" education programs at the MSFA Convention. This year the FAN Council designed and distributed fifteen Safe Sleep interactive displays to Safe Kids coalitions, partners and the three chapter of Maryland ENA. These displays provide the most current Maryland and national data on SUID deaths (SIDS, suffocation and unsafe sleep environments). The displays were funded by the federal EMSC State Partnership grant from the Maternal Child Health Bureau (MCHB) of Health Resources Services Administration (HRSA). The Safe Sleep campaign has been identified as a priority by the Maryland Child Fatality Review state and local committees.

Pediatric EMS and Hospital Education (programs primarily funded through EMSC SP Grant)

During FY 2022, the Maryland EMS for Children Department provided pediatric course offerings during each of the EMS and emergency nursing educational seminars and conferences held virtually. Additionally, the Maryland EMS for Children Department was able to offer in-person educational content and pediatric displays for EMS Care 2022 and Maryland ENA by the Bay. Topics included obstetrical emergencies, pediatric fatality case reviews, pediatric stroke, child abuse, unrestrained children in vehicular crashes, pediatric cardiac arrest, pediatric sepsis, fireworks injuries in children and COVID-19 in children. In October 2021, the department sponsored a Certification in Pediatric Emergency Nursing review course 'live' through a virtual broadcast. Nurses from six states participated in this two-day course, which may be used for both continuing education and certification exam preparation.

The Maryland EMS for Children Department continues to offer the revised Pediatric Education for Prehospital Professionals Fourth Edition (PEPP-4) hybrid course for both ALS and BLS clinicians. The PEPP-4 hybrid course was offered twice during FY22 – once as a preconference offering for the Winterfest EMS conference and again as a regional course offering in Central Maryland. Course participants enjoy the PEPP-4 course's hands-on skills and scenarios/simulations components and report increased pediatric skills confidence after taking the course.

The Maryland EMS for Children Department continues to work closely with the EMS operational programs' Pediatric EMS Champions. The Pediatric EMS Champions returned to an in-person/virtual forum schedule in FY22. During the first in-person forum since the start of the COVID-19 pandemic, best practices on pediatric manikins and teaching resources were reviewed as well as instructor information to assist with the rollout of pediatric extraglottic airway devices. Virtual forums provided the opportunity for ongoing work to be shared as well as CE lectures on pediatric non-transport and pediatric asthma. The Pediatric EMS Champions were able to meet in-person again as part of the EMS Care 2022 Pre-Conference offerings to learn about Pediatric Termination of Resuscitation, Death Notification as well as content on EMS clinician wellness and resilience. The second half of the preconference allowed the Champions to write and pilot pediatric clinical scenarios with specific pediatric skill tasks. The content developed will move Maryland closer to meeting the federal EMSC performance measures and provide scripted training drills for local implementation.

Child Passenger Safety and Occupant Protection Health Care Project

The Child Passenger Safety (CPS) and Occupant Protection (OP) Health Care project promotes buckling up and safe travel for all ages. It is in its 22nd year of funding from the Maryland Department of Transportation's (MDOT) Highway Safety Office (MHSO). The project uses many strategies to promote CPS/OP best practices including training for Maryland healthcare professionals and CPS technicians, social media on MIEMSS' Facebook and Twitter accounts, development and distribution of educational materials, and assistance at the national CPS certification courses and at car seat checks to keep CPS Technicians certification current. While the rates of injury and death among child passengers due to motor vehicle crashes have decreased, there are high-risk groups, as much as 1/3 of deaths to children in MVCs are to children completely unrestrained, and no death due to traffic or vehicles is acceptable. Grant activities this year slowly started to include some in-person events while keeping up most of the online activities. Some highlights of this project include:

- Provided 168 car seats to EMS agencies, hospitals (EDs and Maternal-Child Units) and Safe Kids-Maryland coalitions and community partner for them to give to local families in need.
- Distributed over 11,000 educational items on CPS and OP.
- Conducted 14 trainings (in-person and live) for 185 healthcare clinicians and other safety advocates and health educators.
- Hosting an in person workshop focused on child passenger safety for hospital newborn nursery and NICU nurses. This workshop had participation of 22 Maryland hospitals (most of the hospitals who have a newborn

nursery). The workshop was held twice (four hour sessions) with didactic, hands on skills, and scenario based discussions on newly born and infants with special needs.

- A pilot project started in 2022 involved providing in person trainings for EMS supervisors on how to use an all-in-one car seat provided by the grant for non-emergency transport of children who are not patients in vehicles other than ambulances. Four EMSOP are participating and three of the trainings distributed 12 car seats during May and June. The fourth will occur in August.
- Participating in both virtual and in person (9) car seat “checks” for families and to provide mentorship to new and renewing CPST.
- Participating in 10 of the national Child Passenger Safety Technician course to 65 students.
- Coordinated one live webinar for 38, and created, videotaped and released on YouTube 4 other video-trainings.
- Conducted 9 in-person exhibits and 2 online “exhibits” at/for professional EMS and ED conferences.
- Heatstroke prevention/temperature displays were lent out for 24 events.
- Promoted CPS and OP via social media: 146 messages on CPS and 319 messages on other traffic safety topics using the platforms of Facebook, Twitter, and Instagram.
- Gave or loaned 13 special needs car seats to appropriate agencies/patients and consulted on 13 cases.
- Developed and distributed new stand up banners, two different laminated guides, heatstroke magnet signs, and a buckle up photomontage. Had two items translated into Spanish.

Contact CPS@miemss.org for more information.

Bike Helmet Safety Grant

The Bike Helmet Safety project completed a fifth year of funding from the Maryland Department of Transportation’s (MDOT) Maryland Highway Safety Office (MHSO). The project has three focuses: 1) to provide bike helmets to children, youth, and adults through partnerships with the Safe Kids local coalitions and community partners; 2) develop and disseminate bike safety messages for print and social media for distribution across the state; and 3) provide in-person training of professionals in healthcare, injury prevention, and education on the correct use and fitting of bike helmets. During this year, the project:

- Distributed 1,049 bike helmets for children, youth and parents through local Safe Kids partners as well as trauma coordinators and pediatric champions across the state (total helmet distribution for the five years is over 4,100);
- Developed a new poster that teaches children, youth

and families the parts of the brain and their functions which are protected when a helmet is worn correctly;

- Distribute “Bike Helmet Fit Test”, “Be Seen & Be Safe”, and Brain Anatomy posters along with bike safety checklist cards & safety reminder magnets (combining helmet and rider visibility safety) across Maryland;
- Distributed the additional table top “Be Seen & Be Safe” and “Brain Function” signs for displays to new partners;
- Promotion of safety messages through online (YouTube) public service announcements on bike helmet fit and safety, monthly Bike Safety Facebook safety messages, and quarterly articles in *Maryland EMS News*;
- Participation virtually in the MHSO bimonthly Pedestrian Bike Area Emphasis Team and attended the MHSO Summit in person on April 18, 2022;
- Provided in-person training at the Maryland Emergency Nurses Association annual conference, the Public Fire & Life Safety Educator Seminar at MFRI, and at the MSFA convention;
- Participated in the interactive displays with Safe Kids Maryland as part of the “Steps to Safety” project at the MSFA Convention reaching children, youth, families and injury prevention advocates from local EMS, Fire & Rescue companies.

Contact bikesafety@miemss.org for more information and to request materials.

Additional Injury Prevention and Life Safety Programs

Maryland EMS for Children staff team members participate in national, state, and local Safe Kids coalitions meetings and webinars. Safe Kids Maryland also maintains membership on the board of the Maryland division of the American Trauma Society, which met virtually in 2020-2021. Ongoing participation in Maryland State ENA, Partnership for a Safer Maryland, and the Maryland Trauma Center Network (TraumaNet) have facilitated distribution of resources and educational materials from both MHSO grants reaching out to rural, suburban, and urban areas in Maryland. These collaborations provide a consistent flow of information to MIEMSS’ five regional advisory councils and PEMAC on injury prevention resources and initiatives.

The Maryland RISK WATCH community, which has been in operation for 25 years, is led by EMS for Children in collaboration with the Office of State Fire Marshal and the MSFA Fire Prevention and Life Safety Committee. Other partners in RISK WATCH include the Cecil County Department of Emergency Services, Johns Hopkins Pediatric Emergency Department, TidalHealth Peninsula Regional, the Maryland Poison Center, and the American Trauma Society – Maryland Division (ATS). Three injury prevention presentations were included in the MSFA Convention educational workshops: Child Passenger Safety updates and implications for EMS; Bike Safety- Making a Difference in Your Community, and Safe Sleep Environment – Take the Steps to Prevent SUID.

MIEMSS is the lead agency for the Safe Kids Maryland state coalition that is coordinated by the EMS for Children Department. In FY 2022, Safe Kids Maryland hosted two virtual statewide educational meetings with seven local coalitions and eight community partners. In partnership with the MSFA, Office of State Fire Marshal, and Maryland Fire and Rescue Institute EMSC supported the March Public Fire & Life Safety Educators Symposium with a hybrid (in person and YouTube broadcast) reaching over 100 participants. Throughout the year, EMSC and Safe Kids Maryland promote educational displays and social media information to raise awareness of the risk to children if left in cars. There are now five outdoor thermometer display kits for use throughout the state that provide visual education on the dangers of leaving children in cars. Social media posts extend the reach of these displays. The CPS project coordinates the schedule for these displays and updates printed materials regularly. Johns Hopkins Pediatric Emergency Department, TidalHealth Peninsula Regional, the Maryland Poison Center, and the American Trauma Society – Maryland Division (ATS). Pre-recorded injury prevention presentations were provided on both Child Passenger Safety and Medication Safety for the virtual 2021 MSFA Convention in June.

Maryland EMS for Children is the lead agency for the Safe Kids Maryland state coalition. In FY 2021, Safe Kids Maryland hosted two virtual statewide educational meetings with seven local coalitions and eight community partners. In partnership with the MSFA, Office of State Fire Marshal, and Maryland Fire and Rescue Institute EMSC supported the March Public Fire & Life Safety Educators Symposium with a half-day live broadcast of three presentations. Throughout the year, EMSC and Safe Kids Maryland promote educational displays and social media information to raise awareness of the risk to children if left in cars. There are now five outdoor thermometer display kits for use throughout the state that provide visual education on the dangers of leaving children in cars and can be seen at a distance. Social media posts extend the reach of these displays. The CPS project coordinates the schedule for these displays and updates printed materials regularly.

EMERGENCY PREPAREDNESS AND OPERATIONS

Mission

To provide leadership and support to the statewide EMS system by cultivating strong relationships with system stakeholders, ensuring that the system is effectively prepared and responding to the prehospital medical needs of the residents and visitors of Maryland.

The EMS Preparedness and Operations Division includes EMRC/SYSCOM, Field Operations, Regional Coordination, the Critical Care Coordination Center (C4), and Critical Incident Stress Management.

Field Operations

Preparedness Planning. Emergency operations personnel began FY 2022 by participating in many emergency and disaster preparedness efforts, including the following:

- Participated in and co-chaired the Maryland Active Assailant Interagency Workgroup (AAIWG) and subcommittees;
- AAIWG hosted Texas A&M Engineering Extension Service (TEEX) Active Shooter (PER-353) three-day multidiscipline/multimedia training program;
- National Disaster Medical System patient reception preparedness;
- Critical incident stress management team development and coordination;
- Healthcare facility evacuation preparedness and exercises;
- CHEMPACK program maintenance, awareness, and operations;
- High-consequence infectious disease (HCID) planning and preparedness;
- Continued to development of a MIEMSS infectious disease application for Android and iOS platforms. This application will provide up-to-date information on infectious disease and other information via phones and tablets;
- Participated in the State Incident Management Team (IMT) meetings and training sessions;
- Coordinated agency Continuity of Operation (COOP) planning;
- Participated in COOP operations during the COVID-19 pandemic and transition of most staff to telework;
- Management of the EMS portion of the ASPR/HHS Hospital Preparedness Program (HPP) grant programs and funding;
- Supported EMS Care Conference in Ocean City;
- Participated in the Maryland Department of Emergency Management Association in-person statewide EM conference;
- Staff attendance at Texas A&M Engineering Extension Service (TEEX) Sports and Special Event Risk Management and Assessment (January 2022);
- Participated in the yearly review of the State of Maryland's Threat & Hazard Identification and Risk Assessment (THIRA)/Stakeholder Preparedness Review (SPR) (November 2021); and
- Participated in supporting and assisting agencies in a walk-through of where the repatriation service area would be located at BWI. (September 2021).

Emergency operations staffing and programs are supported by HPP grant funds from the Maryland Department of Health with funds from the Hospital Preparedness Program provided by the Assistant Secretary for Preparedness and Response, US Health and Human Services.

Emergency Response. The focus of Emergency Operations personnel and most MIEMSS staff redirected to focus on responding to the COVID-19 pandemic beginning in February/March 2020. Emergency Operations staff assisted in coordination of the overall MIEMSS response in support of the statewide EMS system. Emergency Operations-related activities included:

- Development of an ICS structure and daily incident action planning process to organize MIEMSS response activities;
- Maintained daily situational awareness through frequent communications with federal, state, and local stakeholders;
- Received, stored, allocated, and dispersed PPE for public safety and commercial EMS operational programs. PPE from the Strategic National Stockpile and from state purchases was received by MIEMSS via MDH and distributed multiple times;
- Assisted EMS/Fire personnel with COVID-19 testing by providing access to test kits when requested;
- Supported EMS transportation of patients from skilled nursing facilities experiencing COVID-19 outbreaks;
- Coordinated and maintained state-procured ALS ambulances, as well as an ambulance strike team, maintained in a 24/7 state of readiness, for part of the year. In April, ALS ambulances were procured to provide on-site medical coverage at FEMA mobile and fixed vaccination sites;
- MIEMSS Field Operations Support Team (FOST) personnel provided on-site support to health and medical task forces that supported skilled nursing facilities heavily impacted by the pandemic;
- MIEMSS coordinated a joint project with MDHBHA to provide crisis mental health support to personnel working in skilled nursing and other long-term care facilities. FOST personnel provided on-site logistical support for virtual training sessions;
- Collaborated with the International Critical Incident Stress Foundation to coordinate virtual wellness training for state personnel. These sessions focused on self-care, resiliency, and stress management;
- Operated vaccination clinics for critical state workers and public safety personnel;

- Operated vaccination clinics in support of the Port of Baltimore and the Maritime Community by vaccinating port workers and ships' crews;
- MIEMSS Emergency Operations and Regional programs staff participated in multiple planning efforts preparing for the Presidential Inauguration. On Inauguration Day, MIEMSS personnel functioned in a liaison role in the DC Fire/EMS Medical Communications Center;
- MIEMSS Emergency Operations personnel, in response to Hurricane Isaias, participated in twice-daily preparedness/weather calls. MIEMSS and other state agencies also provided virtual staffing for the State Emergency Operations Center.

Regional Coordination

Regional Coordination. MIEMSS Regional Offices are geographically dispersed throughout the state, staffed by regional coordinators and administrative staff. Each office is responsible for monitoring the operation of their assigned region of the statewide EMS system. They serve as technical experts to EMS jurisdictions, hospitals, and other system partners on EMS systems coordination and development. Each regional coordinator works with jurisdictional EMS programs to ensure efficient and effective emergency care is available at all times.

Regional EMS Advisory Councils. By statute, each region of the statewide EMS system has a regional EMS advisory council tasked with advising MIEMSS on EMS function within each particular region. Each council provides a forum for regional coordination of the EMS system among neighboring jurisdictions, hospitals, emergency management personnel, public safety answering points, local health departments, and other EMS system partners. The councils collaborate on matters related to regional EMS conferences, EMS clinician training, quality improvement, emergency preparedness and response, and mutual aid activities.

Prehospital EMS Performance Improvement Initiatives. The Regional Programs Division coordinators serve as the lead for a number of systemic prehospital EMS performance improvement initiatives. During FY 2022, work continued on the following initiatives:

- *eMEDS®/CRISP Integration Project.* This project

MIEMSS Grant Disbursements (FY 2022) by Region

	Cardiac Devices Grant for Fiscal Year 2022	ALS Training Funds	Emergency Dispatch Programs	Totals By Region
Region I	\$57,714.00	\$28,000.00	\$0.00	\$85,714.00
Region II	\$37,687.00	\$28,000.00	\$26,501.00	\$92,188.00
Region III	\$117,540.00	\$98,000.00	\$2,500.00	\$218,040.00
Region IV	\$112,640.00	\$67,998.00	\$13,490.00	\$194,128.00
Region V	\$99,217.00	\$78,000.00	\$7,156.00	\$184,373.00
Total	\$424,798.00	\$299,998.00	\$49,647.00	\$774,443.00



provides a bi-directional data linkage between eMEDS[®] and the Chesapeake Regional Information System for our Patients (CRISP), the State's designated health information exchange. This data linkage has provided a number of products to EMS system partners, including hospital staff access to prehospital care summaries, notification to EMS jurisdictions of exposure to certain infectious diseases, and the ability for EMS quality assurance officers to review an EMS patient's hospital outcome. Work is underway to expand the data elements being transferred to provide better patient care coordination.

- *eMEDS[®]/ESSENCE Integration Project.* This project provides unidirectional data linkage between eMEDS[®] and the Electronic Surveillance System for the Early Notification of Community-Based Epidemics (ESSENCE), the State's syndromic surveillance system. This system has allowed the Maryland Department of Health's emergency preparedness epidemiology staff access to Maryland's EMS data to identify emerging trends in infectious diseases. During the past year, the project has expanded to include additional data elements.

Critical Care Coordination Center (C4). The Region I/II office played an instrumental role in continuing to operate the Maryland Critical Care Coordination Center (C4). C4 was initiated at MIEMSS' Emergency Medical Resource Center (EMRC)

in December 2020, as the winter 2020-2021 COVID-19 surge was escalating. It is staffed 24/7 by a paramedic who is designated as a C4 Coordinator, a Central Intensivist Physicians (CIP), and a Central Advisor Pediatric Physicians (CAAP). The C4 on-duty team monitors the availability of critical care resources throughout Maryland, receives calls from referring clinicians, provide consultative guidance when appropriate, matches patient needs to available critical care resources, and facilitates transfer of patient knowledge between the referring physician and the receiving one(s).

The C4 Coordinator is responsible for monitoring pediatric, critical care, and specialty care beds through the statewide facility reporting database, the data feed from the Chesapeake Regional Information System for our Patients (CRISP), and maintaining periodic contact with hospital intensive care units and health system transfer/coordination centers. The Critical Care Coordinator receives the calls from referring centers and collects necessary patient demographic information as well as an overview of the clinical situation.

Once a call is received from a referring facility, the C4 Coordinators bring together the referring clinician and the on-duty CIP or CAPP for each clinical case. The CIP or CAAP provides clinical guidance that may suffice to help the referring clinician manage the patient in a way that obviates the need for transfer. When transfer is necessary, the CIP or CAPP identifies the patient's care needs and, together with the C4 Coordina-

tor, identifies available resources that are the most proximate to the referring facility. Once the C4 Coordinator identifies an acceptable receiving facility, the CIP or CAAP confers with the accepting physician to ensure that relevant clinical information is conveyed.

From November 30, 2020, through July 2022, the C4 managed nearly 3,200 calls regarding critical care patients. Approximately 64% of the calls resulted in C4 facilitation of transfer to a critical care or specialty bed in a different facility. Thirty-five percent (35%) of the consults resulted in CIPs' delivery of guidance, allowing the patient to be cared for by the referring facility with no need for immediate relocation. Sixty-two percent (62%) of patients were unrelated to COVID-19, and most had typical critical care needs that would occur regardless of a viral pandemic. Every hospital in Maryland has been, at one time or another, a referring facility and an accepting facility. This provides evidence to the effectiveness of C4 in facilitating movement of patients to facilities that match their needs. The result is optimal utilization of available resources and, in many cases, caring for people closer to their homes.

C4 calls have come from hospitals outside of Maryland while, alternately, some Maryland patients have been referred to out-of-state hospitals when necessary in-state resources were not available. Patients have been transferred to and from Washington, DC, Pennsylvania, West Virginia, Virginia, and Delaware.

C4 continues to serve an important function for facilitating the most appropriate critical care for emergency department and hospitalized patients in Maryland. It has proven effective in freeing clinicians to continue to provide necessary care, obviating the need for many would-be transfers, identifying appropriate critical care resources to match patients' needs, and distributing patients more optimally within Maryland's health care system.

Emergency Preparedness and Operations – Field Operations. MIEMSS EMS Preparedness and Operations personnel were actively engaged in the State's response to the COVID-19 pandemic, with several serving in interagency coordinating roles and providing crucial data, including hospital capacity data, to support the State's response. EMS Preparedness and Operations Staff provided COVID-19 testing kits throughout the state, testing EMS clinicians who were symptomatic for COVID-19, or who had a COVID-19 exposure, and field operations personnel were heavily involved in the distribution of personal protective equipment (PPE) to EMS jurisdictions throughout the state. EMS Preparedness and Operations staff also served as members of the State Incident Management Team and MIEMSS Field Operations Support Team, supporting on-scene deployments at significant incidents. (See page 15 for EMS Preparedness and Operations – Field Operations statistics by region.)

Grant Programs. The EMS Preparedness and Operations Division work closely with the SEMSAC Regional Affairs Committee and Regional EMS Advisory Councils to administer a statewide grants program that provides funding directly to

jurisdictional EMS operational programs and to represent EMS and MIEMSS on entities that coordinate funding priorities for Maryland. Grant programs have included the Hospital Preparedness Program and the State Homeland Security Grant Program. Regional coordinators also work on MIEMSS-funded grant programs that provide funds for EMS clinician training programs to support initial and continuing education and the purchase of automated external defibrillators.

Research. The EMS Preparedness and Operations division is actively engaged in EMS research, working on projects related to behavioral health, cardiac arrest management, and patient safety.

Critical Incident Stress Management Mission

To offer crisis support services to EMS clinicians, firefighters, law enforcement officers, dispatchers, and other emergency services personnel involved in stressful emergency incidents, and to help accelerate recovery of those individuals exhibiting symptoms of severe stress reaction.

The Maryland Critical Incident Stress Management (CISM) program offers education, defusings, and debriefings conducted by a statewide team of trained volunteers. The team consists of volunteer doctoral- or master-level psychosocial clinicians and emergency services personnel as well as fire/rescue/law enforcement peer-support individuals trained in critical incident stress management. Volunteer regional coordinators are responsible for specific geographic areas of the state and serve as points of contact, through local 9-1-1 centers and EMRC/SYSCOM, for critical incident stress management. In addition to coordination of the state CISM team, MIEMSS works closely with local CISM/peer-support teams and the International Critical Incident Stress Foundation to improve capabilities throughout the state.

In FY 2022, MIEMSS sponsored a three-day CISM course, which was held as a preconference offering at the annual EMS Care Conference in Ocean City.

During the 2022 legislative session, a Peer Support Bill was passed and signed by the governor. The Bill (SB 446) provides confidentiality protection for peer support team activities as well as other provisions. The new law also requires the Behavioral Health Administration, in consultation with MIEMSS, to study and provide a report on specified items for peer support teams. MIEMSS personnel and members of first responder health and wellness workgroup will assist with this study.

EMRC/SYSCOM Mission

The Maryland EMS Communications Center is a statewide coordination and operation center for Maryland's EMS system composed of two integrated components, Systems Communications (SYSCOM) and the Emergency Medical Resource Center (EMRC), which function 24 hours, 365 days a year.

Systems Communications (SYSCOM) at MIEMSS receives requests and coordinates helicopter resources for medevac missions. The Maryland State Police Aviation Command (MSPAC) Operational Control Center is located within SYSCOM, and the MIEMSS SYSCOM staff coordinate missions with MSPAC Duty Officers involving medevac, search and rescue, law enforcement, homeland security, and disaster assessment.

The Emergency Medical Resource Center (EMRC) has a threefold mission:

1. Provide communications linkages and facilitate medical consultations between prehospital EMS clinicians and emergency departments, trauma centers, and specialty centers;
2. Maintain and share situational awareness of the activities, capabilities, and capacities of the prehospital system and hospitals;
3. Provide initial alerting and coordination of resources and the distribution of patients during major medical incidents.

In FY 2022, the EMRC handled 174,407 telephone and radio calls. Of these calls, 171,791 were communications involving administrative/operational support issues, single patients, or incidents with multiple patients, while 13,156 of these calls involved online medical direction. SYSCOM handled 23,874 telephone calls and 11,937 radio calls. Of these, the majority (31,810 calls) were related to requests for medevac helicopters.

EMRC/SYSCOM staff also monitors EMS system activity, so as to alert key MIEMSS staff of significant or extraordinary major medical incidents that may require MIEMSS support and response.

GOVERNMENT AFFAIRS

Mission

The MIEMSS Office of Government Affairs is the agency's liaison with the Executive and Legislative branches of Maryland government and helps develop effective statutory and regulatory approaches and solutions to a variety of prehospital emergency and healthcare issues. MIEMSS works on proposed legislation that affects all the various components of the statewide EMS system, the emergency care system, and Maryland's healthcare system as a whole. MIEMSS partners with EMS clinicians, physicians, nurses, hospitals, and other healthcare providers to ensure that EMS system issues are accounted for in legislation considered by the Maryland General Assembly.

The 2022 Session of the Maryland General Assembly passed the several bills important to Maryland's EMS System.

- The ability of Maryland Paramedics to administer influenza and COVID-19 immunizations as part of a public health outreach conducted by a health department or hospital/hospital system was extended to January 1,

2025. From the time the COVID-19 vaccine became available (early 2021) through September 1, 2021, EMS clinicians administered over 80,000 vaccinations to members of the general public, and an additional 21,000 vaccinations to State, county, and local government employees. Given the uncertain trajectory of COVID-19 and annual surge of seasonal influenza, EMS may be needed to continue to administer vaccinations and boosters to the general public as part of public health efforts, and the new law authorizes Paramedics to continue to provide these inoculations until 2025.

- Significant changes in Medicaid reimbursement for EMS will occur in FY 2023, when Medicaid payment to EMS for transportation and medical services will increase from \$100 to \$150. For the first time, Medicaid will also reimburse EMS for treatment provided to Medicaid patients who are not transported to a hospital and will also reimburse for transport of a low-acuity patient to urgent care services. Finally, Medicaid will begin reimbursing EMS for Mobile Integrated Health services provided to a Medicaid recipient in an amount that is at least \$150 per interaction.
- Confidentiality protections were increased for peer counseling programs for fire, rescue, and EMS personnel through a new law that prohibits disclosure of written or oral communications regarding a peer counseling session by a peer support specialist or a peer support participant. The Behavioral Health Administration at the Maryland Department of Health, in consultation with MIEMSS, will report to the Legislature by October 1, 2024, on best practices and professional standards for a peer support counseling program.
- As of July 1, 2022, EMTs, CRTs, and Paramedics are authorized by law to offer an opioid overdose-reversal drug to an individual who received treatment for a nonfatal drug overdose or was evaluated by a crisis evaluation team. The Maryland Department of Health is required to purchase and provide opioid overdose reversal drugs to EMS clinicians and other health care providers who are required to offer them.
- MIEMSS was tasked to develop a report on hospital interfacility transport of emergency and nonemergency Medicaid patients, including the capacity under the current referral process, response time to referral requests, costs under the current system, and recommendations for improvements. The report will be submitted to the Legislature in December 2022.

HEALTH CARE FACILITIES AND SPECIAL PROGRAMS

Office of Hospital Programs

Mission

To implement the designation and verification processes for trauma and specialty referral centers, provide continuing evaluation of these centers for compliance with the regulations and standards in COMAR 30.08 et seq., and ensure ongoing quality monitoring of the trauma/specialty care system.

Trauma System

The Maryland trauma system is regionalized and tiered, which ensures prompt and appropriate care of the trauma patient throughout Maryland. A complete list of facilities within the Maryland trauma system, including out-of-state hospitals that receive Maryland trauma patients, appears on page 32.

Trauma Centers

Under Code of Maryland Regulations (COMAR) 30.08.05, MIEMSS is responsible for oversight of the Maryland trauma system, the foundation of which is comprised of the nine Maryland-designated adult trauma centers and five categories of specialty referral centers: pediatric trauma, adult and pediatric burn, neurotrauma, eye, and hand/upper extremity.

Adult trauma centers are designated at one of four levels of care (Primary Adult Resource Center, Level I, Level II, and Level III), which provides for the appropriate resources necessary to care for injured and ill patients across the state. Memorandums of understanding are in place with three out-of-state hospitals (MedStar Washington Hospital Center, Children's National Hospital, and ChristianaCare) to facilitate trauma services for injured patients requiring a higher level of care in outlying areas of the state.

Since 2015, all Maryland adult and pediatric trauma centers submit data to the National Trauma Data Bank (NTDB), which assists the centers in benchmarking their trauma center with other centers around the country. MIEMSS works with each Maryland trauma center and the National Trauma Data Bank (NTDB) submitted data to provide a statewide yearly comparison of quality between Maryland trauma centers and National trauma centers.

The Maryland Trauma Quality Improvement Committee (TQIC) is comprised of trauma program managers and directors; trauma performance improvement staff; trauma registrars; and injury prevention and education staff, and uses a trauma quality scorecard to review, monitor, and trend statewide compliance with these quality metrics:

- Emergency department documentation of patient's temperature;
- Emergency department documentation of patient's Glasgow Coma Scale;
- Emergency department documentation of patient's pain

assessment;

- Hourly patient vital sign documentation;
- The patient required reintubation within 24 hours of extubation;
- The patient had an unplanned visit to the intensive care unit;
- The patient had an unplanned visit to the operating room;
- Antibiotic administration within one hour of arrival, excluding penetrating trauma;
- Antibiotic administration within one hour of arrival, including penetrating trauma;
- Anticoagulant reversal administration within two hours of arrival when found to be on anticoagulants;
- Trauma bypass hours per month.

In FY 2022, we worked with ESO Solutions, Inc., to successfully move to the GEN6 Trauma Registry platform for the Trauma, Eye Trauma, and Hand and Upper Extremity Trauma Registries. We continue to link EMS documents to the patient's Trauma Registry documentation.

The Maryland Burn Collaborative continues to meet to focus on burn data submission, standard audit indicators, and performance improvement. A Maryland burn center scorecard is in place to monitor and trend statewide compliance with the following burn quality indicators:

- Burn Total Body Surface (TBSA) greater than 10% of patients admitted within six hours from the scene;
- Burn TBSA greater than 10% of patients admitted within six hours from interhospital transfer;
- Greater than 10% TBSA first temperature within 30 minutes of arrival;
- First temperature within 30 minutes of arrival at the hospital;
- Deaths less than 10% TBSA.

Designated Stroke Centers

Maryland's statewide regional system approach to stroke care continues to evolve as new literature and research findings on stroke care are published. In FY 2022, the Stroke Quality Improvement Committee (Stroke QIC) comprised of the stroke program coordinators and stroke program medical directors continued their focus on ongoing initiatives for improving stroke care in Maryland. In FY 2022, the revised and updated Primary Stroke Center (PSC) and Comprehensive Stroke Center (CSC) COMAR Regulations were promulgated and enacted. Two additional Stroke Center designations the Acute Stroke Ready Hospital Center (ASRHC) and the Thrombectomy-Capable Primary Stroke Center (TCPSC) were promulgated and enacted, thus improving the regional system of care approach. All stroke centers are re-designated every five years. In FY 2022, three (3) PSCs achieved initial designation as a TCPSC, and 21 PSCs achieved re-designation status. Currently, Maryland has designated 33 Primary Stroke Centers, three (3) Comprehensive

Stroke Core Measures (5-Year Comparison)

Core Measure	CY 2017	CY 2018	CY 2019	CY 2020	CY 2021
Percent of ischemic stroke patients who arrive at the hospital within 2 hours of time last known well and for whom IV t-PA is initiated within 3 hours of time last known well	90.7%	93.2%	93.3%	92.7%	91.8%
Percent of patients with ischemic stroke or TIA who receive anti-thrombotic therapy by the end of hospital day two	98.8%	98.6%	98.2%	98.3%	97.7%
Percent of patients with an ischemic stroke, or hemorrhagic stroke, who receive VTE prophylaxis the day of or the day after hospital admission	97.9%	98.2%	98.0%	97.5%	97.3%
Percent of patients with an ischemic stroke or TIA prescribed anti-thrombotic therapy at discharge	99.5%	99.5%	99.6%	99.7%	99.4%
Percent of patients with an ischemic stroke or TIA with atrial fibrillation/flutter discharged on anticoagulation therapy	97.3%	98.2%	97.7%	98.9%	97.8%
Percent of patients with ischemic or hemorrhagic stroke, or TIA with a history of smoking cigarettes, who are, or whose caregivers are, given smoking cessation advice or counseling during hospital stay	99.4%	99.0%	99.0%	99.1%	98.6%
Percent of ischemic stroke or TIA patients with a cholesterol LDL level=100, or LDL not measured, or on cholesterol-reducer prior to admission who are discharged on statin medication	98.8%	98.5%	99.1%	99.0%	99.0%
Percent of stroke patients who undergo screening for dysphagia (difficulty swallowing) with an evidence-based bedside testing protocol approved by the hospital before being given any food, fluids, or medication by mouth	90.7%	89.1%	89.0%	91.0%	89.8%
Percent of patients with stroke or TIA, or their caregivers, who were given education and/or educational materials during the hospital stay addressing all of the following: personal risk factors for stroke, warning signs for stroke, activation of emergency medical system, the need for follow-up after discharge, and medications prescribed	97.5%	97.5%	96.9%	96.7%	96.8%
Percent of patients with stroke who were assessed for rehabilitation services	99.5%	99.3%	99.1%	99.5%	99.4%
<p><i>Source: Get With the Guidelines-Stroke Registry</i></p> <p>IV t-PA = Intravenous Tissue Plasminogen Activator VTE = Venous Thromboembolism LDL = Low Density Lipoprotein (bad cholesterol) TIA = Transient Ischemic Attack</p>					

Stroke Centers, and three (3) Thrombectomy-Capable Primary Stroke Centers.

Each stroke center submits data monthly to the American Heart Association's (AHA) Get with the Guidelines® (GWTG) – Stroke registry. MIEMSS accesses the registry each month and monitors for compliance with the core performance measures for standards of care established by the AHA and American Stroke Association (ASA) (see above). MIEMSS utilizes this data to

benchmark Maryland's compliance rate with the core performance measures to national compliance rates, as compliance has been shown to improve patient outcomes. The annual state aggregate data for CY 2021 revealed Maryland had a compliance rate of 91% or greater for each of the core performance measures, significantly higher than the AHA/ASA minimal compliance rate of 80%.

The stroke centers use GWTG data to support changes to

their stroke alert protocols, improve their response times, and to share best practices and processes with each other. In FY 2022, stroke centers continued their efforts to improve door-to-intravenous tissue plasminogen activator (IV t-PA) times utilizing GWTG data. It has been well established that the sooner a patient is treated with the clot-busting fibrinolytic t-PA, the better their outcome. The AHA/ASA Target Stroke program has set a new minimal compliance rate of 75% of stroke patients who are eligible for t-PA to receive the drug within 60 minutes from time of hospital arrival (“door”). For CY 2021, Maryland’s median door-to-PA time was 45 minutes. Additionally, 84.9% % of all acute ischemic stroke patients eligible to receive t-PA had a door-to-t-PA time of 60 minutes or less.

Perinatal Referral Centers

In Maryland, there are 12 designated Level III and two designated Level IV perinatal referral centers. All perinatal referral centers are re-designated every five years. The re-designation process began again in December 2020 and is ongoing.

Hospitals participating in the Maryland perinatal system submit patient care data to the Maryland Department of Health (MDH) and MIEMSS, as appropriate, for system and quality management. All Level III and Level IV perinatal referral centers submit an annual perinatal indicator report that provides statistics beyond mortality data and focuses on striving for clinical excellence, patient safety, and reliability with zero preventable adverse outcomes. Database elements and indicators include variables related to maternal and infant health. The MIEMSS Perinatal Advisory Committee uses this database to identify areas common to all centers that indicate a need for improvement, as well as to highlight and share best practices.

The Vermont Oxford Network (VON) is a collaborative

comprised of neonatal specialty care hospitals and medical professionals that participate in a coordinated program of research, education, and quality improvement initiatives. VON maintains and analyzes data on the care and outcome of very low-birth-weight infants and infants meeting other special criteria. The system provides each participating center with the information necessary to conduct quality improvement projects and to benchmark their data to data from all centers in the network. MIEMSS has entered into an agreement with VON to develop the Maryland State Group Reporting Service, a comprehensive reporting option that allows Level III and Level IV perinatal referral centers in Maryland to combine data for collaborative learning and improvement. A combined report is generated that compares individual center data among all the Level III and Level IV perinatal centers. The report also includes aggregated summary group data as well as tables and figures of individual center data. MIEMSS continues to work closely with MDH in supporting all perinatal referral centers that have the ability to participate in VON.

Office of Cardiac and Special Programs

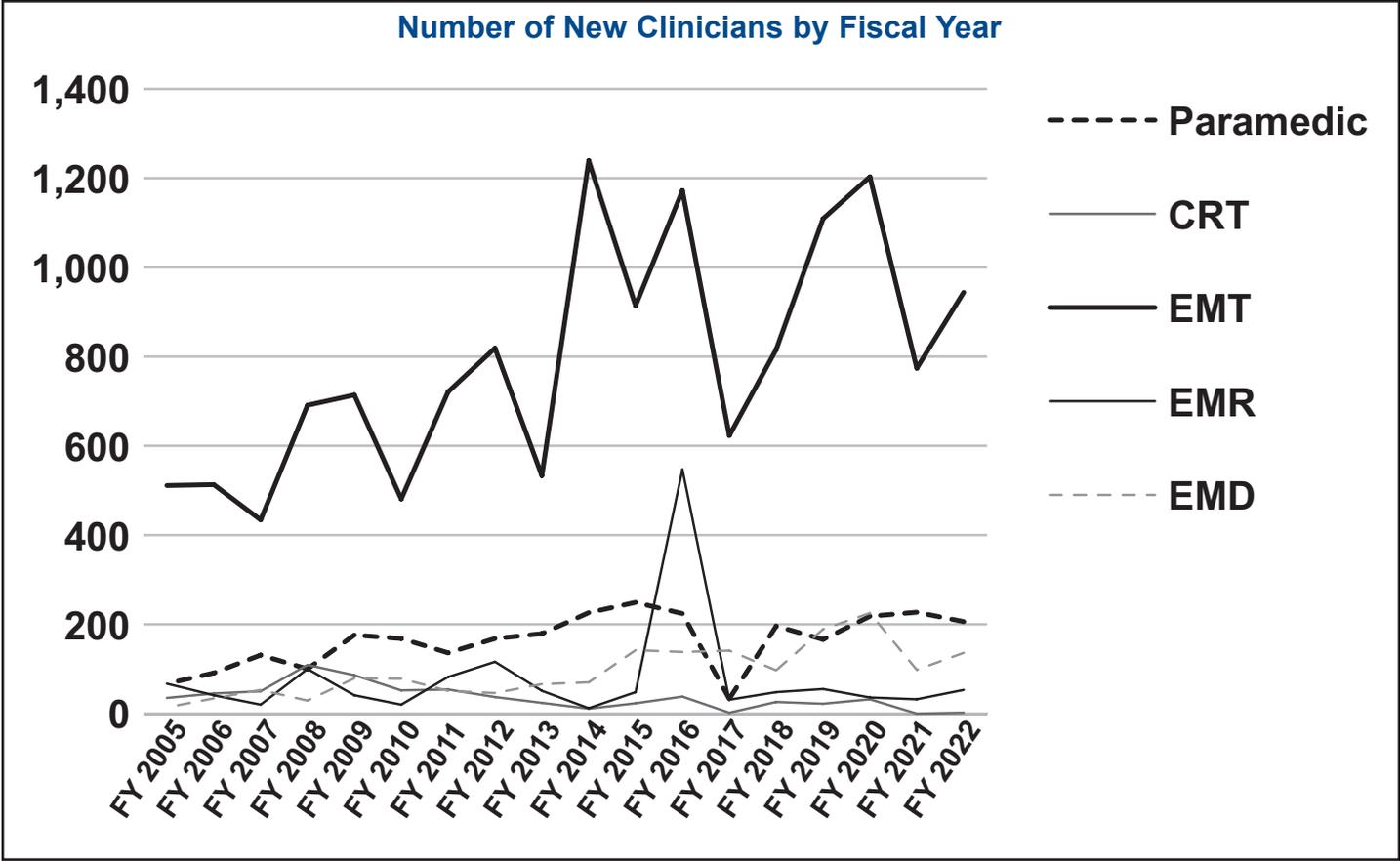
Mission

To develop and implement policies, regulations, and programs for the enhancement and improvement of the statewide EMS system and Maryland communities.

Public Access Automated External Defibrillator Program

Public high schools, middle schools, and county or municipality-owned or operated swimming pools are required to have AEDs, as are some public/semipublic pools and health clubs per local ordinances. However, the voluntary Maryland Public Ac-





cess Automated External Defibrillator (AED) Program permits facilities that do not provide health care but meet certain requirements to have an AED onsite for use in the event of a sudden cardiac arrest (SCA) until EMS arrives.

Through the online Maryland AED registry (www.marylandaedregistry.com), MIEMSS received and approved 417 public access AED applications, which placed 1,425 AEDs in FY 2022. As of June 30, 2022, there were 8,843 locations in the state with AEDs onsite. Registered users can receive automated notifications regarding battery and electrode expirations, program renewals, and AED recalls. The registry also integrates with AED Link, an application that displays all registered AEDs within a certain jurisdiction without having to manually enter site addresses.

The AED program has had 263 (23.1%) successful AED uses out of 1,138 reported incidents. Success is measured by the patient having a return of pulse at EMS arrival, during EMS arrival, or during EMS transport. Of the overall arrests, 612 were witnessed, and 191 of those witnessed arrests regained a pulse at the time of EMS arrival, for a 31.2% save rate for witnessed cardiac arrests.

Cardiac Arrest Steering Committee

Maryland maintains a Cardiac Arrest Steering Committee

(CASC), authorized by the State EMS Board, which serves to provide guidance to the MIEMSS medical and executive leadership teams on matters related to sudden cardiac arrest in Maryland. The committee actively works on matters related to public safety answering point engagement, prehospital cardiac arrest management performance improvement, and further development of a comprehensive statewide system for the treatment of sudden cardiac arrest. Additionally, the committee works with the MIEMSS public information team to develop public messaging campaigns related to increasing bystander use of CPR and AEDs.

The mission of the Cardiac Arrest Steering Committee is to improve cardiac arrest survival in all communities in Maryland. In the past year, the CASC has been evaluating two new educational and implementation strategies that utilize feedback of high-fidelity simulation data on CPR performance to EMS clinicians and on telephone CPR data to 9-1-1 Specialists. Results of these trials are positive and have been presented to the 9-1-1 Board and to SEMSAC. Plans are underway to share the results of these pilot programs and identify a few early adopter communities that may be interested in trying new educational and quality improvement strategies to improve survival in their communities. The Committee plans to hold its next meeting virtually in September 2022; with administrative support, the meeting and minutes will be generated to reflect the discussions had at the meeting.

Maryland STEMI System

Hospitals that comply with state standards to receive patients who are transported by EMS and are experiencing the most common type of heart attack, called an ST-elevation myocardial infarction (STEMI), are designated as cardiac interventional centers (CIC) by MIEMSS. Twenty-eight centers have been designated by MIEMSS, including four out-of-state. For STEMI patients, primary percutaneous coronary intervention (pPCI) is recognized by the American College of Cardiology and the American Heart Association (AHA) as the treatment of choice, and is generally associated with fewer complications and better outcomes than other forms of treatment. It is also well established that the sooner a patient is treated to relieve the blockage causing the STEMI, the better the heart muscle will recover.

All CICs submit data quarterly to the AHA's Get with the Guidelines® (GWTG) – Coronary Artery Disease (CAD) registry. MIEMSS is able to measure care for STEMI patients in Maryland as compared to national data from participating hospitals. The goal for first medical contact (FMC) to intervention in the cardiac catheterization lab ("device") time is 90 minutes or less. Data from the registry indicated that for the rolling four quarters of CY 2021, FMC-to-device in less than 90 minutes was achieved in 71.9% of STEMI patients transported by EMS, with a median time of 87 minutes.

INFORMATION TECHNOLOGY AND DATA MANAGEMENT

Mission

To improve Maryland's EMS systems by providing leadership, support, and guidance to the agency and Maryland's EMS community regarding the use of information technology and the meaning of collected EMS data.

electronic Maryland EMS Data System (eMEDS®)

The electronic Maryland EMS Data System (eMEDS®) uses commercial, off-the-shelf software provided and hosted by ImageTrend, the industry leader for emergency patient care reporting. MIEMSS owns a statewide site license for the eMEDS® system, permitting the State's EMS services to use it at no cost and no additional burden on local funding. All 29 of Maryland's jurisdictional EMS operational programs (EMSOP) and most licensed commercial ambulance services submit patient care reports directly into eMEDS®. Maryland has one of the few statewide comprehensive prehospital patient care reporting systems in the nation.

The eMEDS® system supports a number of important system goals, including:

1. Providing uniform and consistent data collection and reporting on prehospital medical care delivered by Maryland's emergency medical clinicians;
2. Supporting the advancement of the practice of EMS medicine, which includes the modification of scope

of practice, roles of EMS clinicians, and destination capacity;

3. Providing the foundation for applying performance measures to patient care and clinicians' compliance with protocols by local departments, EMSOPs, regional medical directors, and MIEMSS;
4. Enabling standardized data reporting to the National EMS Information System (NEMSIS); and
5. Supporting data integration efforts, including Maryland's syndromic surveillance system (ESSENCE), the State's health information exchange (CRISP), and the State's overdose program (ODMAP).

The eMEDS® system also provides timely information to hospital emergency department physicians and nurses. All Maryland healthcare facilities have access to the eMEDS® Hospital Hub website, enabling them to obtain prehospital patient care reports. MIEMSS also provides an interface to populate prehospital data into the Cardiac Registry to Enhance Survival (CARES) and the Maryland State Trauma Registry and to report hospital patient outcomes back to EMS services.

eMEDS® Elite Software Project

As of March 1, 2021, public safety and commercial services have transitioned to eMEDS® Elite.

Upgrading eMEDS® to ImageTrend's Elite software program made Maryland's system compatible with the National EMS Information System (NEMSIS) Version 3. NEMSIS is a nationwide database for prehospital information and research, and is the de facto standard for prehospital patient care reporting. Moving eMEDS® to the Elite platform has also improved its compatibility with the Health Level Seven International (HL7) data framework, enabling better exchange of data with health information exchange systems. eMEDS® is able to function on many popular electronic tablets and laptops with a variety of operating systems so that EMS clinicians have more flexibility on the equipment they use. The Elite system also adds many new and enhanced features requested by Maryland's EMS clinicians.

Chesapeake Regional Information System for our Patients (CRISP) and eMEDS® Integration Project

One important ongoing project is the integration of eMEDS® with Chesapeake Regional Information System for our Patients (CRISP), the health information exchange service for Maryland and Washington, DC. This integration has been enhanced in order to allow additional patient care data to be received by CRISP in a timelier manner. EMS reports are currently securely transferred to CRISP in close to real time. This integration makes the EMS report available to all health care clinicians with CRISP access, including those in primary care. Aligning these two systems makes prehospital emergency care information available to participating physicians and hospitals throughout the state. A future phase of the project aims to make select patient medical data, such as medical history and medications, available

to EMS clinicians to enhance the care they are able to provide at the patient's side.

National Study Center Collaboration

MIEMSS continues to work collaboratively with the National Study Center for Trauma and Emergency Medical Systems (NSC) to further the use of EMS data. Collaborative efforts include working on the Crash Outcome Data for Enhancing Survival (CODES) project and the EMS Research Interest Group (RIG).

Online Training Center

MIEMSS recently updated its Online Training Center site, greatly improving usability and design in the agency's effort to provide continuing education opportunities to emergency medical clinicians in the State. The Online Training Center is based on Moodle (a free, open-source learning management system) and is integrated with the MIEMSS Licensure System.

Teleworking

The COVID-19 pandemic has posed many challenges for everyone. MIEMSS, along with other state agencies, needed to quickly shift from an office-oriented workforce to a telework-oriented workforce. MIEMSS IT already had the groundwork in place for such a transition prior to the pandemic and was able to pivot to telework operations quickly when the pandemic occurred. As MIEMSS was a point agency for several initiatives during the pandemic and into the vaccine phase, MIEMSS IT was always concerned with hybrid operations – remote work and onsite. While MIEMSS has resumed in-office work, MIEMSS IT continues to support a hybrid workforce. Key to the transition was maintaining the agency's ability to provide ongoing customer-focused support to the EMS community. MIEMSS is well-positioned to continue this hybrid model and will be making additional infrastructure improvements to enhance this capability.

Ongoing Missions

■ **Flight Vector™.** MIEMSS hosts, supports, and maintains Flight Vector™, the computer-aided dispatch system utilized by the Maryland State Police Aviation Command (MSPAC) and MIEMSS. This application streamlines the process of requesting, selecting, assigning, and tracking aircraft to respond to medevac requests in and around Maryland. The system accelerates the request and dispatch process, and improves MSPAC flight safety by providing real-time, automated tracking of MSPAC aircraft. The system also automates the tracking of Emergency Medical Resource Center (EMRC) consultations. The system includes a disaster recovery instance located at a data center that is geographically separate from the MIEMSS data center. This year, MIEMSS completed a server refresh to upgrade the operating system and databases on all Flight Vector™-associated servers to the most current versions.



■ **Maryland Emergency Medical Resource and Alerting Database.** MIEMSS continues to host and operate the Maryland Emergency Medical Resource and Alerting Database (MEMRAD). The system includes the County/Hospital Alert Tracking System (CHATS) and Facility Resource Emergency Database (FRED) applications, which are mission-critical services for EMS operations as well as disaster response. CHATS is a public, web-based service that displays the alert status information and capacity of hospitals in Maryland and adjacent regions. FRED is utilized to alert healthcare partners of an incident or the need for aid, and allows them to indicate what resources they are able to lend to the response. This year, critical analysis and maintenance was performed on CHATS that resulted in increased security, performance, and stability.

■ **Trauma and Specialty Care Registries.** MIEMSS hosts the Maryland State Trauma Registry, Hand Registry, and Eye Registry. The MIEMSS IT Department, in conjunction with ESO, maintains critical support for these registries. Last year, MIEMSS and ESO worked collaboratively to upgrade the software for the three registries to the Linux-based Gen 6 platform. This upgrade provided productivity and security enhancements, allowing the decommissioning of the Flash Plugin. This year, MIEMSS IT and ESO have worked together to add functionality and increased stability and security to the platform, in addition to quickly addressing critical support issues from the user base.

■ **EMRC/SYSCOM Support.** The Emergency Medical Resource Center and System Communications (EMRC/SYSCOM), located in Baltimore City, is operational 24/7 and is staffed by MIEMSS and Maryland State Police Aviation Command (MSPAC) personnel. The facility is home to the Region III and Region V EMRC communications centers,

as well as the state's medevac dispatch center, SYSCOM. The IT Department continues to provide 24/7 technical support to EMRC/SYSCOM in coordination with MIEMSS Communications Engineering Services. This year, the IT Department worked collaboratively with EMRC/SYSCOM leadership and operators to further refine procedures for updating EMRC/SYSCOM IT equipment with the latest security patches and operational software in both the main and backup centers on a monthly (or as needed) basis, without down time or interference in critical EMRC or helicopter mission tasks.

■ **EMS Audio Recording (EMSAR) System.** MIEMSS IT continues to work with MIEMSS Communications Engineering Services to host a new way for hospitals to retrieve EMS/Hospital consult recordings through the internet using a secure portal. This continues to be a necessary step in the completion of the EMS Communications Upgrade Project, as well as copper circuit retirement by Verizon. The system provides connectivity to the MIEMSS NICE Audio Recorder system for hospitals to review consults for quality assurance needs. This year, a plan was drafted for the critical refresh of components for this system to provide greater performance and security. The plan is currently under review and scheduled for implementation in the coming months.

■ **Help Desk and User Support.** The MIEMSS IT department is committed to providing support to end users, including both agency staff and EMS clinicians, statewide. MIEMSS IT hosts a help desk ticketing system, which supports a number of agency departments, including MIEMSS Computer Support, eMEDS®, Licensure, MEMRAD, and Infectious Diseases. This system is set up to create support tickets from incoming phone calls and emails. Dedicated, skilled staff monitor these queues, and tickets are investigated, resolved, and closed.

Two of the primary public-facing ticketing systems are the eMEDS® and Licensure queues. Each ticketing system receives assistance requests from EMS clinicians and EMS Operational Program (EMSOP) administrators throughout the state for issues like password resets and login concerns, access questions, report writer functionality, and other eMEDS®/Licensure-related issues. In addition, the Computer Support queue receives requests for general MIEMSS IT-related issues (including password and login issues, VPN, email, website and application outages, and general hardware/software/network support).

The Licensure support queue received and worked on the nearly 6,000 tickets that were created in CY 2021. The eMEDS® Support queue processed over 2,000 tickets in CY 2021. The Computer Support queue received nearly 700 requests, which were resolved in that same period. IT strives to improve staff technology experiences by maintaining and proactively improving IT infrastructure, protecting data and systems through enhanced IT security, and providing quick resolutions to PC and application software issues.

In addition to last year's creation of the MEMRAD and

Infectious Diseases ticket queues, the IT Department this year has created a new ticket queue for the Critical Care Coordination Center (C4), which will provide the coordinators of this unit with a dedicated location to fully address and resolve the concerns of C4-affiliated clinicians. The queue is currently in a testing, review, and change cycle, with a full launch expected in the coming year.

■ **Opioid Overdose Data Reporting.** MIEMSS, in compliance with state law, continues to provide data from EMS patient care reports into the Washington/Baltimore High-Intensity Drug Trafficking Areas (HIDTA) Overdose Map (ODMAP) database to assist with statewide monitoring of and responding to the opioid overdose problem. MIEMSS is also collaborating with the Maryland Department of Health and other agencies to do everything possible to monitor and combat the opioid overdose epidemic in Maryland.

■ **Security Improvements.** The Information Security Department continues to monitor the agency's IT operations for potential exploits, vulnerabilities, and threats, and proactively make enhancements to the MIEMSS IT infrastructure and related systems. Security awareness training continues to be a focal point, ensuring that staff are aware of common security threats and take necessary action. MIEMSS also continues to work closely with the Maryland Coordination and Analysis Center (MCAC) in identifying and reporting of threats.

MIEMSS continues to apply critical security patches to the IT infrastructure and related systems in a timely fashion to protect against emerging cybersecurity threats and vulnerabilities. In addition, the Information Security department and MIEMSS IT continue to work together collaboratively to expand and develop system security plans, and codify managerial, operational, and technical security controls. Efforts in the past year have included software updates to internal firewalls, network, email, and endpoint protection suites; a full assessment and periodic monitoring of all front-facing websites for security strengthening; upgrades to physical security systems; and the installation/configuration of new network scanning tools.

Over the past year, MIEMSS leveraged grant funding to make significant improvements to our cybersecurity posture. MIEMSS was able to purchase and deploy security software tools, including industry-standard Vulnerability Scanning Software and Log Management/Security Information and Event Management Software. These new tools allow MIEMSS to rapidly identify and remediate security issues, track and identify anomalous network behavior, and ensure MIEMSS information systems remain safe, stable, and operational to provide critical services and information to clinicians.

Physical security of IT resources continues to be a great priority. A joint MIEMSS IT, Communications, and IT Security initiative utilized grant funding to update aging Security Camera infrastructure, installing new Network Video Recorder (NVR) hardware and software that improves the reliability and perfor-

mance of this system and enhances the Agency's ability to monitor the physical security of HQ.

Recently, MIEMSS IT also performed a full evaluation of the security posture of public-facing IT systems, looking for ways to improve security and reliability. As a result of this activity, servers hosting critical applications are more secure and resilient against attack. Additionally, these improvements have increased speed and stability of connections to end users.

■ **Computer Network Improvements.** The IT department continues to improve computer resources, network reliability, and disaster preparedness by upgrading core server, storage, and VMware systems. Following last year's collaboration with the University of Maryland (UMD) to add a new fiber connection, MIEMSS has continued to enhance the backup network path by retiring aging equipment with new devices. This includes new routing equipment as well as a redundant microwave path. MIEMSS IT also performed a major upgrade of its Wide Area Network (WAN) infrastructure hardware, improving reliability, security, and usability, in addition to providing multiple discrete options to ensure connectivity to the public internet in the event that the Agency's primary internet connection should fail.

MIEMSS IT continues to expand resources, including adding additional storage and server hardware. These resources allow MIEMSS to expand the capacity of the computing infrastructure, allowing continued growth of the virtual server environment, and to decommission end-of-life technology. Specifically this year, new production storage and VM infrastructure equipment was purchased to be integrated in the coming year to allow for both a complete refresh of production assets as well as the flexibility to utilize existing equipment in other initiatives, such as the expansion of disaster recovery capabilities.

MIEMSS IT also purchased new networking equipment to further bring our regional office sites on the Eastern Shore, Western Maryland, and the National Capitol Region into alignment with our core network. This new equipment will be deployed in the coming year.

Onsite/offsite system backup capabilities were increased in the past year by the purchase of an upgraded tape backup system, allowing greater storage capacity while maintaining backward compatibility with the previous system. This, coupled with an increase in onsite backup storage, greatly improved resiliency.

■ **Strengthen Data Analysis.** Recognizing the importance of accurate, timely, and accessible prehospital patient care data, MIEMSS has continued to expand data analysis capability through the use of local copies of hosted eMEDS® and the Licensure System databases. The emphasis continues on statistical reporting, key metrics for system-wide quality improvement and assurance, and practical applications of EMS and hospital data.

MIEMSS IT and Security continues to support the Data Management department and other MIEMSS departments by

creating a reporting server for future reporting enhancements, as well as supplying critical daily COVID-19-related data reports for distribution.

■ **EMS Portal.** Additionally, the MIEMSS Data Management department continues to work with the Licensing and Certification department to maintain an EMS Portal to provide local jurisdictions the ability to create and run custom educational reports. This enhances jurisdictional awareness of educational needs for affiliated clinicians.

■ **@Hospital Ambulances (@HA).** The At Hospital Ambulances (@HA) app is a web-based application that displays ambulance activity at each of the Maryland Hospitals utilized by jurisdictional EMS clinicians. The MIEMSS Data Management department developed this application to work on desktop computers and mobile devices, including iOS, Android, and Windows mobile devices. The @HA application displays information pertaining to ambulances located at the hospitals, including the hospital name, number of ambulance units, alert status, and length of stay. Participating jurisdictions supply data via CAD that populates the information displayed in the app, and is made available to clinicians via a link in the eMEDS® patient care reporting system dashboard. It can also be viewed with limited details at <https://aha.miemss.org>. Jurisdictional EMS administrators may login and view additional information about the ambulance units, including unit number and jurisdiction.

Future Projects

■ **Disaster Recovery.** The MIEMSS IT and Communications Departments have begun discussing ways to collaboratively increase disaster recovery flexibility. This includes the identification of new DR sites and pathways, as well as the potential relocation of the EMRC/SYSCOM backup operations site.

■ **EMSAR Refresh.** MIEMSS IT is planning a complete refresh of the components of the EMS Audio Recording system in the coming year.

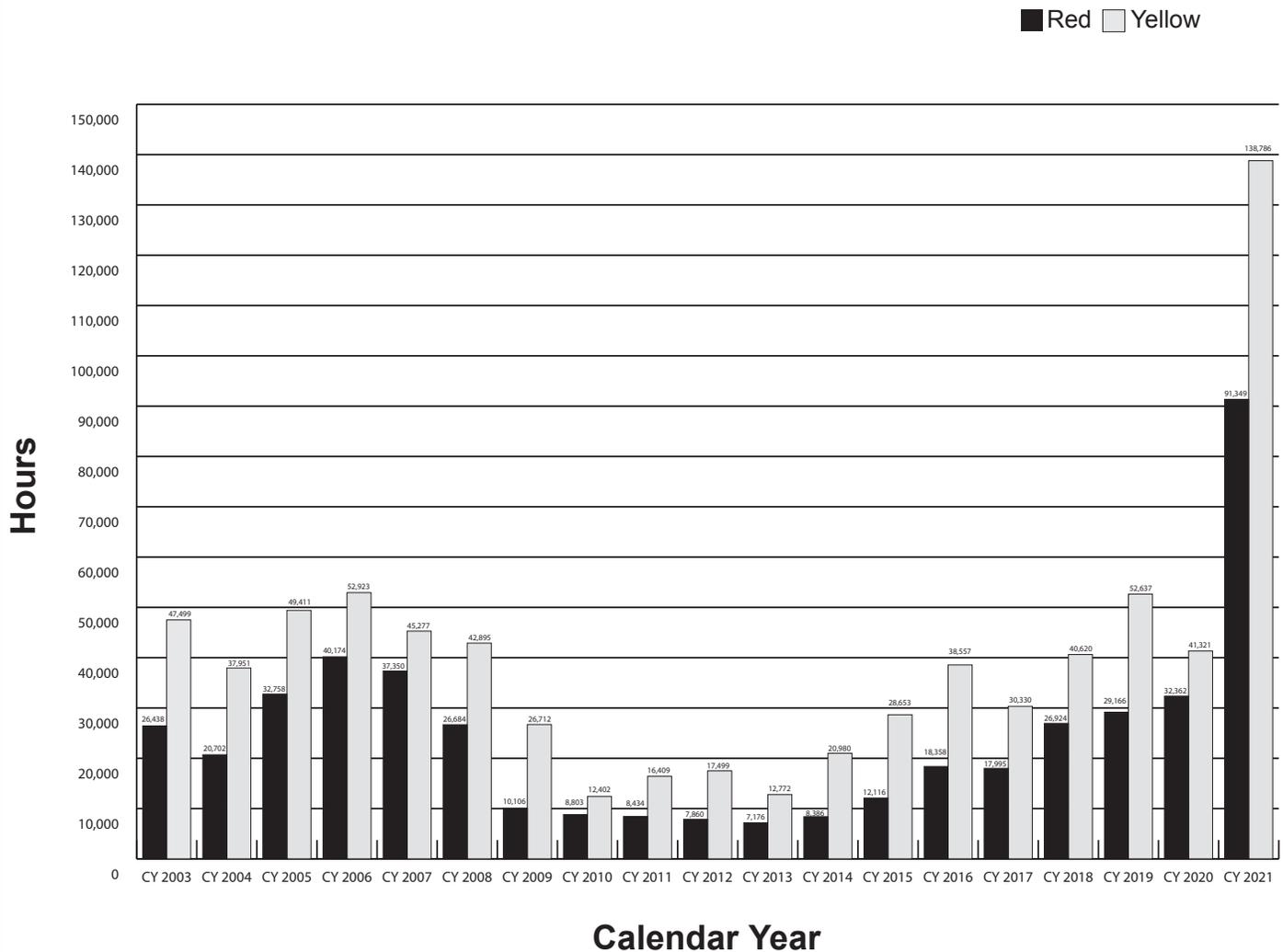
■ **Internal hardware infrastructure improvements.** MIEMSS IT is planning to implement several production hardware infrastructure improvements over the next year.

■ **Internal software infrastructure improvements.** To complement our hardware infrastructure improvements, MIEMSS IT is also planning to implement important upgrades to our software infrastructure (including email system and virtual production environment).

■ **Mobile Apps.** MIEMSS IT and the Data Management department is continuing to work alongside other groups within MIEMSS on the creation of mobile applications. These mobile apps will provide clinicians and stakeholders the ability to easily obtain information necessary for emergency response while on the go. The Infectious Disease app provides relevant information about MIEMSS protocols, as well as contact information necessary in support of at-patient side care.

■ **Public website.** MIEMSS IT continues to work with the

State Diversion Alert Totals (Calendar Years 2003 to 2021)



Educational Support Services (ESS) department to update the MIEMSS public website. The IT Department, alongside the Data Management department, are working on upgrading the existing IT infrastructure of the website. ESS is working with IT and Data Management, along with other departments within MIEMSS, to update the content and organization of the public website. This upgrade and enhancement will make the public-facing website easier to navigate and find relevant data for visitors.

■ **Additional IT security tools.** MIEMSS IT and Security are constantly working collaboratively to enhance the suite of IT Security tools at the organization’s disposal. These tools will help to prevent and detect vulnerabilities and provide critical information to IT staff for investigations.

MEDICAL DIRECTOR’S OFFICE

Mission

To provide leadership and coordination for state medical programs, protocols, and quality assurance; to liaison with the regional programs and clinical facilities; and to promote creative, responsive, and scientifically sound programs for the delivery of medical care to all citizens.

The Maryland Medical Protocols for Emergency Medical Services

With the multi-disciplined input of the Protocol Review Committee, medical directors, and EMS clinicians, we have updated the *Maryland Medical Protocols for Emergency Medi-*

cal Services for 2022 to reflect best practices and evidence-based medicine. State EMS Medical Director Dr. Timothy P. Chizmar presented these changes to the Statewide EMS Advisory Council and the Maryland EMS Board for approval.

There were several significant protocol enhancements this year. Here is a brief summary of the changes that went into effect on July 1, 2022:

- **Acetaminophen:** All patients ages 3 months and older may now receive acetaminophen for treatment of fever (EMS-documented temperature of 100.4 or greater) or mild to moderate pain.
- **Cardiac Arrest (Adult):** The Adult PEA/Asystole algorithm has been refined to provide focused guidance on the management of patients in asystole, PEA with a narrow QRS, and PEA with a wide QRS. Calcium chloride and sodium bicarbonate should only be given for PEA with a wide QRS. The medical consultation requirement for sodium bicarbonate administration in adults has been removed.
- **Critically Unstable Patient (Adult):** A critically unstable patient protocol has been added to the General Patient Care section. This protocol emphasizes resuscitation of unstable patients on-scene prior to initiating transport.
- **Direct to Triage:** This protocol defines stable patients who may be suitable for direct transport to triage upon arrival to the receiving emergency department.
- **Droperidol:** This medication replaces haloperidol for treatment of patients who are 13 years of age or older presenting with moderate agitation.
- **Extraglottic Airways:** This addition to the Procedures section allows for the use of extraglottic/supraglottic airways including the King LTS-D, LMA, Air-Q, and iGel. An EMS operational program must select one of these airway devices and carry sizes appropriate for all patients from newborn through adult. These devices serve a critically important role in assisting ventilation and oxygenation to patients with compromised airways.
- **Induced Hypothermia:** Based on recent high-level scientific evidence, induced hypothermia has been removed from the protocols.
- **Lateral Uterine Displacement:** For pregnant patients with hypotension or cardiac arrest, specific guidance has been added to provide left lateral uterine displacement, with a goal of increasing venous return.
- **Tranexamic Acid (TXA):** TXA has been added to the protocols for treatment of traumatic hemorrhagic shock in patients 15 years of age and older.
- **Ventricular Assist Device (VAD):** Specific guidance has been added for the management of unstable patients with VADs.
- **Optional Supplemental Protocol-Hydrofluoric Acid:** Due to increased risk of HF exposure from electric car batteries, this OSP has been added to allow for calcium

gluconate via IV, topical, and nebulized routes. Interested jurisdictions should submit an OSP application to the State EMS Medical Director.

As a reminder, the information located in the full protocol book is the official medical reference for Maryland's EMS clinicians.

Clinical Guidance for Emerging Infectious Diseases

Dr. Chizmar continues to work closely with the MIEMSS EMS Preparedness and Operations Division, EMS operational programs, and partners at the Maryland Department of Health to ensure that EMS clinicians have access to the latest clinical guidance regarding emerging infectious diseases, such as COVID-19 and monkeypox. These resources aim to decrease the risk of disease transmission to EMS clinicians by emphasizing the use of work practice controls and personal protective equipment (PPE).

Regional Medical Directors

The OMD coordinates a network of Regional EMS Medical Directors, all of whom serve on the Protocol Review Committee, as well as on their respective regional councils. In addition, they serve as a resource to jurisdictional medical directors and lead quality improvement initiatives within their regions of the state. In conjunction with the Division of Regional Programs and Office of Health Care Facilities and Special Programs, the Regional EMS Medical Directors administer the statewide EMS base station program, which provides for online (real time) medical consultation for Maryland's EMS clinicians.

Regional Medical Directors

The Office of the Medical Director (OMD) coordinates a network of Regional EMS Medical Directors, all of whom serve on the Protocol Review Committee, as well as on their respective regional councils. In addition, they serve as resources to jurisdictional medical directors and lead quality improvement initiatives within their regions of the state. In conjunction with the EMS Preparedness and Operations Division and the Office of Care Integration, the Regional EMS Medical Directors provide oversight for the statewide EMS base station program, which provides for online (real time) medical consultation for Maryland's EMS clinicians.

Research

The OMD works closely with the Regional EMS Medical Directors, MIEMSS Regional Coordinators, and colleagues at Johns Hopkins Medicine and the University of Maryland School of Medicine's National Study Center for Trauma and Emergency Medical Systems to coordinate the statewide EMS research interest group. This collaboration has led to the publication of several peer-reviewed articles, including "A Statewide Viral Syndrome Pandemic Triage Protocol: 24 Hour Outcomes" in Prehospital Emergency Care in late 2021.

CHEMPACK Program

MIEMSS coordinates the CHEMPACK program for first responders in the State of Maryland, in partnership with the HHS Assistant Secretary of Preparedness and Response and the Maryland Department of Health Office of Preparedness and Response. Originally an initiative of the CDC's Strategic National Stockpile (SNS), this program allows EMS clinicians to access time-critical antidotes for intentional nerve agent attacks and large-scale organophosphate poisonings. The nerve agent antidotes are strategically deployed at secure locations throughout Maryland to ensure rapid accessibility. The CHEMPACK inventory is closely monitored, and near-expiring medications were replaced this year by MIEMSS Regional and Emergency Operations personnel using the new Drop Ship Program.

Base Stations

There are 47 Maryland hospital base stations designated by the EMS Board. All physicians and nurses who answer a base station call are required to successfully complete the MIEMSS-approved Base Station Communications Course for Emergency Department Personnel and the 2022 Maryland EMS Updates for Hospital Base Station Personnel training video in order to communicate with EMS clinicians and provide appropriate online medical consultation. MIEMSS' Base Station Communications Course for Emergency Department Personnel was offered at multiple hospitals entirely in a virtual format or in-person with appropriate social distancing measures in place in FY 2022, resulting in 354 base station certificates issued to emergency physicians and nurses. Additionally, three emergency medicine physicians became new MIEMSS-approved base station instructors over the past year.

CARES Program

MIEMSS continues to participate in the Cardiac Arrest Registry to Enhance Survival (CARES) in order to measure and ultimately improve emergency cardiac care in Maryland. CARES is an out-of-hospital cardiac arrest registry for the United States, facilitating uniform data collection and quality improvement in each state and nationally.

EMS clinicians document relevant cardiac arrest information within the dedicated Cardiac Arrest tab in eMEDS®, the statewide prehospital patient care reporting system. The prehospital information can then be directly exported by MIEMSS to CARES when it is first entered, saving time for clinicians and EMS CARES coordinators. Using a single patient care record for CARES submission makes Maryland one of the first states to incorporate this process within their electronic patient care reporting documentation. Maryland hospitals provide valuable outcome data into CARES for patients who receive ongoing care in the ED.

Since January 2017, all jurisdictional EMSOPs and Maryland health care facilities have submitted their cardiac arrest data

to CARES. Statewide data for calendar years 2017 to 2021 is now included in CARES National Reports (see tables and graphs on page 79). Of note, the number of out-of-hospital cardiac arrests increased from 6,796 in CY 2019 to 7,850 in CY 2020, which represents an increase of 15.5%. The number of out-of-hospital arrests continued to remain high in CY 2021, at 7,667. Nationally, the number of out-of-hospital cardiac arrests sharply increased during the COVID-19 pandemic.

Two factors have demonstrated a significant impact on survival from sudden cardiac arrest: early cardiopulmonary resuscitation (CPR) and early defibrillation. All Maryland high school students must complete CPR training prior to graduation. Additionally, most EMSOPs offer layperson CPR and automated external defibrillator (AED) courses. Using the CARES data, it is clear that patient outcomes in Maryland are significantly improved by early bystander CPR and the use of public access AEDs.

EMS Medical Directors' Symposium

Due to COVID-19 restrictions, the 27th Annual EMS Medical Directors' Symposium was held as a virtual meeting on April 13, 2022. The Symposium was attended virtually by regional, jurisdictional, and commercial ambulance service medical directors, base station physicians and coordinators, highest jurisdictional officials, quality assurance officials, and MIEMSS personnel. This year's keynote speaker was Corey M. Slovis, MD, FACP, FACEP, FAAEM, FAEMS, who serves as EMS Medical Director for the Metro Nashville Fire Department and Nashville International Airport in Nashville, Tennessee. Dr. Slovis' presentation was entitled "Top Recent Articles for EMS Physicians". Other symposium presentations included the following:

- "Maryland State of the State": Theodore R. Delbridge, MD, MPH
- "Breathing Room: Quality Improvement Around Albuterol Administration for Pediatric Asthma": Jennifer Anders, MD
- "Building an EMS Agency Operational Surge Plan": Matthew Levy, DO
- "Legal Issues Facing EMS Clinicians": Sarah Sette, Esq., and Adam Malizio, Esq.
- "Maryland EMS Quality Improvement Metrics": Timothy P. Chizmar, MD

Opioid Crisis in Maryland

Dr. Chizmar works closely with the Maryland Opioid Operational Command Center, which was established by an Executive Order signed by Governor Larry Hogan declaring a State of Emergency in response to the opioid crisis in Maryland. Governor Hogan subsequently extended this declared State of Emergency by Executive Order. For its part, MIEMSS has implemented multiple strategies in an effort to reduce morbidity and mortality related to opioid overdoses.

- Authorized all EMS clinicians to administer naloxone;

- Enhanced EMS clinician education and community awareness on opioids;
- Promoted distribution of an opioid overdose information and crisis hotline card by EMS clinicians to patients and their family members;
- Partnered with the Maryland Department of Health to identify individuals who need treatment for opioid use disorder;
- Encouraged EMSOPs to share identified opioid overdose information with local health officers so they can provide peer support and rehabilitation opportunities;
- Reported opioid overdose data to the Washington/Baltimore High-Intensity Drug Trafficking Area Overdose Map (ODMAP), which provides real-time overdose surveillance data across jurisdictions, as required by law.

Additionally, 19 of Maryland’s jurisdictional EMSOPs currently participate in the Naloxone Leave-Behind Pilot Protocol, which allows EMS clinicians to supply an opioid overdose kit with naloxone to adult patients most at risk (history of previous overdose).

QUALITY MANAGEMENT

Mission

To support both MIEMSS and the EMS community in their continuous quality improvement initiatives and commitment to a customer-based way of doing business. Successfully accomplishing this is not simply dependent upon recognizing that the ultimate customer is a patient in need of timely, proficient, and compassionate care, but understanding and improving the processes that maintain a well-functioning EMS system for the delivery of quality medical care.

MIEMSS’ quality management program supports requests for information, query design, and results interpretation, and also educates data owners and managers in process improvement, enhancing the ability to effect improvement in related fields. Data analysis and process examination form the basis of much of the program’s responsibilities.

Managing for Results

MIEMSS is required to submit Managing for Results (MFR) updates along with its fiscal year budget requests to the Maryland Department of Budget and Management. MIEMSS has met the MFR requirements this year, which include re-evaluation of key goals, objectives, and strategies; development of action plans; and creation and monitoring of performance indicators.

Two MFR goals were established by MIEMSS: 1) provide high-quality medical care to individuals receiving emergency medical services and 2) maintain a well-functioning emergency medical services system. The measures for successful achievement of these goals include two objectives: 1) maintain statewide trauma patient care performance above the national norm at a 95% or higher statistical level of confidence and 2) transport



at least 89% of seriously injured patients to a designated trauma center throughout the calendar year.

EMS Surveillance Measures

MIEMSS has maintained several EMS system surveillance priorities based on routine data review, customer requests, and research outcomes. Hospital yellow alert demand is monitored at state, regional, jurisdictional, and hospital-specific levels through the online County Hospital Alert Tracking System (CHATs) for real-time system response capabilities as well as historical trends. This monitoring, coupled with hospital strategies that address high demand for emergency department services, helps improve the availability of this vital service system-wide. Yellow alert data also form one measurement in the Maryland Department of Health’s (MDH) syndromic surveillance programs.

The Helicopter Utilization Database (HUD) accounts for all helicopter requests for transport independent of actual transport mode outcome, and permits requesting EMS managers and medical directors to conduct case reviews. HUD data analysis supports MIEMSS’ efforts to utilize aerial transportation for only the most severe, time-critical scene incident patients statewide.

Since FY 2017, EMS encounters resulting in naloxone administration for opioid overdose patients are identified and reported to the MDH and the Opioid Operational Command Center. This non-confidential data set is used, along with other resources, to monitor the incidents of opioid overdoses and help plan effective strategies in combating the crisis.

Data Confidentiality

MIEMSS maintains or has access to eight confidential databases used in ensuring quality EMS care delivery. The Data Access Committee was formed to ensure that all data and requests for information are expedited efficiently and accurately while ensuring patient and provider confidentiality at all times. Since January 2000, MIEMSS has tracked and responded to over 2,500 data requests.

MARYLAND TRAUMA AND SPECIALTY REFERRAL CENTERS

MARYLAND DESIGNATED ADULT TRAUMA CENTERS (For explanation of differences in levels, see Trauma Center Categorization chart on page 32)		
<u>Primary Adult Resource Center</u> <ul style="list-style-type: none"> R Adams Cowley Shock Trauma Center/ University of Maryland Medical Center, Baltimore City (MIEMSS Region III) 	<u>Level II Adult Trauma Centers</u> <ul style="list-style-type: none"> Johns Hopkins Bayview Medical Center, Baltimore City (MIEMSS Region III) Sinai Hospital, Baltimore City (MIEMSS Region III) Suburban Hospital–Johns Hopkins Medicine (JHM), Bethesda (MIEMSS Region V) University of Maryland Capital Region Medical Center, Largo (MIEMSS Region V) 	<u>Level III Adult Trauma Centers</u> <ul style="list-style-type: none"> Meritus Medical Center, Hagerstown (MIEMSS Region II) TidalHealth Peninsula Regional, Salisbury (MIEMSS Region IV) UPMC Western Maryland, Cumberland (MIEMSS Region I)
<u>Level I Adult Trauma Center</u> <ul style="list-style-type: none"> The Johns Hopkins Hospital, Baltimore City (MIEMSS Region III) 		
OUT-OF-STATE HOSPITALS (with MOUs)		
<ul style="list-style-type: none"> Adult Trauma Center/ChristianaCare Health System, Newark, DE Adult Trauma Center/MedStar Washington Hospital Center, Washington, DC 	<ul style="list-style-type: none"> Adult Burn Center/MedStar Washington Hospital Center, Washington, DC Pediatric Trauma Center/Children’s National Hospital, Washington, DC 	<ul style="list-style-type: none"> Pediatric Burn Center/Children’s National Hospital, Washington, DC
MARYLAND DESIGNATED SPECIALTY REFERRAL CENTERS		
<u>Burn Centers</u> <ul style="list-style-type: none"> Adult Burn Center/Johns Hopkins Bayview Medical Center, Baltimore City Pediatric Burn Center/Johns Hopkins Children’s Center, Baltimore City 	<ul style="list-style-type: none"> Out-of-State Cardiac Interventional Centers Bayhealth Kent General, Dover, DE Christiana Hospital, Newark, DE MedStar Washington Hospital Center, Washington, DC Nanticoke Memorial Hospital, Seaford, DE 	<u>Primary Stroke Centers</u> <ul style="list-style-type: none"> Adventist HealthCare White Oak Medical Center Anne Arundel Medical Center Atlantic General Hospital Calvert Health Medical Center Carroll Hospital Center Christiana Care, Union Hospital Doctors Community Hospital Frederick Health Greater Baltimore Medical Center Holy Cross Germantown Hospital Holy Cross Hospital Howard County General Hospital–JHM Mercy Hospital Center Meritus Medical Center MedStar Good Samaritan Hospital MedStar Harbor Hospital MedStar Montgomery Medical Center MedStar Southern Maryland Hospital Center MedStar St. Mary’s Hospital MedStar Union Memorial Hospital Northwest Hospital St. Agnes Hospital Suburban Hospital–JHM TidalHealth Peninsula Regional Medical Center University of Maryland (UM) Medical Center Midtown Campus UM Baltimore Washington Medical Center UM Capital Region Medical Center UM Charles Regional Medical Center UM Harford Memorial Hospital UM Shore Medical Center at Easton UM St. Joseph Medical Center UM Upper Chesapeake Medical Center UPMC Western Maryland
<u>Cardiac Interventional Centers</u> <ul style="list-style-type: none"> Region I UPMC Western Maryland Region II Frederick Health Meritus Medical Center Region III Anne Arundel Medical Center Carroll Hospital Center Howard County General Hospital, JHM Johns Hopkins Bayview Medical Center The Johns Hopkins Hospital MedStar Franklin Square Medical Center MedStar Union Memorial Hospital Sinai Hospital St. Agnes Hospital University of Maryland (UM) Medical Center UM Baltimore Washington Medical Center UM St. Joseph Medical Center UM Upper Chesapeake Medical Center Region IV TidalHealth Peninsula Regional University of Maryland Shore Health at Easton Region V Adventist HealthCare White Oak Medical Center Holy Cross Hospital MedStar Southern Maryland Hospital Center Shady Grove Adventist Hospital Suburban Hospital–JHM University of Maryland Capital Region Medical Center 	<u>Eye Trauma Center</u> <ul style="list-style-type: none"> The Wilmer Eye Institute/The Johns Hopkins Hospital, Baltimore City 	
	<u>Hand/Upper Extremity Trauma Center</u> <ul style="list-style-type: none"> The Curtis National Hand Center/MedStar Union Memorial Hospital, Baltimore City 	
	<u>Neurotrauma Center</u> <ul style="list-style-type: none"> R Adams Cowley Shock Trauma Center/ University of Maryland Medical Center, Baltimore City 	
	<u>Pediatric Trauma Center</u> <ul style="list-style-type: none"> The Johns Hopkins Children’s Center, Baltimore City 	
	<u>Perinatal Referral Centers</u> <ul style="list-style-type: none"> Anne Arundel Medical Center Frederick Health Greater Baltimore Medical Center Holy Cross Hospital Howard County General Hospital–JHM Johns Hopkins Bayview Medical Center The Johns Hopkins Hospital MedStar Franklin Square Medical Center Mercy Medical Center St. Agnes Hospital Shady Grove Adventist Hospital Sinai Hospital University of Maryland (UM) Medical Center UM St. Joseph Medical Center 	
	<u>Comprehensive Stroke Centers</u> <ul style="list-style-type: none"> The Johns Hopkins Hospital University of Maryland Medical Center Johns Hopkins Bayview Medical Center 	<u>Thrombectomy-Capable Primary Stroke Centers</u> <ul style="list-style-type: none"> Sinai Hospital Shady Grove Adventist Hospital MedStar Franklin Square Medical Center
POISON CONSULTATION CENTER		
<ul style="list-style-type: none"> Maryland Poison Center/University of Maryland School of Pharmacy, Baltimore City 		

DESIGNATED TRAUMA CENTER CATEGORIZATION

Differences in Standards Based on Physician Availability and Dedicated Resources	PARC	Level I	Level II	Level III
For the “most critical patients”, an in-house fellowship-trained attending trauma surgeon, trauma fellow, or trauma equivalent/PGY5+ general surgery resident should be at the bedside upon arrival, documented at least 80% of the time.	X			
Dedicated facilities (Resuscitation Unit, Operating Room, and Intensive Care Unit) 24 hours a day	X			
Facilities (Resuscitation Area, Operating Room, and Intensive Care Unit) 24 hours a day		X	X	X
Trauma Surgeon available in-house at all times shall be at the bedside within 15 minutes of call request, documented at least 80% of the time		X	X	
On-call Trauma Surgeon shall be at the bedside within 30 minutes of call request, documented at least 80% of the time of call request				X
Anesthesiologist in-house dedicated 24 hours a day to trauma care, should be at the bedside upon arrival, documented at least 80% of the time	X			
Anesthesiologist in-house at all times but shared with other services and shall be at the bedside within 15 minutes of call request		X	X	X
Orthopedic Surgeon in-house at all times and dedicated to trauma care	X	X		
Orthopedic Surgeon on-call shall be at the bedside within 30 minutes of call request, documented at least 80% of the time of call request			X	X
Neurosurgeon in-house at all times and dedicated to trauma care	X			
Neurosurgeon in the hospital at all times but shared with other services		X		
Neurosurgeon on-call shall be at the bedside within 30 minutes of call request, documented at least 80% of the time of call request			X	X
A designated fellowship-trained/board-certified in surgery or critical care surgical director of the Intensive Care Unit	X	X	Desired	
An organized trauma research program with a designated physician director and documented research plan	X	X		
Education – Fellowship Training in Trauma	X			
Surgical Residency Program	X	X		
Injury Prevention and Public Education Program	X	X	X	X

MARYLAND EMS SYSTEM TRAUMA AND SPECIALTY CENTER REPORTS

Primary Adult Resource Center

R Adams Cowley Shock Trauma Center

22 S. Greene Street, Baltimore, Maryland
MIEMSS Region III

The R Adams Cowley Shock Trauma Center (RACSTC), located within the University of Maryland Medical Center, serves as the state's Primary Adult Resource Center. RACSTC treated 5,412 primary trauma patients from June 1, 2021, through May 31, 2022, according to the Maryland State Trauma Registry. (See pages 83 to 88 for additional patient data.) Over this 12-month period, 85% of patients admitted to the Shock Trauma Center arrived by ground transportation and 15% arrived by air. Demographic data obtained indicates that the majority of admissions were male (68%) and aged 15-35 years (37%), or 56 or older (37%), followed by those aged 36-55 (24%).

Mission

The R Adams Cowley Shock Trauma Center is a multidisciplinary clinical, educational, and research institution dedicated to world-class standards in the prevention and management of critical injury and illness. Its highly specialized medical personnel and dedicated resources are focused on a single mission: to eradicate preventable death and disability, thus reducing the personal tragedy and overall costs associated with severe injury. This mission is continuously pursued through state-of-the-art clinical care services, active research, didactic and hands-on clinical education, and prevention programs.

Primary Adult Resource Center Trauma Staff

Physician-in-Chief:

Thomas M. Scalea, MD, FACS, MCCM

Vice-President R Adams Cowley Shock Trauma Center:

Kristie Snedeker, DPT

Center for Hyperbaric Medicine

The Center for Hyperbaric Medicine is the statewide referral center for individuals who experience decompression sickness, carbon monoxide poisoning, smoke inhalation, delayed effects of radiation treatment, non-healing wounds, and/or gas gangrene. It is internationally recognized for its leadership and expertise in the clinical application of hyperbaric therapy.

As the only multi-place chamber in Maryland, the Center is capable of simultaneously accommodating 10 patients on stretchers or 23 seated patients. Hyperbaric therapy provides oxygen to all parts of the body in amounts greater than possible under normal conditions by providing 100% oxygen under increased atmospheric pressure. The center can treat a wide spectrum of patients 24/7, from the most critically ill inpatients to ambulatory outpatients.

In FY 2022, therapeutic hyperbaric oxygen treatment (HBO) was provided during 888 dives, totaling 4,189 dive hours. Of these, 34% were inpatients and 65% were outpatients and 0.3% were emergent. The practitioners from the Center for Hyperbaric and Dive Medicine have a long history of treating divers suffering from decompression sickness and are available 24 hours/day for consultation and treatment of dive emergencies. In addition, four specially trained physicians provide fitness-to-dive physicals for new recreational or commercial divers, as well as providing consultation with patients who have previously suffered dive accidents.

■ Accomplishments

- All nurses working in HBO are neuro critical care trained and regularly rotate through the critical care areas in order to maintain their skills.
- The Center for Hyperbaric Medicine received reaccreditation with distinction from the Undersea and Hyperbaric Medical Society (UHMS).
- The "Operational Guidelines for Treating COVID-19 Positive Patients in the Hyperbaric Chamber" policy was finalized.
- The Center for Hyperbaric Medicine collaborated with Patient Access Services to better define HBO outpatient registration workflows, and initiated the training of HBO RNs in outpatient registration and scheduling to facilitate timely treatment of off-hours urgent/emergent patient dives.

■ Presentations

- Undersea and Hyperbaric Medical Society (UHMS) Scientific Conference, "Under Pressure: A Case Study of Violence While at Depth in the Hyperbaric Chamber" Beth Cipra, DNP, RN, APRN-CNS, CCRN; Melissa Schroeder, BSN, RN, CHRN; Janelle Jones, BS, RRT, CHT; Alison Lembo, MSN, MBA, RN, CMSR. Poster presented by Melissa Schroeder BSN, RN, CHRN.

The GO-TEAM

The GO-TEAM is the rapid deployment arm of the R Adams Cowley Shock Trauma Center (RACSTC) that enables the extrication, resuscitation, and stabilization of patients prior to and during transport to advanced hospital facilities. In collaboration with the Maryland State Police Aviation Command and the Maryland Institute for Emergency Medical Services Systems, the GO-TEAM delivers anesthetic, surgical, and resuscitative services to the prehospital arena and renders life-saving interventions at the scene of injury. Each GO-TEAM activation will bring an attending physician and nurse anesthetist to the patient's side, whether that is on a highway, in the Chesapeake Bay, or at

the bottom of a ravine. The GO-TEAM is a joint effort between the Shock Trauma Center and Fire, Rescue, EMS, and aeromedical services throughout the region, and serves as a specialized component of Maryland's statewide emergency medical system.

In FY 2022, there were nine requests for the GO-TEAM, with two deployments – one to Charles County, for an MVC, and one to Baltimore City's Fort McHenry Tunnel, for an MVC with entrapment. Patients from both incidents were transported to Shock Trauma.

Center for the Sustainment of Trauma and Readiness Skills

Since 2001, US Air Force Medical Service personnel have traveled to Baltimore for training at the US Air Force Center for the Sustainment of Trauma and Readiness Skills (C-STARS), embedded within RACSTC. These civilian-military partnerships are crucial in keeping military medics continuously ready for wartime casualty care. In addition to providing educational observation experiences to the Air Force, we are now also providing these experiences to Walter Reed nurses and technicians.

FY 2022 Annual Report

■ Notable Accomplishments

- Matthew Piper, BSN, RN, TCRN, PHRN, Senior Clinical Nurse II from the Trauma Resuscitation Unit, was recognized for a second time as an "Excellence in Nursing" winner by *Baltimore Magazine*.
- Paul Thurman PhD, RN, ACNPC, CCNS, CCRN, Nurse Scientist, and Stella Hines, MD, from the Division of Pulmonary and Critical Care Medicine and Division of Occupational Medicine, completed their research study investigating healthcare workers use of elastomeric half mask respirators (EHMR). This study aimed to investigate physiologic changes to covering the exhalation valve of an EHMR with a surgical mask. No clinically significant changes occurred indicating that use of the surgical mask to potentially prevent aerosolization of the exhaled breath from EHMR use is safe. This study also completed analysis of a survey of healthcare workers (HCW) responses to EHMR use. They found that the majority (71%) of HCW confidence and knowledge of the steps in EHMR donning/doffing matched; however, 21% exhibited overconfidence, making those HCW a) more susceptible to accidental exposure, and b) unaware that an exposure has occurred. These findings suggest that continued training and monitoring of HCW use of respiratory protection is needed. This study has led to two publications.
- Karen McQuillan, MS, RN, CNS-BC, CCRN, CNRN, TCRN, FAAN, Lead Clinical Nurse Specialist, received the Excellence in Nursing Research award from the University of Maryland Medical Center.
- Sarah Rosenbloom, BSN, RN, TCRN, Senior Clinical

Nurse I on Multitrauma Intermediate Care 6, received the Excellence in Innovation Through Evidence-Based Practice award from the University of Maryland Medical Center.

- Melissa Schroeder, BSN, RN, CHRN, Senior Clinical Nurse I in the Hyperbaric Chamber, received the Excellence in Publication or Presentation Award by the University of Maryland Medical Center.
- The Critical Care Resuscitation Unit (CCRU) continues to maintain a 100% in Advanced Certification rate among Registered Nurses.

■ Presentations

- Matta, A., Andersen, B., Gaasch, S., Dawson, M., McComiskey, C. APP Critical Care Bootcamp: A Novel Method of Standardizing APP Critical Care Orientation. Abstract SCCM 2022, February 6-9, 2022, in San Juan, Puerto Rico.
- Andersen, B., Matta, A., Gaasch, S., Dawson, M., McComiskey, C., Schofield, D., Tran, Q. Nurse Practitioner Critical Care Fellowship Outcomes: Elevated Performance and Improved Retention. Abstract SCCM 2022, February 6-9, 2022, in San Juan, Puerto Rico.
- Karen McQuillan, MS, RN, CNS-BC, CCRN, CNRN, TCRN, FAAN, served on a panel presenting Restoring Joy in Nursing on May 16, 2022, for the American Association of Critical Care Nurses National Teaching Institute in Houston, Texas.
- TraumaCon 2022 – Society of Trauma Nurses Annual Conference, virtual conference, March 30–April, 2022, in Las Vegas, Nevada. Molecular Adsorbent Recirculating System (MARS) Therapy for Trauma Related Acute Liver Failure poster presenters: Donna Mursch, BSN, RN, CCRN; Jeffrey Broski, BSN, RN, CCRN; Christopher Kolokythas, MS, AGACNP-BC, ACCNS-AG; Shannon Gaasch, AGACNP-BC; Samuel Galvagno Jr., DO, PhD, FCCM.
- Katherine Aumann, DNP, CRNP, presented Trauma: A Seasonal Sport – Evaluation and Treatment of Common Summertime Orthopaedic High-Energy Injuries for the Meritus Health Virtual Trauma Spring Conference 2022 on May 10, 2022, Hagerstown, Maryland.
- Karen McQuillan, MS, RN, CNS-BC, CCRN, CNRN, TCRN, FAAN, served on a panel presenting Restoring Joy in Nursing on May 16, 2022 for the American Association of Critical Care Nurses National Teaching Institute in Houston, Texas.
- Fencel, R., Fitzpatrick, S., Dunlap, E., & Nagarsheth, K. (2022). *Utilizing of Removable Rigid Dressing to Decrease Below the Knee Amputations to Above the Knee Amputations Conversion Rates*. ePoster for the Society for Clinical Vascular Surgery Annual Symposium, March 19-23, 2022, Las Vegas, Nevada.
- Heidi Halterman MSN, RN, CEN, TCRN, NRP – Pro-

vided education to EMS clinicians:

- July 2021 – Rockville FD EMS Training Day with Tiffany Hein PA-C, MMS – Overview of STC.
- Fall 2021 – Carroll County ALS Refresher – Neurotrauma and Disaster Triage.
- March 2022 – Miltenberger Conference – “Using Your Brain to Care for Their Brain”.

■ EMS Educational Broadcasts

- November 2021 – When The Shock Comes To Trauma (116 participants)
- March 2022 - You Go, We Go - The Shock Trauma Go Team (203 participants)

■ Publications.

- Zhuang, E., Thurman, P., Chen, H. H., McDiarmid, M. A., & Hines, S. E. (2022). Physiological Impacts of Surgical Mask Coverage of Elastomeric Half-Mask Respirator Exhalation Valves in Healthcare Workers. *Annals of Work Exposures & Health*, 66(2), 233–245.
- Thurman, P., Zhuang, E., Chen, H. H., McClain, C., Sietsema, M., Fernando, R., McDiarmid, M. A., & Hines, S. E. (2022). Characteristics Associated with Healthcare Worker Knowledge and Confidence in Elastomeric Half-Mask Respirator Use. *Journal of Occupational and Environmental Medicine*.
- Andersen, B., Matta, A., Gaasch, S., Dawson, M., McComiskey, C., Schofield, D., Tran, Q. Nurse Practitioner Critical Care Fellowship Outcomes: Elevated Performance and Improved Retention. Abstract Society of Critical Care Medicine 2022, *Critical Care Medicine*, 2022 Supplement; 50 267-267. 1p.
- Hart, E, Murthi, SB. Transthoracic Ultrasound; 39-44. In: Atlas of Critical Care Echocardiography; Springer; 2021; 1st edition.
- Matta, A., Andersen, B., Gaasch, S., Dawson, M., McComiskey, C. (2022) *APP Critical Care Bootcamp: A Novel Method of Standardizing APP Critical Care Orientation*. Abstract Society of Critical Care 2022, *Critical Care Medicine*, 2022 Supplement; 50 267-267. 1p.
- Tran, Q. K, Najafali, D., Tiffany, L., Tanveer, S., Andersen, B., Dawson, M., et al. (2021). Effect of blood pressure variability on outcomes in emergency patients with intracranial hemorrhage. *Western Journal of Emergency Medicine: Integrating Emergency Care with Population Health*. 22(2): 177-185. Retrieved from <https://escholarship.org/uc/item/2bz607gt>.

■ **Quality Management and Improvement.** RACSTC maintains a complete and comprehensive quality management program. All aspects of care from prehospital trauma-line consulting to peer review of patient deaths and complications are monitored through the quality program, benchmarked to the best practices of other institutions, and continually improved.

The program integrates quality activities of other specialty services that provide care to critically ill and severely injured patients. The multidisciplinary Quality Improvement Committee is responsible for outlining the quality program, monitoring performance, and developing new initiatives.

■ **Injury Prevention Programs and Initiatives.** In keeping with the mission of preventing severe injury and death, RACSTC’s Center for Injury Prevention and Policy (CIPP) focuses on identifying injury trends and developing prevention education programs. In FY 2022, CIPP presented 115 events, reaching 6,303 students and community members with important prevention messages.

CIPP injury prevention programs include:

- Violence Intervention Program
- Bridge Program – Aimed at breaking the cycle of domestic or intimate partner violence
- Promoting Healthy Alternatives for Teens – Designed to expose youth to the consequences associated with poor decision-making
- Trauma Prevention Program – Saving Maryland’s At-Risk Teens, targeting high school students involved in dangerous behaviors related to drug and/or alcohol abuse
- Trauma Survivors Network
- Stop the Bleed® campaign – designed to educate community members on how to stop life-threatening bleeding with tourniquet application and wound packing.

The Stop the Bleed® program has touched and informed countless people through community outreach, such as the B’More Healthy Expo, as well as numerous local news segments and articles about this life saving skill. RACSTC’s Stop the Bleed® program succeeds through the strong voluntary collaboration between our clinical employees and community partners. Our program recommenced in January 2022 after being placed on hiatus during the COVID-19 pandemic. We participated in the National Stop the Bleed® day, training over 150 people within Shock Trauma, many of whom have joined our pool of instructors. In addition, RACSTC participated in a community event in Baltimore city, reaching over 500 people in one day. In total, during FY 2022, we have trained 1,378 Maryland citizens through 24 community-based classes. We continue impacting our Maryland community and teach anyone and everyone how to “Stop the Bleed® and Save a Life.”

■ **Emergency Medical Services and Nursing Continuing Education.** RACSTC continues to expand and advance educational programs focused on patient care trends by delivering lectures and participating in case reviews with local jurisdictions. In FY 2022, evening educational programs open to EMS clinicians and nurses were held twice via remote, live broadcast, reaching over 300 clinicians. Members of the RACSTC EMS liaison team continue to provide education to their assigned EMS jurisdictions. The Difficult Airway course was conducted

one time for 18 participants and 100 MSP Flight Medics completed the Trauma-Based Airway Management course, which was held five times in FY 2022. A virtual tour video is available to provide more EMS students, clinicians, and first responders an opportunity to gain better understanding of the process involved in transporting a patient to RACSTC. EMS clinicians are permitted to observe procedures in the Trauma Resuscitation Unit or in the Critical Care Unit. Eighty-four (84) EMS clinicians observed in FY 2022.

The Trauma Observation Program provides healthcare professionals with a current understanding of their particular area of interest through clinical interactions, meetings and lectures, rounds, and observation of operational procedures. Program participants include EMS students, pre-med students, military medics, nurses, high school trainers, nurse practitioners, and physicians. In FY 2022, we welcomed 51 observers to the Shock Trauma Center.

■ **Center for Critical Care Training and Education (CCCTE).** The CCCTE has a robust educational schedule and has built environments to mimic every phase of patient care within the Primary Adult Resource Center. The Center hosts many certification courses, including Advanced Trauma Life Support (ATLS), Advanced Trauma Care for Nurses (ATCN), PreHospital Life Support (PHLS) and Maintenance of Certification in Anesthesiology. Advanced trauma skills training includes Basic Endovascular Skills for Trauma, Extracorporeal Membrane Oxygenation (ECMO), and ultra-sound training. The American College of Surgeons designated RACSTC as the training site for both students and course instructors in Maryland. Critical care and surgical skills training courses are offered to providers from around the world. In FY 2022, over 500 classes were provided to more than 7,000 healthcare workers, including medical students, EMS clinicians, attending physicians, and nurses through the CCCTE.

The CCCTE also is home to EMS training via Difficult Airway, MSP training and Maryland Express Care courses along with a myriad of programs at UMMC Downtown and Midtown campus for all departments. In addition, we host community outreach educational programs, including Stop the Bleed®, Minds of the Future, and the Edmonson High School Scrub Tech Program.

We house four simulation rooms, including a Trauma Resuscitation Unit/Trauma ED, OR, PACU/Med Surgical, and ICU spaces with three conference rooms. We utilize both task trainers and high-fidelity simulators for our courses and work in partnership with the UMB SOM Cadaver Lab. We create moulage both temporary and reusable, utilize standardized participants as embedded team members within the simulations and as patients, and work with an AV system for observing simulations in real time, debriefing, research studies, and virtual learning.

Please check in on us at <https://www.umms.org/ummc/pros/critical-care-trauma-education>.

■ **Fellowships and Residencies.** The Surgical Critical

Care (SCC) Fellowship Program is the largest Accreditation Council for Graduate Medical Education (ACGME) accredited SCC training program in the country. RACSTC offers 21 fellowship positions in SCC, anesthesiology, orthopedic surgery, emergency medicine-SCC, and acute care surgery specialties.

The ACGME-accredited University of Maryland Orthopedic Traumatology Fellowship is considered to be the foremost orthopedic trauma fellowship worldwide. The fellowship is focused on preparing orthopedic surgeons for careers in academic orthopedic trauma surgery including emphasis on managing musculoskeletal injuries in severely or multiply injured patients in an interdisciplinary environment. Fellows also receive training in rigorous research methodologies and in learning to become effective surgical educators themselves. Five surgeons are selected for the fellowship annually through the orthopedic fellowship match program.

■ **Research.** Clinical research at RACSTC is conducted under the umbrella of the Shock, Trauma, and Anesthesiology Research – Organized Research Center (STAR-ORC), a multidisciplinary research and educational center focusing on brain injury, critical care and organ support, blood and resuscitation, surgical outcomes, patient safety, and injury prevention. It is the first research center in the nation dedicated exclusively to the study of trauma, its complications, and prevention. There are currently over 20 clinical studies being conducted at RACSTC. The diversity of these studies is impressive, covering nearly all body regions and systems. Study areas include, but are not limited to, traumatic brain injury, hemorrhagic shock, venous thromboembolism therapies, spinal cord injury, vascular injury, and the biomechanics of motor vehicle crash-related injury.

Our research projects are designed to enhance the trauma system's ability to resuscitate, stabilize, and treat the needs of trauma patients. We have a diverse portfolio of research partners. NIH is funding a translational clinical study seeking to identify key molecular biomarkers upregulated after severe trauma and indicating hemorrhagic shock. The ongoing Air Force-funded "Genomics, Microbiomics, and Bioenergetics-Based Personalized Treatment for Trauma Patients at Risk for Sepsis" is using NanoString technology to define the gene expression pathways in the traumatic brain injured population. The Brain Oxygen Optimization in Severe Traumatic Brain Injury—Phase 3 (BOOST-3) is a multicenter trial from The National Institute of Neurological Disorders and Stroke to test the efficacy of a prescribed treatment protocol based on monitoring the partial pressure of brain tissue oxygen PbtO₂. RACSTC has continued enrollment to the ongoing Hyperbaric Oxygen Brain Injury Treatment (HOBIT) trial and is about to begin the Brain Oxygen Optimization in Severe Traumatic Brain Injury trial, both large TBI/NIH-funded studies conducted through the SIREN Emergency Trials Network. RACSTC is initiating a study investigating psychotherapy for the recidivism of gunshot wound violence among young African American males, which was funded by the Eastern Association for the Surgery of Trauma..

■ **Rehabilitation Services.** RACSTC emphasizes early patient mobilization as the beginning of the ATLS rehabilitative process. The University of Maryland Rehabilitation & Orthopedic Institute and the UMMC Midtown Campus primarily provide post-acute inpatient and outpatient services for RACSTC patients.

Level I Adult Trauma Center

The Johns Hopkins Hospital

1800 Orleans Street, Baltimore, Maryland
MIEMSS Region III

The Johns Hopkins Hospital (JHH) is a designated Level I Adult Trauma Center serving Baltimore City and its surrounding counties, as well as patients throughout the state and region. JHH treated 2,239 trauma patients from June 1, 2021, through June 30, 2022, according to the Maryland State Trauma Registry. Adult trauma services are provided by the Division of Acute Care Surgery within the Department of Surgery.

Mission

The mission of Johns Hopkins Medicine is to improve the health of the community and the world by setting the standard of excellence in medical education, research, and clinical care. Diverse and inclusive, Johns Hopkins Medicine educates medical students, scientists, health care professionals, and the public; conducts biomedical research; and provides patient-centered medicine to prevent, diagnose, and treat human illness.

Adult Trauma Center Staff

Adult Trauma Medical Director:

Kent A. Stevens, MD, MPH, FACS

Adult Trauma Program Manager:

Zakk Arciaga, MSN, RN

FY 2022 Annual Report

■ **Notable Accomplishments.** JHH is again ranked among the top five hospitals in the nation according to *U.S. News & World Report's* Best Hospitals 2021-22 rankings. The trauma acute care surgery departments of JHH and Johns Hopkins Bayview Medical Center (JHBMC) are unified under a single division of Acute Care Surgery.

Institutions are only as strong as their people, and our trauma surgeons, advanced practice providers, nurses, and staff continue to serve the frontlines of the ever-evolving pandemic, in addition to the care of the injured patients.

Hopkins Trauma is led by Kent Stevens, MD, MPH, FACS, TMD, and Chief of the Acute Care Surgery Division, and his research interest continues to support Global Surgery, Trauma Care in Resource-Poor Settings, Trauma System Development, and Trauma Outcomes. Dr. Stevens continues to hold a joint ap-

pointment in the Department of International Health at the Johns Hopkins Bloomberg School of Public Health and is Associate Director of the International Research Unit, which is a World Health Organization (WHO) collaborative center.

Elliott R. Haut, MD, PhD, FACS, Vice Chair of Quality, Safety & Service for the Department of Surgery, is the Director of the Trauma/Acute Care Surgery fellowship at Johns Hopkins. Dr. Haut is the incoming Editor-in-Chief for *Trauma Surgery & Acute Care Open* (TSACO). He recently finished his tenure as Chair of Maryland TraumaNet. He is a member of the Board of Directors and the Scientific Advisory Council of the Coalition for National Trauma Research (CNTR). Dr. Haut is the principal investigator on a project funded by The Patient-Centered Outcomes Research Institute (PCORI) entitled “Implementing Best-Practice, Patient-Centered Venous Thromboembolism (VTE) Prevention in Trauma Centers”, working with 10 trauma centers across the country. He co-chaired the recent 2022 Consensus Conference to Implement Optimal VTE Prophylaxis in Trauma, funded by the National Institute of Health National Heart, Lung, and Blood Institute (NIH/NHLBI) and co-sponsored by CNTR.

Joseph V. Sakran, MD, MPH, MPA, FACS, is a trauma surgeon, coalition builder, policy advisor, public health practitioner, and nationally recognized advocate for gun violence prevention. He is currently Director of Emergency General Surgery, Associate Professor of Surgery and Nursing, Associate Chief of the Division of Acute Care Surgery, and Vice Chair of Clinical Operations at JHH in Baltimore, Maryland. Dr. Sakran is also a Senior Fellow at the Satcher Health Leadership Institute at Morehouse School of Medicine. He currently serves as President of the American College of Surgeons (ACS) – Maryland Chapter and is Vice-Chair of the Maryland ACS – Committee on Trauma.

Johns Hopkins Acute Care Surgery welcomes a new trauma attending to their division. Katherine Florecki, MD, completed her surgical critical care fellowship at JHH. Her fellowship and research focuses on surgical education, trauma simulation, standardization of trauma fellowship core curriculum, and resident-fellow well-being.

James Byrne, MD, PhD, completed his first year on faculty. He is enthusiastically applying his research training to further invigorate the trauma research efforts within the Division. In doing so, he leads the biweekly Division research meeting and is the site PI for two American Association for the Surgery of Trauma (AAST) Multi-Institutional Studies. He is the incoming Assistant Director of the Surgery Faculty-Student Mentoring Program for the Johns Hopkins Surgery Center for Outcomes Research program at Johns Hopkins Bloomberg School of Public Health under the leadership of Dr. Haut. In the past year, Dr. Byrne's work was presented on the podium at AAST and twice published in *JAMA Surgery*.

Mariuxi Manukyan, MD, is the site PI under the multicenter trial led by Dr. Grace Roxycki related to angioembolization and survival rates in severe hepatic injuries (blunt and penetrat-

ing). She will deliver an oral presentation related to the research at the American Association for the Surgery of Trauma in September 2022.

The division celebrates the retirement of Kathy Noll, MSN, RN, whose 38 years of service were celebrated in February 2022. The second program manager in the history of JHH, her accomplishments include eight publications and longstanding service with both state and national committees in Trauma. Her long service to JHH and service to trauma patients is noted and appreciated.

Zakk Arciaga, MSN, RN, has been appointed to serve as Trauma Program Manager at JHH. His nursing background includes Chair of Trauma and Critical Care Committee, Quality Coordinator, Interim Safety Officer, and Assistant Nurse Manager within the Johns Hopkins Emergency Department. He has presented posters at the Society of Trauma Nurses and Emergency Nurses Association, in addition to his publications for Implementation of Standardize Debriefing Tools (first author) and Simulation-Based Redesign of Cardiac Arrest Room Ergonomics. His interests include system integration, quality improvement, and staff satisfaction in improving trauma care.

■ **Quality Management and Improvement.** JHH continues to be a leader in quality and safety. Dr. Elliott Haut, the current Vice Chair of Quality, Safety & Service for the Department of Surgery at JHH, has worked to improve outcomes and eliminate preventable harm. JHH has received an A grade by Leapfrog related to patient safety, in addition to achieving the American College of Surgeons NSQIP's Meritorious Status for their performance.

Judy Schroeder, MS, RN-BC, continues to lead trauma quality improvement activities at JHH. She maintains strong organizational skills in facilitating multidisciplinary discussions for performance improvement. Most notable, Judy has identified a performance improvement project that aims at eliminating preventable harm related to vocal cord paralysis through efforts by removing latent safety defects, in addition to spreading awareness and re-education.

JHH's Armstrong Institute for Patient Safety and Quality leads regional, national, and international projects that reduce preventable harm, improve patient and clinical outcomes, and decrease health care costs. Their project can be found online at https://www.hopkinsmedicine.org/armstrong_institute/improvement_projects/.

■ **Injury Prevention Programs and Initiatives.** Judy Schroeder, MS, RN-BC, leads trauma injury prevention events at JHH. She plans the annual Trauma Survivor's Day Celebration and a Stop the Bleed® training program for Hopkins providers and staff.

Prevention of gun violence remains a large focus at the local, state, and national levels. Dr. Joseph Sakran, a JHH trauma surgeon, has played a major role in this effort through the levels

of medicine, public health, and policy. Dr. Sakran remains a prominent speaker on gun violence on Capitol Hill and has worked with numerous elected officials on a pathway forward towards safer communities and better gun control.

The Hopkins Responder Violence Intervention Program (VIP) provides intervention services to patients who have sustained an injury from a gunshot wound, stabbing, or assault. Led by Dr. Nathaniel Irvin, the program aims to interrupt cycles of intentional violence and trauma recidivism related to violence. It also provides follow-up visits to connect victims to community employment services, substance abuse counseling, and legal assistance.

In collaboration with Adult Trauma and the Violence Intervention Program, Judy Schroeder, JHH Trauma's Performance Improvement, Inquiry, and Injury Prevention Coordinator, organized a Gun Violence Awareness event at JHH, which focused on celebrating the survivors and allowing them to tell their stories. Members of the Hopkins Health System, MIEMSS, and esteemed community colleagues such as MONSE were invited to hear current trauma statistics paired with the heartfelt stories of our survivors in an effort to highlight our partnership in supporting our community.

The Johns Hopkins Center for Gun Policy and Research, a division of the Johns Hopkins Bloomberg School of Public Health, continues to deliver expertise on the issues related to gun violence prevention. The center provides input into the effectiveness of programs and policies aimed at reducing violence, as well as information to legislative and public health officials on effective interventions.

The Stop the Bleed® education campaign is offered to JHH professionals bimonthly, while outreach to individuals and groups is growing. Dr. Matthew Levy, Senior Medical Officer for Hopkins Center for Law Enforcement Medicine and Associate Professor of Emergency Medicine, remains an integral advocate at national and international levels. Most notable, Dr. Levy worked to develop a repository for Stop the Bleed® instructional materials that have been translated into Ukrainian, as well as additional resources made available to Ukrainians to help educate the public and provide additional care.

■ **Emergency Medical Services and Nursing Continuing Education.** Matthew Levy, DO, MSc, Associate Professor of Emergency Medicine and Deputy Director of Special Operations, is a senior faculty member who has multiple roles across the Johns Hopkins Health System, as well as at local, state, and federal governmental levels. In addition to serving as the EMS medical director for the Howard County Department of Fire and Rescue Services, Dr. Levy is also the Region III Medical Director for MIEMSS. Dr. Levy works closely with EMS officials from multiple agencies on numerous projects related to EMS system development, quality assurance, clinical protocols, EMS clinician education, and research. Dr. Levy holds joint appointments at the Uniformed Services University's

National Center for Disaster Medicine and Public Health, as well as the Department of Emergency Health Services at the University of Maryland, Baltimore County. He is a member of the Scientific Advisory Council for the American Red Cross. Dr. Levy has published extensively on topics related to emergency medical services, trauma critical care, and the Stop the Bleed® initiative. In 2021, he was the lead author on several landmark manuscripts on topics that included tourniquet use and management, Stop the Bleed®, EMS response during the COVID-19 pandemic, and others. In 2021, several national organizations, including the American Red Cross, the American College of Emergency Physicians, and the National Association of Emergency Medical Technicians, called upon Dr. Levy to provide subject matter expertise in the development of courses related to emergency medical and bystander care.

Trauma Education continues as a priority for the trauma center. Trauma attending physicians at JHH teaches Advanced Trauma Operative Management, Advanced Trauma Life Support, Advanced Surgical Skills for Exposure in Trauma, and Rural Trauma Team Development courses. Many trauma physicians are speakers at numerous national and international conferences this past year. They have added expertise as session moderators, visiting professors, and keynote speakers throughout the country, and have conducted presentations for members of the US Congress and military.

■ **Fellowships and Residencies.** The Adult Trauma program welcomes three new Acute Care Surgery/Trauma Fellows: Stephanie Martinez, MD; Kathryn Joy, MD; and Jeremy Kauffman, MD. Dr. Elliott Haut is the Acute Care Surgery Fellowship director. The program graduates two or three fellows per year.

■ **Research.** As an academic medical center, all attending trauma center faculty maintain research interest and expertise through a trauma research program directed by Dr. Haut. Extramural research funding of over \$4 million in grants and contracts have been awarded to projects with trauma surgery faculty serving as primary investigators, some of which have culminated in notable publications and presentations. Extramural funding has come from sources including the Patient-Centered Outcomes Research Institute (PCORI), the Agency for Healthcare Research and Quality (AHRQ), the Department of Defense/Army Medical Research Acquisition Activity, and the Henry M. Jackson Foundation for the Advancement of Military Medicine (HJF).

The faculty carry diverse research interests, including health services research related to trauma outcomes, trauma systems in the developing world, trauma resulting from interpersonal violence, the effects of frailty on injury outcome, prehospital trauma care, and gun violence prevention. Trauma research resulted in a significant number of peer-reviewed publications this past academic year.

JHH maintains a unique collegial relationship with

JHBSPH that encompasses all facets of ongoing research. Drs. Haut and Stevens have joint faculty appointments at JHBSPH, and Dr. Haut runs the Surgery Faculty-Student Mentoring Program, which pairs master's students with faculty to perform clinical and outcomes research. The success of this program has been documented in *JAMA Surgery*, and it has trained over 100 students, resulting in over 200 peer-reviewed manuscripts.

■ **Rehabilitation Services.** The JHH Department of Physical Medicine and Rehabilitation (PM&R) continues to provide a wide range of rehabilitation services to trauma patients, from the bedside to inpatient rehab and home services. The Comprehensive Integrated Inpatient Rehabilitation Program, opened in 2017, is a state-of-the-art, 18-bed inpatient rehabilitation unit offering unique features that include a mock apartment where patients can practice the tasks of living independently and a “streetscape” area for patients to rehearse activities of daily living, such as grocery shopping and using an ATM. The JHH PM&R also sponsors a yearly national rehabilitation conference. This year's conference focus will be on the early mobilization of patients in the ICU setting.

Level II Adult Trauma Center

Johns Hopkins Bayview Medical Center

4940 Eastern Avenue, Baltimore, Maryland
MIEMSS Region III

Johns Hopkins Bayview Medical Center (JHBMC) is a designated Level II Adult Trauma Center serving eastern Baltimore City, eastern Baltimore County, Harford, and Cecil Counties. From June 1, 2021, through May 31, 2022, JHBMC treated 2,650 trauma patients, according to the Maryland State Trauma Registry. An additional 1,680 patients underwent expedited trauma evaluations upon Emergency Department arrival due to their prehospital EMS reports, but did not meet criteria for entry into the registry. Adult trauma care services at JHBMC are provided by the Johns Hopkins School of Medicine Department of Surgery's Division of Acute Care Surgery.

Mission

As a member of Johns Hopkins Medicine, Johns Hopkins Bayview Medical Center provides compassionate health care that is focused on the uniqueness and the dignity of every patient. The program is committed to providing emergency access to surgical care for acutely-injured patients with time-sensitive injuries. The program provides patient-centered comprehensive care to all trauma patients, incorporating a multidisciplinary, team-oriented approach. Under the collaborative leadership of specialized physicians, nurses, and members of the allied healthcare team, the program continues to evolve through implementation of protocols to address patient, community, and institutional needs.

Adult Trauma Center Staff

Adult Trauma Medical Director:

Raymond Fang, MD, FACS

Adult Trauma Program Manager:

Afton Jamerson, BSN, RN, TCRN, CEN

FY 2022 Annual Report

■ **Notable Accomplishments.** JHBMC remains among one of the busiest trauma centers in the state by patient volume. The trauma and emergency surgery services of both JHBMC and the Johns Hopkins Hospital are unified under a single Division of Acute Care Surgery and provide trauma attending physician support for both trauma centers. JHBMC welcomed new staff in FY 2022 to include Trauma Attending Surgeon Dr. Jeffrey Jopling and Trauma Quality Management Coordinator Tom Vargas. The Bayview Trauma Advanced Practice Providers (APP) Service expanded to four APPs who provide care exclusively for trauma patients facilitating more admissions to the Trauma Service with the goal of better patient outcomes through dedicated, specialized care.

Trauma Medical Director Dr. Raymond Fang currently serves as the Vice-Chair for TraumaNet and the Chair of the Maryland Committee on Trauma. Trauma Program Manager Afton Jamerson currently serves as the Co-Chair of the Maryland Trauma Quality Improvement Committee.

JHBMC was excited to again celebrate Trauma Survivors during National Trauma Awareness Month in May 2022. The Trauma Center welcomed back a survivor and her family and celebrated her recovery with a video presentation, speakers, and lunch. Trauma team members also participated in the “Race to Rebuild 5K” to support trauma survivors during Trauma Awareness Month.

National Stop the Bleed® Day was also celebrated with a “marathon” day of training in which Stop the Bleed® was taught from 7:30 a.m. to 7:30 p.m. to any hospital employee.

■ **Quality Management and Improvement.** JHBMC continues to strengthen its quality management process, striving to continuously improve patient care and outcomes at the individual and system level. The multi-disciplinary Trauma Joint Practice Committee consisting of physician liaisons from Emergency Medicine, Trauma Surgery, Orthopaedic Surgery, and Neurosurgery reviews patient care in order to enhance multidisciplinary collaboration and to identify improvement opportunities. Trauma Services has become a leader in performance improvement for JHBMC, closely collaborating with hospital quality committees that are dedicated to patient safety and improving patient outcomes outside of trauma care. Monthly, Trauma leadership meets with leaders from Orthopedic Surgery, Emergency Medicine, Radiology, and Burn for case review sessions. Two shared Trauma/Emergency Department Performance Improvement nurses provide expert bedside trauma care while mentoring their Emergency Department nursing colleagues.

Performance Improvement is led by two Trauma Quality Management Coordinators, Sarah Contos and Tom Vargas, both of whom have extensive ICU bedside experience. The performance improvement team at JHBMC is dedicated to ensuring quality patient outcomes for our trauma patients at Bayview.

■ **Injury Prevention Programs and Initiatives.** JHBMC injury prevention efforts continue to be impacted by restrictions related to the COVID-19 pandemic. JHBMC successfully held their second Stop the Bleed® marathon training throughout the day on National Stop the Bleed® Day in May 2022. JHBMC has also re-entered the community to offer Stop the Bleed® Training with training sessions to local Boy Scout troops, Maryland Occupational Safety and Health, and teams throughout the hospital. JHBMC successfully trained 265 members of the community and hospital in Stop the Bleed® in FY 2022. Trauma Program Manager Afton Jamerson participated in two injury prevention segments for Mid-Day Maryland, highlighting falls prevention and Stop the Bleed®. JHBMC looks forward to a collaborative falls prevention effort with Physical Therapy and Emergency Medicine during Falls Prevention Month in September 2022.

■ **Emergency Medical Services and Nursing Continuing Education.** JHBMC supported semi-annual education for pre-hospital EMS clinicians with trauma and burn injury content at two full-day virtual educational seminars in the fall of 2021 and spring of 2022. Enhancing the knowledge of front-line nurses at JHBMC is crucial to improving patient outcomes. JHBMC supports nursing staff attendance to the Emergency Nurses’ Association Trauma Nursing Core Curriculum (TNCC). JHBMC proudly supports nurses pursuing national certification in trauma nursing with five registered nurses obtaining the Trauma Certified Registered Nurse (TCRN) designation by the Board of Certification for Emergency Nursing. JHBMC trauma program members actively support the Maryland Committee on Trauma’s Advanced Trauma Life Support and Advanced Trauma Care for Nurses Courses as Course Directors and Instructors. Afton Jamerson led TraumaNet’s effort to conduct a statewide “Trauma Care After Resuscitation” course attended by nurses from all of Maryland’s Trauma Centers.

■ **Research.** The integrated Division of Acute Care Surgery provides JHBMC with opportunities to join new and ongoing research initiatives focused on trauma care.

■ **Rehabilitation.** Approximately one-third of admitted trauma patients require a period of rehabilitative care after hospitalization, especially older patients with preexisting comorbidities. JHBMC has access to an inpatient acute rehabilitation center on its campus to care for patients appropriate for this level of care. JHBMC Social Work and Case Management services assess each individual patient’s post discharge care needs prior to hospital release.

Level II Adult Trauma Center

University of Maryland Capital Region Medical Center

901 Harry S. Truman Dr. N., Largo, Maryland
MIEMSS Region V

The University of Maryland Capital Region Medical Center (Cap Region) is a designated Level II Adult Trauma Center serving Prince George's County and other adjacent areas, including Washington, DC. With four major highways nearby, the hospital is an ideal location for local EMS transport and public accessibility. According to the Maryland State Trauma Registry, the University of Maryland Capital Region Medical Center treated 2,883 trauma patients from June 1, 2021, to May 31, 2022. (See pages 83 to 88 for additional patient data.)

Mission

The University of Maryland Capital Region Health is committed to restoring the quality of life for all of our patients, beginning with prehospital communication, and extending during their hospital stay and long after discharge. Our dedication to our patients extends to their families and the communities in which they live by providing state-of-the-art clinical care delivered with compassion, dignity, and respect. We demonstrate our mission by providing exemplary care for each of our patients and their families, enhancing health and wellness, providing highly specialized services to a broad community, and building an environment where each person is valued and respected. Our mission is to the community, both in the treatment of diseases as well as in the pursuit of prevention strategies.

Adult Trauma Center Staff

Adult Trauma Medical Director:

Anthony Tannous, MD, FACS

Adult Trauma Program Director:

Dawn Moreland Pratt, BSN, RN, TCRN

FY 2022 Annual Report

■ **Notable Accomplishments.** Opened in June 2021, the medical center offers a state-of-the-art facility with five treatment bays within a large trauma resuscitation unit, an operating room dedicated to trauma surgery, one operating room dedicated to acute care surgery, and one hybrid operating room dedicated to vascular, orthopedic, and trauma care.

The Acute Care Surgery and Trauma faculty consists of five board-certified surgical critical care full-time Associate Professors as well as one part-time surgeon, along with two community-practice surgeons with decades of trauma experience. We continue to host rotating acute care surgery fellows from the R Adams Cowley Shock Trauma Center in Baltimore and support the education of Howard University surgery residents at every level of their training, as well as rotating residents from Walter Reed Medical Center and Anne Arundel Medical Center.

To widen our coverage for the population of Prince George's County, the University of Maryland Capital Region Medical Center will be designated as a Kaiser facility in July 2022.

■ **Quality Management and Improvement.** Acute Care Surgery's quality management program remains successful with the collaborative efforts of a multidisciplinary care team that align positive patient outcomes with clinical expertise and best practices. Through multiple monthly comprehensive cases and peer reviews, loop closures and process improvement initiatives represent our commitment to improving the care and outcomes of injured patients. Strong collaborations enable the Acute Care Surgery program to have an overall institutional commitment to the care of the injured patient and ensure access to necessary resources. In July 2022, a new ACS Performance Improvement Coordinator will be hired to assist with Performance Improvement efforts.

■ **Injury Prevention Programs and Initiatives.** Injury-specific prevention and awareness resources are shared with in-patients during daily rounds by our Injury Prevention and Outreach Coordinator. During National Trauma Awareness month in May, we hosted a myriad of Trauma Awareness and Prevention activities, providing information and hands-on Stop the Bleed® and fall prevention demonstrations; the Wheel of Prevention highlighted other injury prevention tips. Our Injury Prevention and Outreach program was awarded the TraumaNet Stop the Bleed® grant kits for community education. We also informed the community and our visitors during National Gun Violence Awareness and Prevention Day, providing education and resources via question-and-answer tables and Cap Region's social media sites. Partnering with Cap Region's Community Health and Domestic Violence and Sexual Assault Center (DVSAC) teams, we participated in community events, and visited multiple community centers and centers for aging, providing general injury prevention awareness. We also distributed bicycle helmets and car seats and maintained active participation in the DC Trauma Injury Prevention Coordinators Collaborative (DC TIPCC). Reaching over 1,600 persons throughout the year, our goal is to touch and save many lives.

Our Capital Region Violence Intervention Program (CAP-VIP) hosts weekly virtual Men's Group meetings, allowing for continued contact with survivors and ensuring the necessary mental health and resource support needed for a full recovery, beyond discharge, is identified and provided. Participating in local community-led events, encouraging active participation, and with the support of our Trauma Surgeons and champion physician from Physical Medicine and Rehabilitation, CAP-VIP continues to be a leading HVIP, making strides in interrupting the cycle of violence and associated recidivism. CAP-VIP also partners with research associates to identify participant-centered outcomes to promote and affect policy, strategy, and process changes.

The John “Jack” Godfrey Traumatic Brain Injury Support Group for survivors and caregivers maintains its monthly virtual platform facilitated by our Trauma Social Worker and Speech and Language Pathologist, addressing the emotional, physical, resource, and support needs of survivors and caregivers.

■ **Emergency Medical Services and Nursing Continuing Education.** Cap Region hosted its first annual Trauma and EMS Winter Conference, offering a variety of trauma and injury-specific educational presentations to over 200 attendees. Nursing education includes web-based orientation modules, skills simulation stations, lectures specific to the care of the injured patient, and mock codes to create real-life scenarios. Efforts are supported by the ACS team to enhance learning and build relationships. To expand learning, three nurses from the ED, ICU, and MedSurg units were chosen to attend the statewide Trauma Care After Resuscitation (TCAR) sponsored by TraumaNet.

■ **Research.** Cap Region’s Trauma Registry and ACS team support internal, local, and multi-institutional research efforts to identify trends, improve outcomes, and evaluate injury prevention efforts. There are active collaborations with the Shock Trauma Center as well as the University of Maryland School of Public Health focusing on research around violence intervention and recidivism.

■ **Rehabilitation.** We maintain a constant collaboration with the Physical Medicine and Rehabilitation team to ensure that the physical, occupational, and speech-language therapy needs of the injured patient are met.

Level II Adult Trauma Center

Sinai Hospital

2401 West Belvedere Avenue, Baltimore, Maryland
MIEMSS Region III

Sinai Hospital (Sinai) is a designated Level II Adult Trauma Center serving the Greater Baltimore metropolitan area. Sinai treated 2,567 trauma patients from June 1, 2021, through May 31, 2022, according to the Maryland State Trauma Registry. (See pages 83 to 88 for additional patient data.) Adult trauma services at Sinai are provided by the Acute Care Division of Surgery

Mission

Sinai Hospital is part the LifeBridge Health System. Under the leadership of President Daniel Blum, our mission is to maintain and improve the health of the individuals and communities we serve through compassionate, high-quality care. LifeBridge Health offers comprehensive treatment and preventative wellness services. In addition, Sinai Hospital is dedicated to educating medical students and residents, and engaging in research to improve lives throughout Maryland and worldwide.

Adult Trauma Center Staff

Trauma Medical Director:

Hashim Hesham, MD, FACS

Trauma Program Manager:

James Gannon MS, RN, CEN

FY 2022 Annual Report

■ **Notable Accomplishments.** In April 2022, several members of the Division of Trauma, Geriatric Surgery, Pharmacy and Nursing were published in the *Journal of American Medical Directors Association (JAMDA)* for work done to improve the treatment of injured persons age 65 years and older who have alcohol dependence. Recognizing that this population may not be best treated by conventional alcohol withdrawal protocols, the Division of Trauma sought to develop additional screening and treatment modalities. The article, “Geriatric Trauma Patients with Alcohol Withdrawal”, is the summation of current literature reviews and will serve as the foundation for further practice guidelines in the treatment of alcohol withdrawal in our aging population.

Trauma Program Manager James Gannon, MS, RN, CEN, was invited and spoke at the inaugural international 2022 Abu Dhabi ECMO and Trauma Conference in the United Arab Emirates. Mr. Gannon gave two lectures on trauma program performance improvement loop closure and nursing-based outreach and prevention strategies. He also sat on two expert question-and-answer panels during the conference.

■ **Injury Prevention Programs and Initiatives.** On November 18, 2021, Sinai Hospital partnered with Injury Free Coalition, a national organization dedicated to preventing injury in children, for Kids’ Injury Prevention Day, joining many other hospitals and businesses across the region and around the nation by turning our hospital green to raise awareness and prevention of child injuries.

In spring 2022, LifeBridge Health opened its new Center for Hope building in Park Heights, partnering closely with Sinai Hospital’s Division of Trauma. Formerly Baltimore’s Child Abuse Center, the Center for Hope is part of Baltimore City’s comprehensive approach to combat area violence. The center offers a wide range of services for survivors of sexual assault, domestic abuse, human trafficking, and gun violence, including reduced-cost counseling, forensic interviews, social needs, and medical assessments.

In April 2022, Sinai’s Division of Trauma formed a partnership with Pimlico Elementary Middle School’s Health Science Program to offer Stop the Bleed® instruction to more than 50 sixth- and seventh-graders.

For the second consecutive year, Sinai Hospital kicked off Child Abuse Awareness month in May by participating in the Red Desk Project, a call to action to prevent child homicide. Each year, Sinai places red desks on the lawn in front of the hospital, with each desk representing a child’s life lost to ho-

micide in Baltimore City. This year, Sinai extended this project to include a display inside of the hospital's atrium memorializing the 19 children who tragically lost their lives at the Robb Elementary School shooting in Uvalde, Texas. The desks remain on display for the entire month of May.

This past year, Dr. Stephanie Armocida joined members of TraumaNet to provide Stop the Bleed® education on the WMAR-TV program Midday Maryland. Dr. Armocida discussed the lifesaving tools of recognizing and treating life-threatening hemorrhage.

Sinai Hospital's Division of Trauma also participated in two events where we brought awareness to the dangers of heatstroke from children being left alone in cars. During the grand opening for the Center for Hope, we set up a large temperature display on loan from MIEMSS showing the extreme temperature the inside of a vehicle can reach when parked outside. The second, and similar event, took place a week later outside of Sinai Hospital. During this event, we also engaged TraumaNet, the public, and our social media platforms with a daylong exhibit of the rising internal vehicle temperature and offered education of the dangers of leaving children, pets, and vulnerable adults in a parked car.

■ **Quality Measures and Improvements.** Sinai Trauma Services continues to be active in quality improvement initiatives. Partnering with our system-wide LBH Quality and Patient Safety Department and various multidisciplinary hospital committees allows Trauma Services to concurrently and retrospectively review cases on individual, unit, divisional and system levels. Through a large multidisciplinary approach, providers from all services involved in the injured persons' care, routinely review and implement best practices to improve the outcomes and experience for our trauma population.

■ **Emergency Medical Services and Nursing Continuing Education.** Over the course of FY 2022, the Division of Trauma provided information for nursing trauma continuing education through the many virtual and hybrid conferences that were offered nationally. Sinai's Emergency Department continued to work with the Emergency Nurses Association (ENA) to provide our staff with Trauma Nurse Core Course (TNCC) and Emergency Nurse Pediatric Course (ENPC) via a virtual platform to ensure our staff could receive advanced trauma nursing training. Several Emergency Department nurses also received advanced certifications such as Trauma Certified Registered Nurse (TCRN), Certified Emergency Nurse (CEN), and Certified Pediatric Emergency Nurse (CPEN).

In September 2021, Sinai Hospital brought back our annual Treating Trauma: Care Across the Continuum Conference. The course is comprised of local and national experts who deliver innovative and evidence-based presentations on current topics in trauma care, including prehospital, inpatient, and post-discharge phases. The conference was offered virtually and had attendees from across the nation. This year's speakers discussed topics that

included wilderness EMS, traumatic brain injury, emergency triage, traumatic hand injuries, and mass casualty.

In coordination with our simulation lab, our Emergency Department and Surgery Residency program hold quarterly multidisciplinary trauma simulations. Through the guidance of our Trauma Surgery Attendings, these simulations strengthen relationships and provide opportunities for educational growth and development between the teams.

■ **Fellowships and Residencies.** Sinai continues to boast a full staff of fellowship-trained acute care surgeons providing in-house 24/7 coverage, 21 surgical residents ranging from interns through fifth-year who have extensive training in trauma care, and a dedicated and experienced advanced practice provider staff.

Sinai is the third largest teaching hospital in the state, training residents in multiple specialties. All surgical residents and advanced practice providers at Sinai maintain current ATLS, ACLS, and BLS certifications. The surgical residents also have the opportunity to pursue additional trauma training in Advanced Trauma Operative Management, Focused Abdominal Sonography in Trauma, and Advanced Surgical Skills for Exposure in Trauma. Our residents complete four-week rotations at the R Adams Cowley Shock Trauma Center during their post-graduate III year, focusing on treating soft-tissue injuries; Johns Hopkins main campus, focusing on transplant surgery; and, during their post-graduate II year, at Johns Hopkins Bayview Medical Center, focusing on burn surgery and wound care.

■ **Research.** Our LBH Department of Research provides opportunities for all levels of providers and staff to participate in research initiatives, including those that advance trauma care. This past year, the Division of Trauma at Sinai Hospital has partnered with our Geriatric Surgery program and the Department of Advanced Orthopedics on research projects to further enhance the care we provide to our injured patients.

■ **Rehabilitation.** Sinai rehabilitation services are integrated throughout the patient's hospital stay. When a patient is ready for discharge, Sinai can accommodate qualifying patients in a 43-bed inpatient rehabilitation center. Sinai offers a full spectrum of acute rehabilitation services, including pain management, aquatic therapy, physical therapy, occupational therapy, and speech-language therapies. The rehabilitation center also supports patients with specialists in psychiatry, social work, rehab psychology, offers programs for individuals with balance and dizziness, driving evaluations, return-to-work programs, and a brand-new division of rehabilitation engineering.

Level II Adult Trauma Center

Suburban Hospital – Johns Hopkins Medicine

8600 Old Georgetown Road, Bethesda, Maryland
MIEMSS Region V

Suburban Hospital – Johns Hopkins Medicine (Suburban) is a designated Level II Adult Trauma Center serving Montgomery County, but also easily accessible from Frederick and Prince George’s Counties. Suburban treated 2,001 trauma patients from June 1, 2021, through May 31, 2022, according to the Maryland State Trauma Registry. Adult trauma services at Suburban are provided by the Trauma and Emergency Surgery Section of the Department of Surgery.

Mission

Suburban Hospital’s mission is improving health with skill and compassion. As a member of Johns Hopkins Medicine, Suburban Hospital is committed to fostering the development of an integrated and innovative system of care that provides state-of-the-art clinical care, supported by a strong base of medical research and education. The Board of Trustees continues to reaffirm its commitment to providing all the resources and the infrastructure necessary for a Level II trauma designation, and the entire staff of Suburban Hospital remains dedicated to the delivery of safe and individualized quality medical care that is so much appreciated by patients and families.

Adult Trauma Center Staff

Trauma Medical Director:

Dany Westerband, MD, FACS

Trauma Program Director:

Virginia Schad, RN, BSN

FY 2022 Report

■ **Notable Accomplishments.** Suburban Hospital’s campus-wide transformation was completed in March 2020. The renovations included a 300,000 square-foot addition, a parking garage, a dedicated ambulance driveway with direct access to the Emergency Department entrance, 108 new private patient rooms with enhanced infection control, and the construction of an upgraded suite of 14 state-of-the-art operating rooms, including one hybrid operating room for enhanced imaging capabilities during procedures.

■ **Injury Prevention Programs and Initiatives.** Since September 2016, Suburban has been an active participant in the national Stop the Bleed® campaign and held multiple campus-based events to encourage bicycle safety and increase awareness of the dangers of distracted driving. More recently, in response to the nationwide critical blood shortage, the Trauma Program Staff has actively supported blood drives organized by the Red Cross to encourage the recruitment of donors.

■ **Quality Management and Improvement.** In an effort to identify opportunities for improvement at all levels, Suburban’s comprehensive care review process was significantly strengthened to include a review of every trauma chart by the trauma clinical data abstractor, the trauma performance improvement nurses, the trauma program director, and the trauma medical director. In addition, all deaths, transfers out, and complications continue to be presented at the monthly multidisciplinary trauma Morbidity and Mortality Conference.

■ **Emergency Medical Services and Nursing Continuing Education.** Suburban’s Emergency Department continues to be a training site for prehospital care clinicians through an agreement with the Montgomery County Training Academy and Montgomery County Community College. Due to the COVID-19 pandemic, the spring 2021 Critical Issues in Trauma seminar was cancelled. However, the conference is expected to be offered again in fall 2022.

■ **Research.** No trauma-related research paper was submitted in FY 2022.

■ **Rehabilitation.** Suburban retains a memorandum of understanding with Adventist HealthCare Rehabilitation Center to provide rehabilitation services. Occupational, physical, and speech therapy are provided onsite to trauma patients during their hospital stay. All admitted trauma patients are assigned a case manager, who works closely with the trauma team to make appropriate referrals to rehabilitation facilities.

Level III Adult Trauma Center

Meritus Medical Center

11116 Medical Campus Road, Hagerstown, Maryland
MIEMSS Region II

Meritus Medical Center (MMC) is a designated Level III Adult Trauma Center serving Washington and Frederick Counties in Maryland, southern Pennsylvania, and the eastern panhandle of West Virginia. MMC treated 2,760 trauma patients from June 1, 2021, through May 31, 2022, according to the Maryland State Trauma Registry (See pages 83 to 88 for additional patient data). Adult trauma services are provided by the staff of the emergency department.

Values

Our culture is driven by a set of values that focus on the patient and family first: respect, integrity, service, excellence, and teamwork.

Mission

To improve the health status of our region by providing comprehensive health services to patients and families.

Adult Trauma Center Staff

Trauma Medical Director:

Joseph Schulz, D.O.

Trauma Program Manager:

Susie Burlison, D.N.P., M.B.A., RN, NE

FY 2022 Annual Report

■ **Notable Accomplishments.** In FY 2022, MMC provided continuing education through its bi-annual trauma conferences to more than 300 providers. Attendees included EMS personnel, hospital staff, and other local health care providers from outside the organization.

MMC implemented an Acute Care Emergency Surgery/Trauma (ACES) program in the organization with 24/7 in-house coverage.

■ **Quality Management and Improvement.** Throughout the past year, MMC trauma center staff worked to improve trauma documentation. The staff heavily focused efforts on complete documentation of vital sign assessments on arrival and departure from the ER. We have implemented changes to our electronic health record to allow for automated reminders to staff to provide the required documentation. The trauma team has also redesigned the workflow in the trauma rooms to allow for better movement and care of the trauma patient by eliminating duplicate equipment and ensuring all bays are consistent in supply and specialty equipment location. The trauma center staff also worked with the ED physicians and pharmacy to help ensure antibiotics are administered within one hour of arrival for open fractures. We are currently working on increasing efficiency of trauma patient throughput in the ER and have implemented daily multi-disciplinary rounds for inpatient trauma admissions in order to decrease length-of-stay and improve patient satisfaction.

■ **Injury Prevention Programs and Initiatives.** In FY 2022, MMC participated in statewide injury prevention days, promoting distracted driving awareness and falls prevention. MMC trauma staff also taught several Stop the Bleed® classes in the community.

MMC worked collaboratively with Safe Kids Washington County to provide bicycle, fire, poison, sun, and pedestrian safety education to 1,135 children in the community. MMC also partnered with local summer camps to discuss overall safety with children.

In addition to car seat checks and loaner programs (see Notable Accomplishments above), MMC trauma staff offered one-on-one car seat installation assistance to families in the community; teaching parents and grandparents how to properly install child passenger safety seats. During this time, MMC offered virtual and in-person car seat checks.

■ **Emergency Medical Services and Nursing Continuing Education.** In FY 2022, MMC organized free trauma confer-

ences for staff and EMS partners, and provided trauma nurse core curriculum (TNCC) and emergency nursing pediatric care (ENPC) courses at the hospital. The Trauma Department also provided Case Reviews for EMS throughout the region.

Each spring, the trauma department team recognizes a Trauma Nurse of the Year for his/her outstanding care of patients. The honoree is granted an educational stipend to spend at a trauma conference.

■ **Research.** MMC has a professional nursing research council that studies evidence-based, best practices in nursing, including a recent study on nurses' perception of "quiet time" in the critical care unit.

■ **Rehabilitation.** Meritus Total Rehab Care (TRC) is the largest, most comprehensive rehabilitation center in the region, providing care in an inpatient hospital unit, as well as at an outpatient facility located in Robinwood Professional Center, adjacent to the hospital. The medical director, nursing staff, therapists, social workers and program managers at TRC work together to provide innovative treatment to patients. A full range of rehabilitation programs is available at the center, including comprehensive adult inpatient rehabilitation, outpatient pediatric and adult services, traumatic brain injury rehabilitation and an inpatient joint replacement program. TRC's inpatient rehabilitation unit is certified to meet national rehabilitation standards set forth by the Commission on Accreditation of Rehabilitation Facilities (CARF).

Level III Adult Trauma Center

TidalHealth Peninsula Regional

100 East Carroll Street, Salisbury, Maryland
MIEMSS Region IV

TidalHealth Peninsula is a designated Level III Adult Trauma Center serving the Delmarva Peninsula, the Eastern Shore of Maryland, Sussex County in southern Delaware, and Accomack County on the Eastern Shore of Virginia. TidalHealth encompasses the former Peninsula Regional Health Systems, Nanticoke Memorial Hospital, McCready Memorial, the Peninsula Regional Medical Group, Nanticoke Physician Network, Delmarva Heart, and Peninsula Cardiology. TidalHealth treated 1,835 trauma patients from June 1, 2021, to May 31, 2021, according to the Maryland State Trauma Registry. (See pages 83 to 88 for additional patient data.) The Emergency/Trauma Center provides adult and pediatric trauma services at TidalHealth Peninsula.

Values

Quality, Service, Community – These values set the foundation for our culture and purpose, and they are the driving force behind our attitudes and actions.

Mission

Our mission is to improve the health of the communities we serve.

Adult Trauma Center Staff

Trauma Medical Director:

Brion McCutcheon, MD

Trauma Program Manager (Interim):

Kathy Nichols, RN, MS, CEN, CPEN

FY 2022 Annual Report

■ **Notable Accomplishments.** The TidalHealth Peninsula Trauma program has undergone staffing changes this past year with the departure of long-standing manager Kari Cheezum. We are appreciative of Kari's leadership of the program for the past eight years, and wish her well in the next phase of her career. We are grateful to our trauma program registrars and Kathy Nichols, our interim trauma program manager, for working diligently to maintain the program during the transition. The trauma department has worked in conjunction with the clinical educator to expand the orientation process for new nurses on topics related to trauma.

Former trauma program manager Kari Cheezum received the Daisy Award this past year for going beyond the call of duty to track down a non-English speaking mother and ensure that her six children received new car seats after a motor vehicle collision. Kari put forth a great deal of effort coordinating with the children's pediatrician and coming in on her day off to install the car seats. We are proud that she was the recipient of the well-deserved award.

■ **Quality Management and Improvement.** Several quality improvement initiatives from 2021 remain ongoing. In an effort to improve trauma documentation, Trauma and ED leadership continue to work with the EPIC healthcare software team to improve the Trauma Narrator, an EPIC proprietary application, making it more user-friendly for clinicians. Working with clinical staff, a multidisciplinary team continues to work to improve quality metrics, including vital signs, antibiotics for open fractures, time to head CT, and door to reversal times for anticoagulated patient with abnormal imaging. Documentation feedback is provided to team members as needed. After a brief hiatus due to COVID-19, mandatory Trauma Simulation sessions have resumed. These simulations offer staff an opportunity to document in the EMR in real-time, as well as incorporate the Trauma Nurse Process into practice. We are working to standardize our trauma program policies throughout the health system to further develop an evidence-based, consistent approach to providing care to trauma patients.

■ **Injury Prevention Programs and Initiatives.** Following a long COVID-19 hiatus, our injury prevention initiatives have slowly resumed, including "Safe Kids" preventing heat stroke/forgetting kids in cars (July 2021) and, in September 2021, National Night Out, featuring back-to-school safety, as well as

fitting and gifting of bike helmets to kids. In March 2022, we resumed Stop the Bleed® classes. In June 2022, we participated in the Maryland State Firemen's Association Annual Convention & Conference in Ocean City with an emphasis on pedestrian safety, as well as another Stop the Bleed® class.

■ **Emergency Medical Services and Nursing Continuing Education.** TidalHealth assists in planning, coordinating, and sponsoring regular educational events for prehospital and hospital health care clinicians

The annual "Topics in Trauma" resumed virtually in September 2021, following a COVID-19 hiatus in 2020, and we look forward to resuming the in-person "Topics in Trauma" on September 23, 2022. Conference topics are applicable to the daily practice of prehospital care as well as advanced inpatient trauma care. This annual regional conference continues to attract nurses and EMS clinicians from Maryland, Delaware, Pennsylvania, and Virginia.

Nineteen nurses completed and received certification in the Emergency Nurses Association's Trauma Nursing Core Course (TNCC).

TidalHealth also continued to provide educational classes, such as Advanced Life ALS Skills and paramedic recertifications/refreshers, to EMS clinicians in Worcester, Wicomico, and Somerset Counties. TidalHealth supports Wor-Wic Community College EMS program as a clinical training site for EMS students. The Trauma Department RNS also volunteer to be evaluators for the ALS program National Registry test.

■ **Rehabilitation.** TidalHealth maintains an in-house rehabilitation program that offers physical, occupational, and speech therapy. TidalHealth offers inpatient skilled nursing care at Alice B. Tawes Nursing & Rehab in Crisfield, MD, for those patients recovering from injury. The hospital retains a memorandum of understanding with HealthSouth Chesapeake Rehabilitation Hospital in Salisbury and other appropriate centers to provide care to those who require additional resources and time to recover from traumatic injuries.

Level III Adult Trauma Center

UPMC Western Maryland

12500 Willowbrook Road, Cumberland, Maryland
MIEMSS Region I

UPMC Western Maryland is designated as a Level III Adult Trauma Center serving Allegany and Garrett Counties in Maryland, and neighboring counties in Pennsylvania and West Virginia. Adult trauma services are provided primarily by the Emergency Department. According to the Maryland State Trauma Registry, UPMC Western Maryland treated 638 trauma patients from June 1, 2021, to May 31, 2022.

Mission

To serve our community by providing outstanding patient care and to shape tomorrow's health system through clinical and technological innovation, research, and education.

Vision

UPMC will lead the transformation of health care. The UPMC model will be nationally recognized for redefining health care by:

- Putting our patients, health plan members, employees, and community at the center of everything we do and creating a model that ensures that every patient gets the right care, in the right way, at the right time, every time.
- Harnessing our integrated capabilities to deliver both superb state-of-the-art care to our patients and high value to our stakeholders.
- Employing our partnership with the University of Pittsburgh to advance the understanding of disease, its prevention, treatment, and cure.
- Serving the underserved and disadvantaged and advancing excellence and innovation throughout health care.
- Fueling the global development of new businesses that are consistent with our mission as an ongoing catalyst and driver of economic development for the benefit of the residents of the region.

Values

- *Quality and Safety* – We create a safe environment where quality is our guiding principle.
- *Caring and Listening* – We listen to and care for our patients, our health plan members, our fellow employees, our physicians, and our community.
- *Dignity and Respect* – We treat all individuals with dignity and respect.
- *Excellence and Innovation* – We think creatively and build excellence into everything that we do.
- *Responsibility and Integrity* – We perform our work with the highest levels of responsibility and integrity.

UPMC Western Maryland is caring for what matters most.

Adult Trauma Center Staff

Trauma Medical Director: Milton Lum, MD, FACS

Trauma Program Manager: Jeffrey Hobbs, BSN, RN

Trauma Registrar: Christine Clites

FY 2022 Annual Report

■ **Quality Management and Improvement.** Since becoming a part of the UPMC Hospital Network in February 2020, UPMC Western Maryland has been able to leverage UPMC's innovation and clinical expertise to advance quality initiatives to enhance healthcare services provided to patients in the tristate service region. UPMC Western Maryland is enrolled in the

American College of Surgeons Trauma Quality Improvement Program to streamline and benchmark quality. Quality data is utilized to develop policies for the standardization of patient care and improvement of outcomes built upon evidence-based best practice models.

UPMC Western Maryland's multidisciplinary team approach is designed to serve the unique needs of each patient. Staff work diligently to facilitate communication between hospital and prehospital personnel. To support this initiative, in addition to base station, UPMC Western Maryland maintains representation on the Miltenberger Emergency Services Seminar planning committee, the MIEMSS Region I EMS Advisory Council, the Maryland Trauma Center Network, Maryland EMS Protocol Revision Team for Trauma, Allegany County Emergency Services Board, Allegany County Emergency Services Quality Assurance Review Board, Allegany County Medical Review Board, Maryland Region I & II Healthcare Council, and the MIEMSS Region I Prehospital Care and Quality Improvement Committee.

■ **Injury Prevention Programs and Initiatives.** In conjunction with the Allegany County Department of Emergency Services and the Garrett County Department of Public Safety, UPMC Western Maryland provides instructional support for the Stop the Bleed® program for courses being taught to Fire/Rescue & EMS clinicians, law enforcement officers, and citizens throughout MIEMSS Region I and bordering counties in Pennsylvania and West Virginia.

UPMC Western Maryland participates in the Maryland Kids in Safety Seats program to help provide a safe ride for the children in our region. Additionally, UPMC Western Maryland networks with MIEMSS EMS for Children and Safe Kids Maryland by participating in the Bike Safety Project to provide bicycle helmets to the public while delivering education on correct helmet use in an effort to reduce the number of significant head injury deaths in Maryland due to bike crashes.

■ **Emergency Medical Services and Nursing Continuing Education.** UPMC Western Maryland is the continuing education hub for MIEMSS Region I, offering continuing education credits in a variety of subjects including trauma. The Training Center and Professional Development team at UPMC Western Maryland provide trauma credits through courses in Advanced Cardiac Life Support, Pediatric Advanced Life Support, Neonatal Advanced Life Support, Basic Trauma Nursing, and the Trauma Nursing Core Course while also actively participating in the planning, production, and implementation of the annual Miltenberger Emergency Services Seminar. UPMC Western Maryland serves as a clinical site for Garrett College's Paramedic Studies program. In spring 2022, UPMC Western Maryland constructed a simulation lab equipped with three state-of-the-art simulation patient manikins designed to augment the medical center's ability to provide a sophisticated level of instructive opportunities for regional learners. Educational offer-

ings at UPMC Western Maryland are intended for physicians, nurses, technicians and unit assistants, EMS clinicians, and countless others within the multidisciplinary patient care team.

■ **Rehabilitation.** The 13-bed Comprehensive Inpatient Rehabilitation Unit (CIRU) located at UPMC Western Maryland provides rehabilitation services to its trauma patients. Although each patient's needs are unique, the mission of the CIRU is to improve ability for self-care, mobility, and communication while working to reduce limitations and promote wellness and self-worth. The CIRU develops a plan for care beyond the inpatient rehabilitation stay and helps patients return to their homes and communities.

Out-of-State Adult Trauma Center

MedStar Washington Hospital Center

110 Irving Street, NW, Washington, DC

Adult Trauma Center Staff

Adult Trauma Medical Director:

Christine T. Frankiem, MD, FACS

Adult Trauma Administrative Director:

Susan Kennedy, RN, BSN

The MedSTAR (Medical Shock/Trauma Acute Resuscitation) Trauma Unit at MedStar Washington Hospital Center is the regional referral center for critical multiple trauma, treating individual victims of traumatic injury and multiple victims of mass trauma occurrences.

In the heart of the nation's capital, the Center has responded to thousands of medical crises, including treating patients of the September 11, 2001, terrorist attack on the Pentagon, victims of the Navy Yard shootings in 2013, and the active assailant attack on the Congressional Baseball Game for Charity in 2017.

MedSTAR is verified by the American College of Surgeons as a Level I Facility. MedSTAR serves as a referral center for a 150-mile radius of the hospital, receiving critical trauma patients from the District of Columbia, Maryland, Virginia, Delaware, and Pennsylvania. It provides both air and ground transport via MedSTAR Transport, bringing in patients from referring hospitals and from the site of injury. MedSTAR treated 2,353 trauma patients in FY 2022.

Mission

MWHC is dedicated to delivering exceptional patient-first health care. We provide the region with the highest quality and latest medical advances through excellence in patient care, education, and research. Our guiding principle is to treat each patient as we would a member of our own family by providing the best medical treatment with care and compassion, responsive service, and intelligent use of resources. Through this achievement, we will be recognized as a national model for excellence in patient-centered care.

Adult Burn Center

Johns Hopkins Bayview Medical Center

4940 Eastern Avenue, Baltimore, Maryland

MIEMSS Region III

The Burn Center at Johns Hopkins Bayview Medical Center (JHBMC) serves the residents of Maryland and specific regions of adjacent states. The Burn Center provides a comprehensive, nationally recognized program of care for patients with burn injuries. In FY 2022, JHBMC treated 764 patients – 248 inpatients and 516 patients either in the emergency room or under observation.

Mission

JHBMC, a member of Johns Hopkins Medicine, provides compassionate health care focused on the uniqueness and dignity of each person we serve. We offer this care in an environment that promotes, embraces, and honors the diversity of our global community. With a rich and long tradition of medical care, education and research, we are dedicated to providing and advancing medicine that is respectful and nurturing of the lives of those we touch.

Adult Trauma Center Staff

Burn Medical Director:

Mark Fisher, MD, FACS

Burn Fellowship Program Director:

Julie Caffrey, DO, MS

Burn Program Coordinator:

Emily Werthman, MSN, RN

FY 2022 Annual Report

■ **Notable Accomplishments.** In FY 2022, the Johns Hopkins Burn Center continued to advance the science of burn care with the publication of a record 26 peer-reviewed publications on a wide variety of burn topics. In keeping with the mission of advancing medicine that is respectful of the patients cared for, these research problems sought to seek solutions to the complex medical needs of burn patients. Projects included exploring the use of yoga in scar contracture, early ambulation in patients with lower extremity skin grafts, and strategies to reduce the prevalence of pressure injuries.

The Burn Center continued its tradition of excellence in patient care with the continued support of vital programs rooted in evidence-based practice. Current initiatives to better serve the patients of the Burn Center include quality improvement programs aimed at decreasing hospital acquired infections, decreasing pain, improving functional outcomes of burn patients, and improving fluid resuscitation in large burns. The Burn Center also serves a vital role in educating about burn care through educational offerings for prehospital and hospital-based clinicians, including students.

At the close of the fiscal year, the Johns Hopkins Burn

Center appointed its new medical director, Mark Fisher, MD, FACS. Dr. Fisher is currently an associate professor in plastic and reconstructive surgery and a burn surgeon at the University of Iowa Hospital and Clinics. Dr. Fisher will be joining an outstanding team of burn providers and staff and will begin his new role as Director of the Burn Center on October 1, 2022. Dr. Fisher completed his general surgery at The University of Texas Medical Branch and a burn and critical care fellowship at Shriners Hospitals for Children at UTMB in Galveston, TX. During his training, he pursued research in the Harvard-Longwood T32 Vascular Surgery Research Program. Dr. Fisher completed his plastic and reconstructive surgery at Duke University in 2013 and a craniofacial fellowship at the Hospital for Sick Children in Toronto, ON, Canada. As the ABA ad hoc reconstruction committee founder and recent past-chair, Dr. Fisher leads burn reconstruction services at the University of Iowa, and also provides acute burn care. His burn research interests are focused around global burn care. Dr. Fisher is a fellow of the American College of Surgeons and a member of the American Burn Association, American Society of Plastic Surgeons, and Interburns International Network for Training Education and Research in Burns.

According to Dr. Fisher, “As a service of the Department of Plastic Surgery, we will deliver seamless multidisciplinary care that is unsurpassed. We will also lead the way as an international teaching center particularly in complex acute and reconstructive burn surgery. Strategically located, we will proactively work with civilian and federal partners to improve the resilience of regional and national burn and trauma systems. And we will innovate. And our research will not only push the frontiers of modern burn surgery but will be impactful where the need is greatest, including the disadvantaged and in lower income environments, where the majority of burns occur.”

The Johns Hopkins Burn Center maintains its American Burn Association (ABA) verification. This verification provides a mark of distinction for the Burn Center, establishing it as a burn center that has met the highest standards of care for the burn injured patient.

■ **Quality Management and Improvement.** The Burn Center has developed and maintained a system for tracking and responding to a variety of quality improvement metrics including time hospital-acquired infections, throughput time from the ED, wound infections, and pressure injuries, among others. These metrics are reported and discussed in a multi-disciplinary format monthly. The Burn Joint Practice Committee examines trends in care and quality.

■ **Injury Prevention Programs and Initiatives.** The Johns Hopkins Burn Center realizes the importance of community outreach and education. Carrie Cox, MSN, RN, is the Community Outreach and Education Coordinator for the Burn Center. In FY 2022, the Burn Center was able to return to community-based outreach programs in a limited capacity. Educational offerings included case presentations in the Johns Hopkins Occupational

Therapy Hand and Acute Fellowship program and schools of nursing. Additional education was provided at the annual Topics in EMS conference hosted by Johns Hopkins Bayview Medical Center. The Burn Center also continues to offer Advanced Burn Life Support (ABLS) courses to its staff, external staff, and prehospital clinicians. Community outreach activities, including statewide health and safety fairs and programs in burn prevention, have resumed following the lifting of many pandemic restrictions. In addition, burn staff are again participating in outreach activities with burn survivors, including World Burn Congress, SOAR, and the JHBMC burn survivor support group. The burn survivor support group has resumed its in-person meetings at the Burn Center.

■ **Prehospital/EMS/Nursing Continuing Education.**

Clinical education for healthcare professionals who may encounter burn patients throughout the region is of vital importance for the Burn Center. This year, a return to in-person teaching has allowed the Burn Center to once again provide clinical education at nursing schools. Additionally, EMS students are now able to return to the Burn Center for clinical rotations. Prehospital and clinician education includes ABLS, coordinated at our institution biannually. These have returned to in-person instruction. The Burn Center offers an EMS/Firefighter Burn Course throughout the region for prehospital clinicians. We participate annually in Emergency Medical Technician ALS updates in many counties within Maryland. We also lecture frequently at EMS Regional Conferences and offer education through our institution’s EMS Care Conference. Outside hospital conferences and lectures are provided throughout the region upon request. Onsite clinical training for medical, nursing, rehabilitation, psychology, and dietitian students has resumed. The Burn Center also provides educational presentations at many colleges and universities throughout the region for various health disciplines, including, physician assistants, nurses, physical and occupational therapy, and prehospital clinicians.

■ **Research.** Currently, there are research collaborations with multiple disciplines including physical and occupational therapy, critical care, nursing, infectious disease, palliative care, and psychology. The Burn Center is involved in sponsored clinical trials, federally funded multi-center trials, and investigator initiated research. The Michael D. Hendrix Burn Research Laboratory actively studies the non-healing wound environment in animal models, and is looking at ways to improve burn wound healing. Some of our research this past year includes: a retrospective review of antibiotic prophylaxis in small burns; risk factors for cooking-related burn injuries in children, using pressure mapping to optimize hospital-acquired pressure injury prevention strategies in the burn intensive care unit; the added benefit of combining laser Doppler imaging with clinical evaluation in determining the need for excision of indeterminate-depth burn wounds; development of bilateral heterotopic ossification; opioid dependence and treatment outcomes among patients with burn injury; yoga and cutaneous functional unit recruitment for burn

scar contracture; and Hailey-Hailey Disease with superimposed Eczema Herpeticum caused by Herpes Simplex Virus Type 2 infection.

The Burn Center publishes its findings and presents at various local, regional, and national conferences. In FY 2022, Burn Center staff were invited to present at the American Burn Association Conference, the Northeast Region Burn Conference, the Johns Hopkins Resident Research Day, the American Society of Plastic Surgeons Conference, and the Plastic Surgery Research Council meeting. Staff also published in various peer-reviewed journals, including *The Journal of Burn Care and Research*, *PAIN Reports*, *Burns*, *Burns & Trauma*, *Plastic and Reconstructive Surgery*, *Cureus*, and *Annals of Plastic Surgery*.

■ **Fellowships/Residencies.** The Johns Hopkins Burn Center provides annual fellowship training for physicians in both general and plastic surgery tracks, and has been doing so for over 20 years. We also provide residency training in partnership with local hospitals and universities, including Johns Hopkins University, Christiana Care Health System, Union Memorial Hospital, St. Agnes Hospital, Hershey Medical Center, and Sinai Hospital.

■ **Rehabilitation.** The Johns Hopkins Burn Rehabilitation Department is dedicated to rehabilitating burn survivors. The staff includes two full-time occupational therapists (OT) and two full-time physical therapists (PT), as well as three part-time PTs and one part-time OT.

Every patient admitted to the Burn Center is seen by PT/OT within the first 24 hours. The Burn Center evaluated 248 inpatients this year. Burn inpatients are treated on a daily basis in our onsite burn rehabilitation gym or in their rooms, dependent upon patient condition. This year, the Burn Center has served as a site for a multi-center research study investigating early ambulation in burn patients.

The rehabilitation staff work with case management and social work to discharge patients to appropriate levels of care. There is a close working relationship with the Johns Hopkins Specialty Hospital for inpatient rehabilitation. The burn rehabilitation staff have also provided in-services to outside therapy practices, where patients may receive therapy, and are always available for consultation. On average, a burn outpatient participates in therapy four days a week, for 1–1.5 hours of therapy each session.

Adult Burn Center

MedStar Washington Hospital Center

110 Irving Street, NW, Washington, DC

Adult Burn Center Staff

Adult Burn Medical Director:

Jeffrey Shupp, MD

Burn Outreach and Prevention Coordinator:

Angela White, BSHCM

The Burn Center at MedStar Washington Hospital Center is the adult regional burn center for Southern Maryland, Northern Virginia, eastern West Virginia, and Washington, DC. The Burn Center is verified by the American Burn Association as a regional Level 1 Burn Center in addition to Level 1 Trauma Center by the Committee on Trauma of the American College of Surgeons.

MedStar Washington Hospital Center provides comprehensive, acute, and rehabilitative burn care through a multidisciplinary team approach. The burn surgeons are board-certified general surgeons with extensive experience in burn care, surgical treatment, and burn reconstruction. The Burn Center has expanded the laser program for dyspigmentation and scar reduction. The burn team members – physicians, nurses, rehabilitation therapists, respiratory therapists, nutritionists, and social workers – are specially-trained and experienced to address the special needs of burn patients. The Burn Center is proud to announce that we have recently embedded a psychologist on our team to meet the psychological needs of our patients and their families.

The 20-bed facility features an intensive care unit with its own operating room and tanking facility, as well as an intermediate care/rehabilitation unit, both of which provide wound care and progressive rehabilitation. With 658 admissions (and an additional 680 patients evaluated and discharged from the Emergency Department) annually, the Burn Center provides care for an array of thermal, electrical, and chemical injuries, as well as soft tissue lesions. The burn clinic provides outpatient burn care for more than 2,590 patients annually.

Pediatric Trauma Center

Johns Hopkins Children's Center

1800 Orleans Street, Baltimore, Maryland

Johns Hopkins Children's Center (JHCC) is the designated Level I Pediatric Trauma Center serving Maryland and the surrounding region. JHCC is a 205-bed, state-of-the-art hospital with an expansive pediatric emergency department equipped with dedicated pediatric trauma resuscitation bays, a 28-bed Pediatric Intensive Care Unit (PICU), and a pediatric operative suite with designated emergency operating rooms for pediatric trauma patients. According to the Maryland State Trauma Registry, the Pediatric Trauma Center at JHCC treated over 894 trauma-injured children from June 1, 2021, through May 31, 2022.

Mission

The mission of the Pediatric Trauma Center at the Johns Hopkins Children's Center is to make a positive difference in the

lives of children through pediatric injury prevention, education, evidence-based research, and excellent care of injured children. Three overarching elements encompass the vision of the program:

- 1. To eliminate injury as the leading cause of death and illness among children by relentlessly pursuing comprehensive injury prevention, providing the highest level of injury care, and participating in injury prevention research;*
- 2. To establish and implement specific policies, procedures, and guidelines ensuring prompt and optimal care by pediatric professionals for the seriously injured pediatric patient;*
- 3. To evaluate the effectiveness of the trauma care delivered by ongoing evidence-based research and performance improvement programs.*

Pediatric Trauma Center Staff

Pediatric Trauma Medical Director: Isam Nasr, MD

Pediatric Trauma Program Manager:

Debra Skultety-Robinson, MSN, RN

Pediatric Trauma Coordinator:

Rebecca Gardner, BSN, RN, RNC

Pediatric Injury Prevention Coordinator:

Beatrice Braithwaite, MPH

Community Outreach Specialist:

Creason Walter, BS, CHES

FY 2022 Annual Report

■ **Notable Accomplishments.** The Johns Hopkins Hospital has received Magnet designation four times. Magnet Designation is the highest and most prestigious designation a healthcare organization can achieve for nursing innovation, excellence, and quality driven patient care from the American Nurses Credentialing Center. The Johns Hopkins Children's Center continues to be *U.S. News & World Report's* #1 Ranked Children's Hospital in Maryland, with 10 pediatric specialties ranking nationally.

■ **Quality Management and Improvement.** The pediatric trauma performance improvement (PI) program at JHCC had another productive year. Trauma statistics continue to be presented monthly at the PI Committee meeting. Monthly reports also include these additional metrics: Total Patients, Readmission, Primary Mechanism of injury, Pre-hospital Intubation, Average PICU Days, Deaths, and Average Hours in the ED. The team presents safety and quality dashboards monthly, reflecting metrics such as Surgeon and Anesthesiologist Arrival Time to Level I Traumas, CLABSI, CAUTI, PED Throughput for Trauma Admissions, and Time to Washout and Antibiotics for Open Long Bone Fractures. New metrics, such as Time to CT Head and Time to CT Abdomen, were added to FY 2022 monthly reports. The goal of sharing these data metrics with the multidisciplinary group is to increase transparency and

provide an opportunity to identify areas of improvement in a timely collaborative fashion.

The JHCC strives for a culture of reporting safety concerns encouraging openness, transparency, and learning. The Hopkins Event Reporting Online (HERO) is the forum used by all staff and faculty. The purpose of the HERO System is to learn from adverse events and near-misses to improve patient safety. Reporting of events can be anonymous, protecting staff from retaliation. Accountable leaders then receive the events for action and follow-up.

■ **Injury Prevention Programs and Initiatives.** JHCC has a robust injury prevention program, offering services to its patients, families, community, and staff. Multidisciplinary teams of child passenger safety technicians (CPSTs) provide car seat fittings and assist with on-site installations. A grant from JHCC allowed the team to purchase standard and special needs car seats to provide to families free of charge.

The Injury Prevention Program continues to be active on Twitter, with 518 followers and over 2,500 tweets. A few of the top tweets in FY 2022 educated followers about bike helmet safety and gun violence safety.

In July 2021, the Injury Prevention team partnered with the PED to host the MIEMSS Heatstroke Display to bring awareness about heatstroke safety and the importance of never leaving a child in a car alone. They also partnered with the fellow adult trauma, nursing, Wilmer Eye Institute, and Ambulatory Services to host a Falls Prevention Day Fair for Falls Awareness in September 2021.

In November 2021, they participated in the Injury Free Coalition for Kids' Inaugural National Injury Prevention Day. During this event they partnered with the Bloomberg School of Public Health, hosting various virtual activities, and a Twitter chat. They shared home safety tips and products with patients during visits to the Pediatric Specialty Clinic in Rubenstein. The JHH Dome, Baltimore City Hall Dome, M&T Bank Stadium, Camden Yards, Royal Farms Arena, and many other locations were lit in green for Injury Prevention Day observance. The Community Outreach Specialist was featured on Maryland TraumaNet's Midday Maryland Segment about National Injury Prevention Day.

In April 2022, the community outreach specialist attended a community baby shower to educate expecting parents on child passenger safety. In June 2022, the Injury Prevention Team hosted the first Stop the Bleed® Class for patients and staff in the Pediatric Oncology Clinic.

Throughout the past year, they have attended various webinars on Trauma Topics, such as Firearm Violence, Safe Sleep, Child Passenger Safety, and Hot Car Deaths. The Injury Prevention team also attended the Safe Kids PrevCon Conference at the PTS Annual Meeting, and the Injury Free Coalition for Kids Conference.

■ **Interdisciplinary Pediatric Trauma Bootcamp/Course for Fellows.** Designed to enhance the performance of the pediatric trauma team, the Interdisciplinary Pediatric Trauma Bootcamp emphasizes evidence-based trauma management and procedural training skills. The course supports the enhancement of pediatric trauma team dynamics during pediatric trauma activations. The development of the curriculum for this course places specific emphasis on ATLS implementation in the trauma bay. We piloted the Pediatric Trauma Boot Camp course in December 2020 and January 2021 with a group of 19 fellow-level trainees as participants and 12 faculty facilitators from General Pediatric Surgery, Pediatric Critical Care, and Pediatric Emergency Medicine. Learners participated in four simulated trauma scenarios (Blunt Trauma, Burn/Inhalation Injury, Penetrating Trauma, and Traumatic Brain Injury), each facilitated by faculty from two of the above departments. The goal of this design was to ensure that providers taught in a multidisciplinary way and emphasized one another.

The success of the two pilot courses last year resulted in a \$32,000 institutional grant (Children’s Center Innovation Grant), allowing us to organize a more comprehensive and inclusive program during the 2021-2022 academic year. 67 resident and fellow-level trainees from Pediatric Critical Care, Pediatric/Adult Emergency Medicine, General Surgery, General Pediatric Surgery, and Pediatrics participated in an expanded, full-day Pediatric Trauma Boot Camp course. In addition to the trauma/burn simulations, learners participated in multiple procedural skills stations including chest tube placement, FAST, IO placement, and tourniquet placement. Simulation is a frequently used tool to train physicians in pediatric trauma resuscitation. In addition to demonstrating improved knowledge, procedural skills, and non-technical skills, pediatric trauma centers that utilize a “high volume” of simulation training have shown lower risk-adjusted odds of mortality.

■ **Emergency Medical Services and Nursing Continuation Education.** JHCC offers monthly training to prehospital clinicians and students, including lectures, case reviews, and simulations. Maryland State Police Paramedics train alongside pediatric anesthesiologists in the operating room to maintain comprehensive pediatric airway management competency. Trauma staff provides ongoing education and case reviews to referring facilities.

The Johns Hopkins Simulations Center is a fully accredited, state-of-the-art training facility incorporating standardized patients and teaching associates, human patient simulation, virtual reality, task trainers, and computerized simulation to help clinicians with trauma education and preparedness.

■ **Fellowships and Residencies.** The Division of Pediatric Surgery at Johns Hopkins has a two-year fellowship program approved by the Accreditation Council for Graduate Medical Education (ACGME). A new fellow starts each year, allowing a junior and senior fellow to train concurrently. Under the

direction of the general pediatric surgery attending, fellows are responsible for managing all trauma patients. A collaboration with the University of Maryland Medical Center allows for a three-month rotation at UMMS.

■ **Research.** Multidisciplinary collaboration among different specialties is of the utmost importance with an overarching goal of improving the care of our pediatric trauma patients.

Members of the JHCC Pediatric Trauma Program are involved in several cutting-edge research projects spanning from clinical outcomes and injury prevention to basic science research. A sample of some of the research in which the pediatric trauma program is involved is as follows:

- The Pediatric Trauma Program is part of a National Institutes of Health-funded, multi-institutional, five-year study that tackles the critical issue of drug and alcohol abuse in the pediatric trauma population. This study aims to better understand how nurses, social workers, and doctors within pediatric hospitals talk to their patients about alcohol and drug use. The multicenter goal is to implement a screening process with referral to treatment once identifying the relationship between adolescent’s drug and alcohol use and injury. We are currently in year four of this five-year study.
- Basic science trauma research is also an essential tenet of the program. Several investigators in different disciplines are actively studying the neuroinflammatory pathways involved in pediatric traumatic brain injury.
- Other research efforts include:
 - Examination of the adherence to a trauma checklist during our highest trauma activations
 - Evaluation of the association of elevated white blood cell count and other clinically significant inflammatory markers in pediatric trauma patients
 - Assessment of the interplay between genetically influenced biologic processes and the environment concerning patient recovery after pediatric traumatic brain injury using MRI markers
- Maryland Trauma Network provided a grant to assess how the COVID-19 pandemic, with social distancing and stay-at-home orders, increased the risk for childhood injuries sustained in the home due to increased stress, changes in supervision, and possible increased use of alcohol and/or other substances. We will evaluate the prevalence and patterns of injuries sustained in the home during the pandemic, including those that required medical care and those that did not. We also hope to describe the reasons that may have contributed to participant decisions to delay or avoid obtaining in-person medical care.

The team maintains an active role in national trauma meetings. Several team members have presented their research projects in these meetings, some following with manuscript submis-

sion and, ultimately, publication.

■ **Rehabilitation.** JHCC has a state-of-the-art pediatric rehabilitation program offering both inpatient rehabilitation and comprehensive outpatient services. Therapists, in addition to our injury prevention coordinator, are certified child passenger safety technicians (CPSTs) and support the injury prevention program. JHCC collaborates with the Kennedy Krieger Institute (KKI) and Mount Washington Pediatric Hospital (MWPH) for children requiring inpatient rehabilitation. The Commission on Accreditation of Rehabilitation Facilities (CARF) accredits both programs.

Dr. Stacy Suskauer directs the Brain Injury Clinical Research Center at KKI. She is a pediatric physiatrist and the pediatric rehabilitation medicine liaison to the Pediatric Trauma Center at JHCC. Dr. Suskauer's research program spans the range from studying the severity of pediatric traumatic brain injury from concussion to severe brain injuries associated with disorders of consciousness. Her projects include developing and using sensitive behavioral measures to characterize outcomes, studying brain-behavior relationships using functional and structural imaging modalities, and early clinical trials to optimize outcomes.

Pediatric Trauma Center

Children's National Hospital

111 Michigan Avenue, NW, Washington, DC

Children's National Hospital (CNH) is a Pediatric Trauma Center established by a memorandum of understanding with MIEMSS that serves Washington, DC; multiple counties within Maryland, including Montgomery and Prince George's; Southern Maryland, and certain regions of adjacent states. CNH treated 1,275 trauma-injured children, including 926 of whom reside in Maryland, from June 1, 2021, through May 31, 2022, according to the Maryland State Trauma Registry. (See pages 92 to 95 for additional patient data.) There were 396 children from Maryland treated in the Trauma Code Room. Pediatric trauma services at CNH are provided by the Division of Emergency Trauma and Burn Surgery.

Mission

At Children's National Hospital, we strive to excel in care, advocacy, and education. We demonstrate this by providing a quality healthcare experience for our patients and families, improving healthcare outcomes for children regionally, nationally, and internationally, and by leading the creation of innovated solutions to pediatric health challenges. The commitment of our staff, physicians, volunteers, students, and community partners to our mission permits us to maintain a tradition of quality care, which is the hallmark of Children's National Hospital.

Pediatric Trauma Center Staff

Pediatric Trauma Medical Director:

Randall S. Burd, MD, PhD

Pediatric Trauma Program Manager:

Jennifer Fritzeen, MSN, RN

FY 2022 Annual Report

■ **Notable Accomplishments.** Children's National was successfully re-verified by MIEMSS and the American College of Surgeons as a Pediatric Level One Trauma Center. Identified strengths of the verification review included the robust process improvement program, the trauma centers ability to provide follow up and outreach with transferring centers, innovative injury prevention program as well as the clinical ability to provide care to injured patients.

In April 2022, the Trauma Service launched an internal phone app to disseminate all trauma and burn guidelines and resources and allow trauma providers to have information at fingertips. This application is available to all internal providers who interact with trauma patients. To date the app has shown increase compliance with guidelines and serves as an essential tool in the day-to-day management of patient.

As penetrating injuries in children continue to increase in Children's Hospitals locally and across the country, Children's National has improved availability of blood products for immediate use in the Emergency Department and Intensive Care units. In FY 2022, thawed plasma was made immediately available in the ED blood refrigerator to acute trauma patients allowing a more balanced transfusion ratio.

Children's National Hospital continued to have a national presence in the leadership of the Pediatric Trauma Society in FY 2022. Jennifer Fritzeen sits on the Executive Board and Elizabeth Waibel is the chairman of the Membership Committee.

■ **Quality Management and Improvement.** The Pediatric Trauma Center has a robust quality improvement program, which includes periodic submissions to the Pediatric Trauma Quality Improvement Program (TQIP), an initiative of the American College of Surgeons Committee on Trauma. The TQIP provides adjusted benchmarking for pediatric trauma centers to track outcomes and improve patient care. Based on TQIP data, CNH can benchmark nationally and evaluate its patient care.

There were several quality initiatives undertaken by the Trauma Center in FY 2022. A high-impact example is the continued effort to improve Code Room Efficiency. Under this umbrella, special attention was given to management of the severe head injured child. The trauma service in partnership with the ED providers and Neurosurgery focused on the required care to expedite patients to CT scan and then the operating room. Initiatives included Improving oxygenation/ventilation and brain perfusion activities while eliminating extraneous interventions/

activities that delayed time to CT. Examples of metrics: time to intubation, accuracy of GCS, guideline compliance with hyper-osmolar therapy.

Children's National continues to improve outreach and follow-up efforts to outside hospitals and EMS agencies. The Trauma and Burn Surgery Service to template individualized feedback sent through a protected server to transferring facilities or EMS units. The program has allowed CNH to communicate with 80% of our transferring centers. Our team published this work in an article entitled "The Development and Implementation of a Transfer Follow-up Program at a Level I Pediatric Trauma Center" in a 2020 edition of *Journal of Trauma Nursing*.

■ **Injury Prevention Programs and Initiatives.**

Approximately 44% of our trauma volume is attributed to fall injuries. In response, Children's National developed a video-based fall prevention program. These videos were distributed to the public in a social media campaign from February 2022 to July 2022. These fall injury prevention ads were viewed by 70,912 unique individuals, with 62,371 individuals watching the ads to completion, or for at least 15 seconds. Using polling abilities to evaluate the helpfulness of the videos on social media, we have received 320 poll responses, with 173 users (53%) stating the video content is helpful.

In FY 2022, the Trauma Center continued to provide informed education to the public on the effects and prevention of abusive head trauma. Protecting Young Children, a program designed to teach childcare providers the risk of inflicted abusive head trauma during infancy, was initially offered only to families admitted to CNH, birthing centers, prenatal clinics, and parenting groups. Protecting Young Children is now a mandatory training required by every provider in a daycare facility in the District of Columbia, per the Office of the State Superintendent of Education. The Trauma Center provides 100% of this training. In FY 2022, CNH trained more than 400 daycare providers. Additionally, CNH continues to maintain its five-year partnership with the ChildHelp organization to provide intake call center services for the National Child Abuse Hotline.

In 2021, Children's National Hospital was awarded the Specialized Services for Abused Parents and Children grant. The 2021-2022 SSAPC project supported the development of the Family Support and Enrichment Program (FSEP), including therapy and parenting workshops for children and parents affected by family violence. Additionally, the grant provides partial funding for Regional Academy on Family Violence, formally the Child Abuse Awareness Symposium. In 2022, the conference which promotes awareness, motivation and interest in abuse survivors and child advocacy entertained 150 attendees from over a dozen disciplines and community partners.

■ **Emergency Medical Services and Nursing Continuing Education.** FY 2022 continued to be a year of virtual education, allowing CHN to offer more educational opportunities to more

individuals both internally in the hospital and to outside providers.

The Trauma Service partnered with the Emergency Department to co-host monthly case studies for PG EMS. Cases were presented upon direct request from EMS clinicians and from identified cases through our PIPS process. All sessions were awarded EMS continuing education hours for all clinicians.

The Trauma Center has continued our YouTube education channel allowing our team to provide live and recorded trauma education for nurses, physicians and paramedics covering topics such as Closed Head Injuries, Forensics and Sexual Assault, and Cervical Spine Immobilization. Each video has opportunity for CNE hours. Views of the video can be tracked to provide statistics on outreach. The Trauma Center has just started a new series, TraumaCast, which features members of the trauma team discussing updates, new research, and PI initiatives related to the team. We continue to grow our viewership, with over 24,000 views to date.

The Trauma Center scripted and filmed two videos on the assessment of GCS in the pediatric patient. Both videos are included in our surgical resident orientation and are available to the public through our YouTube channel. The videos were made available for educational purposes to the public in February 2022. Since then, they have a total combined views of 4,075 and are the most watched video on our channel.

■ **Research.** The Trauma Center maintains an active research program with multiyear studies in place. The trauma research team in collaboration with teams from Drexel and Rutgers, have two major studies: a \$3 million, multiyear ROI grant to build an Intention-aware Recommender System for Improving Trauma Resuscitation Outcomes and a NSF grant to recognize activities to reduce delays in fast-response teamwork.

Three research papers have been accepted and published by clinicians within the Trauma Surgery Service.

■ **Rehabilitation.** The Department of Physical Medicine and Rehabilitation at CNH consists of three divisions: Pediatric Rehabilitation Medicine, Physical Therapy, and Occupational Therapy. Physicians, advanced practice nurses (APN), registered nurses, physical therapists, occupational therapists, and rehabilitation aides deliver interdisciplinary care to patients at the National Center for Children's Rehabilitation (acute inpatient medical care) and CNH, including regional outpatient centers (outpatient medical care). Physicians and APNs also provide consultation services in integrated equipment at a bracing clinic and a sub-acute rehabilitation facility.

Pediatric Burn Center

Johns Hopkins Children's Center

1800 Orleans Street, Baltimore, Maryland

The Johns Hopkins Children's Center (JHCC), is a 205-bed, state-of-the-art hospital with an expansive pediatric emergency department equipped with dedicated pediatric trauma resuscitation bays, a 28-bed Pediatric Intensive Care Unit (PICU), and a pediatric operative suite outfitted with dedicated emergency operating rooms for pediatric trauma patients, is verified by the American Burn Association and designated by the Maryland Institute of Emergency Service System as a level one Pediatric Burn Center. According to the Maryland State Trauma Registry, JHCC treated over 300 burn-injured children, including 139 admissions, from June 1, 2021, through May 31, 2022. JHCC follows patients in an outpatient burn clinic and, if necessary, continues treatment via referral to our burn late effects clinic. The late effects multi-disciplinary clinic focuses on the physical and emotional recovery after a burn injury. Laser burn treatment is available for those patients who develop symptomatic scarring.

Mission

The mission of the JHCC pediatric burn center is to make a positive difference in the lives of children through pediatric burn injury prevention, education, evidence-based research, and excellent care of burned children. The center's vision comprises three elements:

- 1. To eliminate injury as the leading cause of death and illness among children by relentlessly pursuing comprehensive injury prevention, providing the highest level of injury care, and participating in injury prevention research;*
- 2. To establish and implement specific policies, procedures, and guidelines that ensure prompt and optimal care to the seriously burned pediatric patient by pediatric professionals;*
- 3. To evaluate the effectiveness of the burn care delivered by ongoing evidence-based research and performance improvement programs.*

Pediatric Burn Center Staff

Pediatric Burn Medical Director:

Alejandro Garcia, MD, FACS, FAAP

Pediatric Burn Associate Director:

Erica Hodgman, MD

Pediatric Burn Program Manager:

Debra Skultety-Robinson, MSN, RN

Pediatric Burn Performance Improvement (PI) Coordinator:

Rebecca Gardner, BSN, RN, RNC

Pediatric Injury Prevention Coordinator:

Beatrice Brathwaite, MPH

Community Outreach Specialist:

Creason Walter, BS, CHES

Pediatric Psychologist:

Carisa Parrish, PhD

FY 2022 Annual Report

■ **Notable Accomplishments.**

- Reverified by the ABA for another three years.
- Integration of innovative methods for burn and wound care such as regenerative medicine, evidenced-based updates to fluid resuscitation protocols and wound dressings.

■ **Quality Management and Improvement.** The Pediatric Burn Performance Improvement (PI) Committee is a multi-disciplinary committee focused on overall programmatic PI. The role of this committee is to:

1. Review programmatic data trends regarding performance metrics;
2. Review existing policies, assess and implement new regulatory requirements and recommendations;
3. Develop and track implementation of action plans stemming from morbidity and mortality review; and
4. Develop and track the implementation of additional action plans as raised from data trends and committee members.

The committee evaluates the progress of action plans until resolution and monitors for continued maintenance. Presentations, including burn statistics, occur monthly at the PI Committee Meeting. Metrics included in the monthly reports are Total Patients, Total Burn Surface Area (TBSA), Burn Etiology, Burn Consults, ED Length of Stay, Hospital Length of Stay, and Deaths. Metrics are compared from the current year and prior year's total to evaluate for trends. The monthly presentations also include safety and quality, reflecting metrics such as Median Time to First Pain Medication, Median Time to Debridement, CLABSIs, and CAUTIs. Sharing these data points aims to facilitate transparency and the opportunity to identify areas of improvement in a real-time cadence. The PI Coordinator reviews all emergency department visits for burn patients. Once flagged, burn patient charts are audited daily and tracked until discharge.

The pediatric burn team established the Pediatric Injury Quality Improvement Consortium (PIQIC), a network with four other similar pediatric burn centers, in 2016. The collection of three years of data is available through this consortium, which will help determine best practices and benchmarks in pediatric burn care.

■ **Pediatric Psychology.** Pediatric psychology is an integral part of the pediatric burn team, providing inpatient and outpatient clinical services to patients and their families. Screenings from this team include standardized instruments to assess the child's quality of life and overall child and parent distress. Interventions, such as providing coping mechanisms

for use during stressful experiences, support optimal adherence to medical recommendations and patient and family recovery. A dedicated burn psychologist at JHCC leads efforts to collaborate with other pediatric burn centers through PIQIC for establishing psychosocial PI metrics and best practices. Through Hopkins' involvement in PIQIC, implementation of our standard psychology screening protocol is now in use across multiple sites.

■ **Injury Prevention Programs and Initiatives.** JHCC has a robust injury prevention program for patients, families, and the community. The injury prevention team has established relationships with elementary schools, youth groups, religious institutions, and summer camps to provide burn prevention education. Using data from the burn registry, high-risk areas are identified and relevant injury prevention topics are addressed. Pediatric burn nurses and the injury prevention team participate in community outreach events, such as health fairs, festivals, and sporting events. This year this team has been able to perform in person and virtual outreach activities.

The injury prevention team created a three-minute "Scald Burn Prevention for Kids" PSA Video with the Children's Center media team. We plan to post this video on social media platforms and also play it on screens around the hospital and clinic sites to help raise families' awareness of common household dangers.

During the ABA's Burn Awareness Week in February, presented burn awareness and prevention at two local elementary schools in person and virtually. They also participated in the ABA social media campaign "The A to Z of Burns".

During FY22, the Injury Prevention Team has initiated distribution of home safety in the outpatient burn clinics. They have expanded their selection and made a cart mobile to enable providing the patients and families with home safety products during their outpatient visit. The Injury Prevention Team continues to share burn prevention tips on their Twitter page.

■ **Emergency Medical Services and Nursing Continuing Education.** The JHCC Burn team provides burn education to referring hospitals, typically focused on evaluation and management of injuries. The team also periodically reviews cases sent from referring centers with them to provide closed-loop feedback.

Continual offerings of monthly training to pre-hospital clinicians and students include lectures, case reviews, and simulation. Maryland State Police paramedics train alongside pediatric anesthesiologists in the operating room to maintain comprehensive pediatric airway management competency.

The Pediatric Base Station provides online medical direction to EMS clinicians and has an active QI plan for evaluation and feedback.

The Johns Hopkins Simulations Center is a fully accredited, state-of-the-art training facility that incorporates standardized patients and teaching associates, human patient simulation, virtual reality, task trainers, and computerized simulation to help

clinicians with trauma education and preparedness.

■ **Fellowships and Residencies.** Johns Hopkins Pediatric Surgery has an Accreditation Council for Graduate Medical Education (ACGME) approved two-year fellowship program. After a competitive process, one fellow per year enters the program, allowing a junior and senior fellow to train concurrently. Under the direction of the general pediatric surgery attending, the fellows are responsible for managing all trauma and burn patients at JHCC. A collaboration with The University of Maryland Medical Center allows for a three-month rotation for the JHCC fellows. The pediatric psychology fellowship program includes an opportunity to train with burn patients. A psychology fellow and/or attending physician meets all burn patients while inpatient. Additionally, a burn fellow and/or attending physician staffs our outpatient clinic.

■ **Research.** The pediatric burn staff at JHCC continue to present research at national meetings and manuscript submissions to peer reviewed journals.

Current research initiatives include:

- Evaluating child quality of life and parent PTSD and depression symptoms following pediatric burn injury;
- Parent perceptions of the pediatric burn healing process and need for support;
- Drug and alcohol screening in teens;
- Epidemiology of hot beverage scalds in children;
- Attrition between emergency department care and outpatient clinic visits; and
- Follow up compliance of burn patients during the COVID-19 pandemic

■ **Rehabilitation Services.** A state-of-the-art pediatric rehabilitation program that offers inpatient rehabilitation and comprehensive outpatient services is available at JHCC. The hospital collaborates with Mount Washington Pediatric Hospital (MWP) for burn patients needing continual inpatient rehabilitation. Accreditation for MWP is by The Joint Commission (TJC) and The Commission on Accreditation of Rehabilitation Facilities (CARF) for the hospital's Comprehensive Integrated Inpatient Rehabilitation Program with a Pediatric Specialty Program.

Pediatric Burn Center

Children's National Hospital

111 Michigan Avenue, NW, Washington, DC

Children's National Hospital (CNH) is a Pediatric Burn Center established by a memorandum of understanding with MIEMSS that serves Washington, DC; multiple counties within Maryland, including Montgomery and Prince George's; Southern Maryland, and certain regions of adjacent states. CNH treated 1,143 burn-injured children who reside in Maryland from June

1, 2021, through May 31, 2022, according to the Maryland State Trauma Registry. (See pages 96 to 99 for additional patient data.) Of the 1,143 burn-injured children, 47 were admitted, and 216 were emergency department (ED) visits. There were an additional 815 burn clinic visits. Pediatric burn services at CNH are provided by the Division of Trauma and Burn Surgery.

Mission

At Children's National Hospital, we strive to excel in care, advocacy, and education. We demonstrate this by providing a quality healthcare experience for our patients and families, improving healthcare outcomes for children regionally, nationally, and internationally, and by leading the creation of innovated solutions to pediatric health challenges. The commitment of our staff, physicians, volunteers, students, and community partners to our mission permits us to maintain a tradition of quality care, which is the hallmark of CNH.

Pediatric Burn Center Staff

Pediatric Burn Medical Director:

Randall S. Burd, MD, PhD

Pediatric Burn Program Manager:

Jennifer Fritzeen, MSN, RN, PCNS

FY 2022 Annual Report

■ **Notable Accomplishments.** On October 12, 2021, CNH burn service launched the EasyTBSA phone application. This patented novel approach to TBSA assessment was developed to assist medical providers to accurately calculate burn TBSA. Developed internally at CNH in collaboration with computer engineers, the app has shown to be superior to other traditional methods of TBSA calculation. These findings, along with the successful use of EasyTBSA, were presented at the 2022 American Burn Association National Conference. A manuscript is pending.

Burn patients require extended care as the burn injury heals, with a focus on scar prevention, stretching, and post-wound care the burn surgery team continues to expand outpatient services at the Friendship Heights clinic. In FY 2022, the treatment team at Friendship Heights expanded to include OT/PT services. This expansion allows patients to have more flexibility with appointment scheduling, with a full complement of resources for the scar patient.

■ **Quality Management and Improvement.** The pediatric burn center has a robust quality improvement program. The PI program includes daily review of care for inpatient acute burns, and weekly multidisciplinary review and care planning for active patients (inpatient and outpatient) with complex wound treatment, risk for scarring/contractures, psychologic needs, or other complexities in care. Additionally, the burn team continues to work on improving care. Several projects in FY 2022 focused on the enhancement of burn care. A highlighted project this year was to improve discharge education the family receives when

discharging a burn patient. This multidisciplinary improvement project culminated with a family friendly burn discharge instruction print out unique to the patient wound and mechanism of injury. The printout includes a link to the burn care videos for the family to view.

CNH is one of five charter members of the Pediatric Injury Quality Improvement Consortium. This consortium has implemented five pediatric burn benchmarks with one year of data. This data will assist in the development of best practice protocol in burn care and contribute to multicenter research in burn management.

■ **Injury Prevention Programs and Initiatives.** Burn prevention remains a top priority for the Burn Service. In FY 2021, the Burn Prevention Videos recorded with DC firefighter funding were released in a social media campaign. This campaign allowed the hospital to use target areas within the catchment with a high number of burn patients. Parents of young children, grandparents of young children can be identified through social media and targeted with the intervention videos. The goals of the social media campaign:

- Reach a target audience of parents in the DC area;
- Ensure that videos/tips are seen and watched fully; and
- Decrease the number of burn injuries in children with a commensurate reduction in hospitalization and hospital care for these injury types.

This mode of intervention can be tracked for views. These efforts continued into FY 2022, funded by an intramural grant for \$20,000. This year we reached 305,094 individuals, with 192,426 of viewings watched through video completion. The burn team published a manuscript outlining the success of the social media program, "Using Social Media for the Prevention of Pediatric Burn Injuries: Pilot Design and Usability Study".

■ **Emergency Medical Services and Nursing Continuing Education.** CNH offered over 50 hours in virtual and in-person continuing education in FY 2022. Virtual burn education is offered through the Trauma and Burn YouTube site. The YouTube site contains both recorded didactic education as well as a burn podcast (BurnCast). This site is available to our internal staff as well as externally. To date, the team has launched a series of seven BurnCasts, covering a wide variety of burn care-related topics of interest to those caring for burn patients. Topics have included a discussion with the Burn Service Psychologist on the mental health needs of a family post-burn injury, school re-entry, and OR interventions of the burn wound.

Virtual education has allowed for Children's National to expand outreach and educational opportunities. Children's Burn Service, in partnership with the Children's Emergency Department, has developed monthly education for multiple EMS departments in Maryland. The education provided is tailored to specific needs of the EMS agency and patient situations encountered.

■ **Research.** The Burn Center maintains an active research

program with multi-year studies in place. Through funds received from the National Institutes of Health and the Agency for Healthcare Research and Quality, the Burn Center continues to research automatic workflow capture and analysis using real-time, data-driven feedback to improve trauma resuscitation outcomes and trauma patient safety.

Funded by the Lambert Foundation Award, the burn service is able to study methods to screen for young child hyperactivity and impulsivity with unintentional burn injuries with the intent to develop interventions for parents to prevent burn injury. Multiple presentations at the American Burn Association national meeting highlighted this work. Additionally, the burn team has published peer review articles on parent resiliency and parent traumatic stress after a burn injury.

■ **Rehabilitation.** The Department of Physical Medicine and Rehabilitation at CNH consists of three divisions: Pediatric Rehabilitation Medicine, Physical Therapy, and Occupational Therapy. Physicians, advanced practice nurses (APN), registered nurses, physical therapists, occupational therapists, and rehabilitation aides deliver interdisciplinary care to patients at the National Center for Children’s Rehabilitation (acute inpatient medical care) and Children’s National Hospital, as well as regional outpatient centers (outpatient medical care). Physicians and APNs also provide consultation services in integrated equipment at a bracing clinic and a subacute rehabilitation facility.

Children with burns are evaluated and treated by a dedicated OT/PT team during the inpatient stay, extending to the outpatient phase of care. The OT/PT team is available both at main campus and the Friendship Heights campus to encompass compression measurement and evaluation.

Laser therapy is available through the burn service for burn patients in the subacute phase of care to minimize pigment changes and increase skin flexibility.

Level I Adult & Pediatric Eye Trauma Center, MIEMSS Region III

Wilmer Eye Institute at The Johns Hopkins Hospital

1800 Orleans Street, Baltimore, Maryland

Introduction

The Wilmer Eye Institute’s Eye Trauma Center (ETC), based at The Johns Hopkins Hospital (JHH) in East Baltimore, is the sole designated facility in Maryland specializing in the diagnosis, treatment, and long-term management of ocular trauma. Wilmer Eye Institute faculty, staff, and trainees collaborate with JHH adult and pediatric emergency departments and care teams across the enterprise to meet the comprehensive care needs of patient populations both within and outside of Maryland. Dedicated eye treatment rooms, operating rooms, diagnostic and

procedural equipment and supplies, Pharmacy, Radiology, and Pathology support services; and on-call coverage in every subspecialty ensure that patients are treated at the highest standard of care, 24 hours per day.

Founded in 1925, the Wilmer Eye Institute is among the largest and most distinguished academic departments of ophthalmology in the United States. The Wilmer team is comprised of 170+ full-time faculty members and more than 600 staff members. In FY 2022, the Wilmer clinical practice supported just under 270,000 patient visits and 14,000 eye surgeries, even during the ongoing public health emergency.

Patient populations presenting to Wilmer span all age groups: neonates, pediatrics, adolescents, adults, and geriatrics. Core clinical areas of expertise include comprehensive eye care (medical, optometric, and optical services), cornea, glaucoma, laser vision correction, vision rehabilitation, neuro-ophthalmology, ocular immunology, ocular oncology, oculoplastics, pediatric ophthalmology and adult strabismus, retina; and traumatic eye injury, of course.

Consistent with prior years, patients from all across the State of Maryland as well as neighboring states presented to the Wilmer ETC in FY 2022. That patient base remained demographically diverse, with higher relative burden of eye trauma observed for racial and ethnic minority groups, mostly adolescent and young-adult males, but overall represented across all populations.

Mission

The mission of the Wilmer Eye Institute is to use and develop the finest scientific evidence to promote improved ophthalmic care and the reduction of visual disability in a collaborative environment that combines compassionate patient care, innovative research, and the training of future leaders in ophthalmology and visual sciences. The institute’s core values are integrity, excellence, diversity and teamwork, innovation, and commitment to scientific rigor. The objectives of the Wilmer ETC remain optimal clinical management of severe ocular injuries, to conduct research into the natural history of eye trauma, to develop new treatments for ocular trauma, and to initiate and support eye trauma education and prevention activities.

Staff

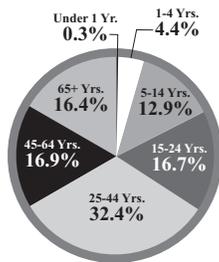
Fasika Woreta, MD, MPH, continues in her role as Director of the Wilmer ETC, along with Shailaja Chopde, MSN, RN, in the roles of Eye Trauma Program Coordinator and Nurse Manager of the Bendann Surgical Pavilion Prep/PACU Unit. Wilmer’s Chief Resident (Assistant Chief of Service), appointed annually, serves as Associate Director for the Wilmer ETC; Sophie Cai, MD, fulfilled this role in FY 2022, and Drs. Narine Viruni and Kapil Mishra took over as dual ACS/Co-Associate Directors in FY 2023. Wilmer physician assistants also continue to assist with daytime consult coverage on behalf of Ophthalmology in

Wilmer Eye Institute at The Johns Hopkins Hospital Demographics

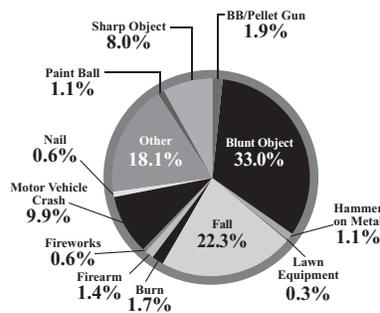
(June 2021 to May 2022)

Source: Maryland Eye Trauma Registry

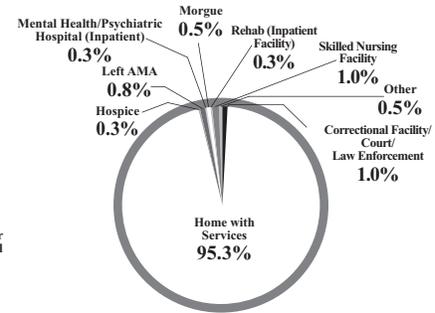
Age



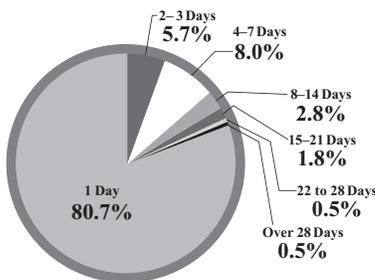
Injury Type



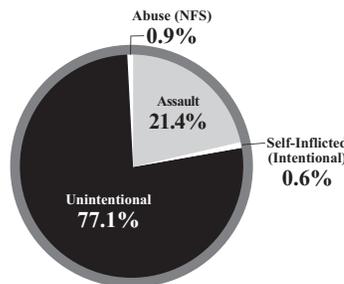
Final Disposition



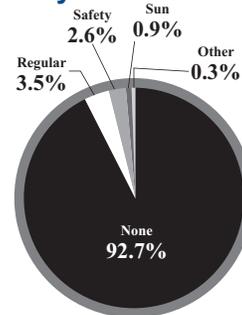
Length of Stay



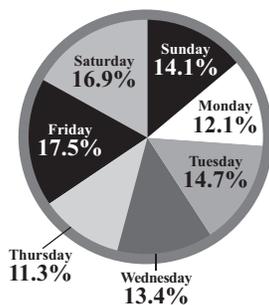
Intentionality



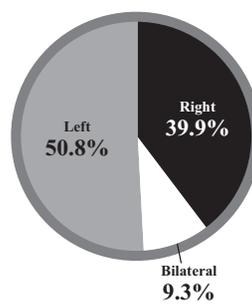
Eye Protection



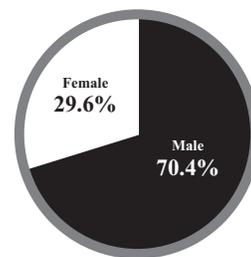
Day of Week



Eye Injured



Gender



JHH Emergency Department and other settings.

Key Activities in FY 2022 and Ongoing

The Wilmer ETC continues to sustain close collaborations with other care teams, most frequently Johns Hopkins Emergency Medicine (JHH Adult & Pediatric Emergency Departments, EDs), Anesthesiology & Critical Care Medicine (ACCM), and Nursing, toward the goals of improved population access to ocular trauma services, streamlined pathways for more coordinated and timely care management, more value-driven models of

healthcare delivery, and highest-quality experience and outcomes for our patients.

Wilmer's Patient Access Center for the Eye (PACE) clinic has continued its same-day and same-week appointment program dedicated for Ophthalmology patients presenting to the ED with non-acute eye issues. This resource, several slots daily, offers ED registrars the ability to direct-schedule patients to a more appropriate venue of care for timely follow-up, which is anticipated to reduce ED wait times, improve access for ETC patients right within the ED setting through advanced triage

of non-emergency visits, and promote more responsible use of healthcare resources.

In January 2022, Dr. Woreta was appointed to the role of President of the American Society of Ophthalmic Trauma (ASOT), a collective of ophthalmologist-leaders across the US who are highly-engaged around professional education, policy-setting, clinical and research collaboration, and next-generation training in this domain. Through her advocacy, ocular trauma was recently added as a searchable track for the American Academy of Ophthalmology (AAO) meeting, and she co-authored many articles that are now available through its EyeWiki® hypertext repository (https://eyewiki.ao.org/Category:Ocular_Trauma).

■ **Quality Management and Quality Improvement.** Wilmer ETC core participated in ongoing surveillance of quality and performance metrics, escalation of and loop closure on prior trauma cases warranting special review, analysis of demographic and injury trends, assessment of operations and infrastructure needs, and generation of new ideas for trauma education, research, and outreach. They also participate with and report up through the Quality Improvement Committee of the Wilmer Eye Institute, which convenes on a quarterly basis, and is directly aligned with the overall quality and safety structure and institutional initiatives at JHH.

Members of the ETC team continue to meet with JHH Adult and Pediatric ED leaders on at least a quarterly basis for detailed review of any issues related to clinical coordination and co-management of patients. The candid discussions that occur in this forum have directly contributed to improvements in handoff communication, workflows, access, quality of care, and value of care. The ETC is presently working on further electronic health record-driven optimizations to its data reporting and review processes, as well as collaboration with General Internal Medicine teams on pathways for post-surgical admissions.

■ **Injury Prevention Programs and Initiatives.** Dr. Woreta is continuing work with medical students, Ophthalmology residents, public health experts, and other collaborators in analyzing data and considering interventions for groups observed to have higher incidence of ocular trauma. ETC leaders also partner with Wilmer's internal Marketing and Communications team to produce social media messaging in line with the American Academy of Ophthalmology eye health monthly observances, including workplace eye wellness, sports eye safety, and eye injury risks to children from toys that are frequently gifted during holiday months. Each summer right before the Fourth of July holiday, the Johns Hopkins website features an article on firework safety co-authored by Dr. Woreta in partnership with Eileen McDonald, MS, Director of the Children's Safety Center of the Johns Hopkins Center for Injury Research and Policy.

■ **Continuing Education.** Each year, ETC physicians and nurses provide education on eye trauma identification and management to multidisciplinary care teams within JHH adult and

pediatric EDsm, as well as across the Wilmer Eye Institute, all of which serve as primary points of entry for ocular trauma patients. Dr. Woreta also presents on ocular trauma across many regional, national, and international forums, and through panel interviews and frequent authorship of articles in the digital space.

In parallel, nurse educators deliver eye trauma programs across JHH units to assure meeting of biannual education requirements, through learning modules that include article reviews, lectures and conferences, online continuing education, and new staff orientations. In June 2022, Wilmer held its second All-Virtual Nursing and Ophthalmic Technician annual education conference, focused on the theme of COVID-19 impacts on Ophthalmology. This online forum incorporated several hours of ocular trauma topics, including presentations on oculoplastic trauma and intimate partner violence, triage of ocular trauma (led by Dr. Woreta), and pediatric ophthalmology emergencies and non-accidental traumas.

■ **Fellowships and Residencies.** The Wilmer Eye Institute supports a four-year ophthalmology residency program with recent integration of a medicine internship year, and accepts five residents per program year. Wilmer residents, alongside assistant chiefs of service, faculty attendings, and staff are highly active participants in the assessment and management of ETC patients in the EDs, on inpatient floors, in the clinic, and in the operating room. Virtually all clinical divisions of Wilmer also offer subspecialty fellowship/advanced specialty training programs. Additionally, Wilmer's robust research enterprise supports a large volume of research fellows each year.

■ **Rehabilitation Services.** The Wilmer ETC offers its patients direct, in-house access to a full complement of clinical services and resources necessary for visual recovery or functional accommodation, in the case of irreversible injury. Wilmer's Low Vision & Vision Rehabilitation Division matches patients with assistive technologies that can enable their independence and participation in activities of daily living. Wilmer's Oculoplastics Division offers functional and cosmetic surgical services to limit the after-effects of traumatic eye injuries. ETC patients also have access to an ocularist, an expert who is highly skilled in the creation and fitting of ocular prosthetics.

■ **Research.** Trauma-related publications by ETC faculty in FY 2022 covered the full spectrum of topics, from population health to policy and societal impacts to clinical innovation and standard of care. The faculty at the Wilmer Eye Institute is principally comprised of clinician-scientists – prolific researchers, authors, and educators, in addition to expert clinicians.

Hand/Upper Extremity Trauma Center

Curtis National Hand Center, MedStar Union Memorial Hospital

201 East University Parkway, Baltimore, Maryland 21218
Region III

Located in Baltimore City, the Curtis National Hand Center (CNHC) at MedStar Union Memorial Hospital (MUMH) serves as the state's referral center for the specialized care of injuries to the hand, wrist, forearm, and elbow. In FY 2022, the Hand Center's emergency department cared for 2,219 patients with acute hand injuries, nearly 25% of which were transported by public safety ambulance or medevac helicopter. The unique nature of the Hand Center's services also draws acutely injured patients from a broad geographic region, including Pennsylvania, Delaware, Virginia, West Virginia, and Washington, DC. Whether from within Baltimore City or as far as these other neighboring states, the onsite heliport facilitates reduced travel times and improves the speed of intervention for the most critically injured.

The Hand Center's expertise in management of challenging bone and soft tissue trauma is supplemented by advanced microsurgery skill. The handling of fractures, complex soft-tissue coverage problems, and amputations requiring replantation continue to be the Curtis National Hand Center's major focus.

The acute trauma unit is staffed by specialists in orthopedic and plastic surgery with subspecialty training in hand and upper extremity surgery. The team is available 24/7/365 for the care of the trauma patient. Calls for transfer from the field are received immediately and accepted by the emergency physicians. Transfer requests from other emergency rooms for the treatment of hand trauma patients are received via the dedicated hand transfer line. This transfer center receives 1,219 calls/year for transfer or consultation. These are rapidly and efficiently routed to the hand surgeons on call. Call logs of these transfer requests demonstrate an acceptance rate of greater than 97% of these patients to the Curtis National Hand Center. The remaining cases (less than 3%) are determined to not require transfer emergently and are provided outpatient follow-up at the Hand Center or are referred for other specialty care due to associated injuries (e.g., burns, ophthalmologic injury, spine injury).

Mission

The Curtis National Hand Center at MedStar Union Memorial Hospital remains committed to handling acute injuries and providing reconstructive surgery for Maryland's trauma victims. The focus on complex hand, wrist, and elbow injuries has been part of the well-developed Maryland trauma care system since Dr. Raymond M. Curtis, the center's founder, collaborated with Dr. R Adams Cowley and others during the inception of the Shock Trauma Center and the Maryland EMS system.

Trauma Staff

*Trauma Medical Director: James P. Higgins, MD
Trauma Program Administrator: Timothy Beckman
Trauma Program Coordinator: Cynthia Johnson*

FY 2022 Annual Report

■ **COVID-19 Precautions and Trauma Management.** The Hand Center initiated a myriad of operational and structural changes to successfully maintain uninterrupted trauma care for the state of Maryland. These included:

- An enlarged dedicated hand trauma suite in the MedStar Union Memorial Hospital (MUMH) emergency department provides greater efficiency for management of hand trauma patients while providing the ability to better isolate these patients from the rest of the ED. The suite is immediately adjacent to the operating room and enables the team to transport patients for operative care without overhead pages throughout the ED hallways.
- The MUMH ED now has a separate isolation area for COVID-19 patients to enable continued maintenance of emergency services, including hand trauma.
- Rapid on-site COVID-19 testing is performed for all trauma patients.
- The MUMH operating suite has COVID-19-specific rooms, as well as preoperative, intraoperative, and postoperative protocols for the management of COVID-19-positive patients necessitating emergent trauma operative care.
- Our Hand Surgery clinic established telemedicine capability for the preoperative and postoperative care of patients appropriate for this platform. This is widely used for elective, urgent, and emergent preoperative and postoperative visits/consultation, when possible.
- During the pandemic surges, the hand trauma team members were separated into platoons for the purposes of ensuring a healthy complement of providers throughout the course of the pandemic. In the event of a team member(s) becoming COVID-19-positive, isolation and quarantine of other members would be limited so that all clinical services could be maintained.
- Hand therapy visits for postoperative/post-injury trauma patients can also be provided virtually to minimize the risk of compromising function due to any pandemic or other care restrictions.

■ **Professional Education.** The Hand Center continues to expand its academic offerings, with increased collaboration with affiliated institutions, and increased participation by colleagues and alumni around the region and country. The didactic program at the Hand Center is robust; lectures, dissections, and interactive conferences are offered every weekday morning throughout the year on a widely circulated and comprehensive schedule. Specialty labs are held 15-20 times per year, encompassing half-day lab demonstrations and surgical simulation practice sessions. The monthly journal club symposia are for review of the most

up-to-date literature on a schedule of pertinent clinical topics, and include all fellows, faculty, and other hand surgeons from around the area to ensure a robust and meaningful discussion and broader learning.

The Hand Center's dynamic Regional Hand Surgery Symposium has been enhanced, and the visiting lecture series has expanded to include impactful speakers who have challenged faculty and staff with new ideas related to innovations in arthroscopy, congenital surgery, osteochondral arthroplasty, microsurgery, allotransplantation, brachial plexus surgery, and forearm and elbow pathology. Speakers are invited from around the country and world to enable the exchange of ideas and expand our capabilities in caring for patients in our region. These "guest faculty" members are numerous (2020: 7 speakers; 2021: 8 speakers; 2022: 10 speakers) and international (United States, Spain, Taiwan, Poland, Japan, South Korea).

Much of the 2020-2021 academic calendar was maintained virtually to ensure the safety of our providers and patients. The ease and accessibility of the virtual format resulted in the Hand Center having more guest speakers and events than ever before, with access to these events available to a wider number of learners nationally. Although for 2021-2022 we have moved many of our teaching and educational sessions in-person, we maintain the remote learning option for many events to allow broader participation and inclusion of any providers unable to attend (whether related to pandemic/quarantine or not). MedStar provides enterprise-level secure video conferencing accounts that continue to support our educational conferences and visiting speaker events. It has enabled our team members to exchange ideas not only on surgical trauma management and technique, but also the evolving "best practice" topics surrounding care delivery in the era of a pandemic and beyond.

■ **Quality Management and Improvement.** The Curtis National Hand Center maintains a formal performance improvement process for timely problem identification, data-driven analysis, and resolution of issues within the quality framework of MedStar Union Memorial Hospital. At our monthly morbidity and mortality conference, challenging and readmitted cases are presented for evaluation and to review outcomes. The Hand Center has maintained efficient electronic data capture and data entry into the Maryland Trauma Registry, providing high quality and completeness in reporting. With expanded data and analytic capabilities, the Hand Center has launched quality-improvement initiatives aimed at improving triage and transfer, evaluating processes of care delivery and how to optimize them across all services, and providing unique approaches to reduce patient burden after trauma.

■ **Injury Prevention Programs and Initiatives.** In FY 2022, the Hand Center initiated community and hospital visitor outreach via social media and hospital digital wall screens that provided injury prevention and safety information about falls, lawnmowers, fireworks, and snow blowers. The center's

trauma coordinator participates each year in a statewide distracted driving injury prevention initiative. The Hand Center Trauma Medical Director, Dr. James P. Higgins, has been active with speaking engagements throughout the state and surrounding areas. Dr. Ryan Katz has been designated the hand center's trauma education liaison, meeting with field providers at statewide meetings and in community hospitals to improve communication and feedback on coordination of trauma transfers.

■ **Focused Services for Amputation Patients.** In line with many other large upper extremity trauma centers, we have initiated a focused clinic for patients that have suffered an upper extremity amputation. This clinic allows for coordination of care across hand surgery, orthotics/prosthetics, therapy, and social work/social services all at one clinic visit, providing efficient and high value care for amputees.

■ **Bone Health and Fracture Prevention Program.** Union Memorial Hospital now has a hand-surgery led bone health program that facilitates streamlined evaluation and management of patients that present to us with fragility fractures or that have bone health challenges that might impact recovery from other traumatic injuries. This partnership between hand/orthopedics, endocrinology, geriatrics, physical therapy/occupational therapy, the MedStar primary care network, and Union Memorial hospitalists has already made a substantial impact on timeliness, capture, and management of bone health especially in our more senior trauma patients.

■ **Prehospital/EMS/Nursing Continuing Education.** The MUMH Continuing Medical Education Committee Hospital oversees the continuing medical education (CME) program at the Curtis National Hand Center. Routine CME events are provided for the attending hand surgeons, fellows and residents, hand therapists, mid-level practitioners, nursing, and ED staff. Hand trauma labs are scheduled on a regular basis, giving staff the opportunity to learn, practice, and update their skills.

Specialty labs for ED management of hand trauma are available for Emergency department staff and first call providers. Aviram Giladi, MD, MS, is actively collaborating with the American Society for Surgery of the Hand and the American College of Emergency Physicians on educational symposia around hand trauma triage and management. Advanced surgical labs are conducted for surgical staff, hand fellows, and residents. Visiting speaker events are open to all staff across the system. Hand surgeons provide lectures for OR staff on specialty topics (i.e., digital replantation, microsurgery, free tissue transfer) as part of the OR weekly educational series.

■ **Fellowships/Residencies.** The Hand Center is one of the premier training centers for hand surgery in the United States. Our fellowship training program is highly sought after by the best plastic surgery and orthopedic surgery trainees in the world and prepares all our graduates for management of complex upper extremity problems. There are two fellowship programs for advanced training in hand surgery that are maintained at

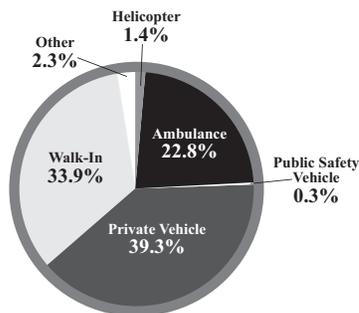
The Curtis National Hand Center at MedStar Union Memorial Hospital

(July 2021 to June 2022)

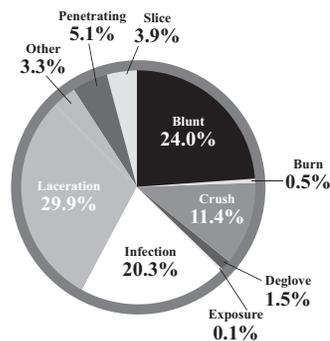
Source: The Curtis National Hand Center

n = 2,219

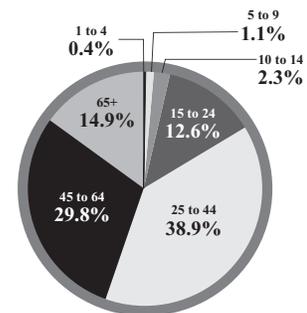
Transport Mode



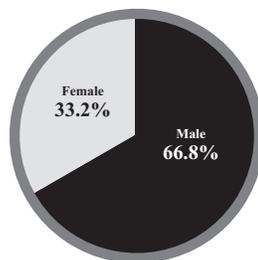
Injury Type



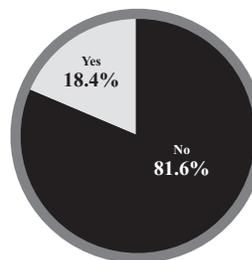
Age



Gender



Work-Related



the Curtis National Hand Center. The civilian track receives approximately 200 applicants annually (over 80% of the national applicant pool applies to train at Curtis) and selects the top four applicants for matriculation. The military track is a collaborative training program maintained with the Walter Reed National Military Medical Center. Established in 1960, this fellowship track has provided hand surgery training to every US Army hand surgeon via this unique military/civilian collaborative. On the residency training level, the Curtis Hand Center for decades has provided dedicated hand surgery training rotations for residents in the Johns Hopkins Plastic Surgery, Georgetown Plastic Surgery, and Medstar Orthopedic Surgery training programs. These rotations provide young surgeons with much of their exposure to the field of hand surgery. Because of our clinical volume and in-depth education experience, we also often have other visiting residents from Johns Hopkins and Georgetown Orthopedic Surgery programs, and visitors from other training programs across the country, come rotate with us.

■ **Research.** Aviram Giladi, MD, MS, a surgeon-scientist with additional training in statistics and research methodology, serves

as the Curtis National Hand Center Research Director. With protected time and hospital support for research work, the investigative efforts across the Hand Center have grown exponentially in the past few years. With this focused committed time and excellent resources, there are numerous research and educational studies ongoing with frequent publications in the highest-impact specialty peer-reviewed journals.

Research projects, funded by internal and external sources, look at a wide range of issues, including microsurgery, peripheral nerve surgery and augmenting nerve recovery, bone and soft-tissue problems, evaluation and triage for traumatic injuries, and reconstruction after trauma. We have also expanded our focus on health services research, launching an expansive data collection initiative, participating in multiple clinical trials, and coordinating numerous research efforts evaluating policy and care quality issues around hand and upper extremity trauma. In August 2021, we initiated a randomized trial of novel surgical treatments for post-amputation neuroma pain, sponsored by the Department of Defense. This is one of many studies aimed at reducing pain and improving return to work and function for our

trauma patients. This is one example of how the focus of our research work centers on our role as a regional trauma center. We are also studying the impact of health policy changes on triage and transfers, how telehealth and video analyses can improve remote triage as well as post-operative follow-up, and various approaches to improving care quality in a regionalized hand and upper extremity trauma center. All these expanded efforts include collaborations with other experts, across our region and around the world, to promote expanded thinking and new developments across all of our research.

■ **Rehabilitation.** The rehabilitation team at the Hand Center and across the MedStar rehabilitation network works closely with the hand surgeons at the Hand Center to establish a treatment plan for each patient. With a wide network of subspecialized Certified Hand Therapists (CHT's) located in satellites throughout the state of Maryland, our therapy team can facilitate supervised and independent therapy sessions for our patients based on their specific surgical, rehabilitative, geographic, occupational, and socioeconomic requirements and restraints.

Additionally, therapists teach and guide each patient to maximize use of the injured or otherwise limited extremity while preventing re-injury or worsening of their condition. Therapists educate patients on the disease process, the healing process, and the rationale for the prescribed therapy techniques, and regularly communicate with the primary surgeon should problems, issues, or challenges arise. In 2020, prior to the COVID-19 pandemic, our hand therapy teams began establishing tele-therapy visits. Since the start of the pandemic, these offerings have expanded substantially across the MedStar network. We have in-person as well as tele-therapy visits for our patients, so they can progress well in their recovery while maintaining proper precautions.

A complete suite of rehabilitation services is offered, including:

- Management of acute or chronic pain
- Protective splinting for immobilization and controlled motion, post-operatively or post-injury
- Exercise programs to restore motion, strength, and fine and gross motor coordination
- Home exercise programs
- Sensory re-education programs after nerve injury
- Thermal and electrical modalities to minimize pain and swelling, facilitate joint motion and tendon gliding, and decrease hypersensitivity
- Wound care techniques to promote healing
- Work hardening and functional testing
- Social worker consultations.

■ **Pain psychology services.** Considering the impact of the opioid epidemic, especially on musculoskeletal surgery and musculoskeletal trauma, we have initiated multiple programs aimed at improving pain management while reducing reliance on opioids. Part of this initiative has included working with MedStar National Rehabilitation Hospital to provide pain psychology

and cognitive behavioral therapy services to many of our hand trauma patients. We now have a pain psychologist, Dr. Natasha Durant, seeing patients in the Hand Center two full days a week. Dr. Durant provides mental health (stress, PTSD, depression, etc.) and pain management support as early as needed in the recovery process to optimize outcomes and avoid reliance on pharmacologic management of pain and other trauma-associated stressors.

Neurotrauma Center

R Adams Cowley Shock Trauma Center

22 S. Greene Street, Baltimore, Maryland

The Neurotrauma Center at the R Adams Cowley Shock Trauma Center, University of Maryland Medical Center, provides comprehensive management for patients with injuries of the brain, spinal cord, and spinal column. According to the Maryland State Trauma Registry, from June 1, 2021, to May 31, 2022, the Neurotrauma Center provided care to 2,114 patients with traumatic brain injuries, 482 patients with spinal column or spinal cord injuries, and 377 patients who suffered from both traumatic brain and spinal column or spinal cord injuries. (See pages 83 to 88 for additional patient data.)

A dedicated, highly trained, and experienced multidisciplinary clinical staff including physicians, nurses, therapy services, case management, pain management, nutritional services, integrative medicine, social work and pastoral care staff, a designated patient advocate, and a substance abuse program are available at the Neurotrauma Center.

At the Neurotrauma Center, patients with severe brain injury receive a multisystem assessment with intracranial pressure parameters closely monitored so factors that may cause secondary brain injury are rapidly recognized and treated, optimizing patient outcomes. Neurosurgeons are readily available to intervene, if necessary, and perform craniotomies for hematoma evacuation, gunshot wound debridement, elevation of depressed skull fractures, decompressive craniectomies, and cranioplasties. Patients with spinal cord injuries, often with cervical spine injuries, are treated using sophisticated respiratory care protocols, leading to successful weaning from mechanical ventilation for most patients.

The 12-bed Neurotrauma Critical Care Unit (NTCC) provides interdisciplinary care to critically ill patients who have sustained primarily central nervous system injury and may have other associated injuries or organ dysfunction. The NTCC operates with all required resources for critical care with the addition of specialized fiber optic, intraparenchymal and/or intraventricular intracranial pressure monitoring, cerebral oxygen monitoring and continuous electroencephalogram monitoring.

The 24-bed Neurotrauma Intermediate Care Unit (NTIMC)

provides interdisciplinary care to ill patients who have sustained primarily central nervous system injury and may have other associated injuries or resolving organ dysfunction. These patients still require frequent monitoring or intensive nursing care.

Mission

The R Adams Cowley Shock Trauma Center is a multidisciplinary clinical, educational, and research institution dedicated to world-class standards in the prevention and management of critical injury and illness. Its highly specialized medical personnel and dedicated resources are focused on a single mission: to eradicate preventable death and disability and thus reduce the personal tragedy and overall costs associated with severe injury. This mission is continuously pursued through state-of-the-art clinical care services, active research, didactic and hands-on clinical education, and prevention programs.

Neurotrauma Center Staff

Trauma Medical Co-Director:

Bizhan Aarabi, MD, FACS, FACSC

Trauma Medical Co-Director:

Gary Schwartzbauer, MD, PhD

FY 2022 Annual Report

■ **Notable Accomplishments.** Throughout each surge of the COVID-19 pandemic, the R Adams Cowley Shock Trauma Center has continued to play a major role in the care of stricken Marylanders, with those patients with concomitant neurologic injury coming to the Neurotrauma Center. Due to the excellent planning and direction from the Hospital Incident Command System, Unit leadership and, very importantly, Nursing and Environmental Services in the front lines daily, we continue to achieve great out-comes in the face of this crisis. Daily debriefings were organized by nursing leadership to troubleshoot, ease stress and improve patient care. Despite the increased patient care demands, the Neurotrauma Center continued to achieve the notable accomplishments below:

- Samantha Adams, MSN, RN, Senior Clinical Nurse II, and Karen Memphis, BSN, RN, Senior Clinical Nurse I from the Neuro Trauma Critical Care Unit, serve as members of the Brain Injury Association of Maryland Board of Directors. Samantha also served in the role of interim Treasurer and Karen currently serves as Secretary for the Executive Committee for the Brain Injury Association of Maryland.
- Eleven nurses from Neurotrauma Critical Care (NTCC) and Neurotrauma Intermediate Care (NTIMC) completed the Academy of Certified Brain Injury Specialists offered by the Brain Injury Association of America. This educational program provides “a body of knowledge that strives to improve the quality of care for individuals with brain injury.”

■ Publications.

- Aarabi B, Akhtar-Danesh N, Simard JM, Chryssikos T,

Shanmuganathan K, Olexa J, Sansur CA, Crandall KM, Wessell AP, Cannarsa G, Sharma A, Lomangino CD, Boulter J, Scarboro M, Oliver J, Ahmed AK, Wenger N, Serra R, Shea P, Schwartzbauer GT. Efficacy of Early (≤ 24 Hours), Late (25-72 Hours), and Delayed (>72 Hours) Surgery with Magnetic Resonance Imaging-Confirmed Decompression in American Spinal Injury Association Impairment Scale Grades C and D Acute Traumatic Central Cord Syndrome Caused by Spinal Stenosis. *J Neurotrauma*. 2021 Aug 1;38(15):2073-2083. doi: 10.1089/neu.2021.0040. Epub 2021 Apr 6. PMID: 33726507; PMCID: PMC8309437.

- Chryssikos, T, Schwartzbauer, G, Sansur, C, Crandall, K, Wessell, A. Enhanced safety of pedicle subtraction osteotomy reduction using intraoperative ultrasound. *World Neurosurgery* 2021 Jun 16:S1878-8750(21)00815-9.
- Podell, J, Miller, S, Jaffa, M, Pajoumand, M, Armahizer, M, Chen, H, Tripathi, H, Schwartzbauer, G, Chang, WT, Parikh, G, Hu, P, Badjatia, N. Admission features associated with paroxysmal sympathetic hyperactivity after traumatic brain injury: a case-control study. *Crit Care Med*. 2021 Oct 1; 49(10):e989-e1000
- Stokum, J, Chryssikos, T, Shea, P, Olexa, J, Schwartzbauer, G, Aarabi, B. Letter: Ultrasound in Traumatic Spinal Cord Injury: A Wide-Open Field. *Neurosurgery*. 2022 Feb 21 (online ahead of print).
- Karen A. McQuillan, MS, RN, CNS-BC, CCRN, CNRN, TCRN, FAAN served as an expert panel member that developed the American College of Surgeons Trauma Quality Program. *Best Practice Guidelines Spinal Injury*. (March 2022). spine_injury_guidelines.pdf (facs.org). Authored the Decubiti section.

■ Presentations.

- Gary Schwartzbauer MD, PhD
 - CNS Oral Board Review: Neurotrauma and Neurocritical Care-Surgical Considerations (webinar) (2022)
 - “Neurotrauma from Baltimore’s R Adams Cowley Shock Trauma Center” Rocky Mountain Traumatological Society Annual Meeting, Jan 14, 2022
 - “Spinal Cord Injury” Webinar Series: Medical Student Neurosurgery Training Center, April 2, 2022
- TraumaCon 2022 – Society of Trauma Nurses Annual Conference, March 30 – April, 2022, in Las Vegas, Nevada.
- *Prevalence and Predictive Characteristics of Agitation in Patients with Traumatic Brain Injury in the Acute Care Setting*. Poster Presenters: Karen McQuillan, MS, RN, CNS-BC, CCRN, TCRN, FAAN; Sara LeMaitre, MS, RN; Paul Thurman, PhD, RN, ACNP, CCNS, CCRN; Alivia Stenzel, BSN, MS, RN, SCRNI, SCN I;

Katelyn DeLauter, MS, RN, CNL, CN II; Nora Tamulevich, BSN, RN, CCRN, CN II; Amy Madren, BSN, RN, TCRN, SCN II

- Karen McQuillan, MS, RN, CNS-BC, CCRN, CNRN, TCRN, FAAN *Neurologic Assessment and Spinal Cord Injury* for University of Maryland School of Nursing, Doctorate of Nursing Practice Advanced Practice Nurses, Baltimore, Maryland.
- Karen McQuillan, MS, RN, CNS-BC, CCRN, CNRN, TCRN, FAAN. *Traumatic Brain Injuries* on May 5, 2022 at the Emergency Nurses Association By the Bay 2022 conference in Baltimore, Maryland.
- Karen McQuillan, MS, RN, CNS-BC, CCRN, CNRN, TCRN, FAAN.
- Agitation Following Acute Traumatic Brain Injury on May 13, 2022 at the Brain Injury Association of Maryland Moving Forward Together conference in Pikesville, Maryland.
- Robin Fencel, PA. *A Pain in the Neck: Understanding Cervical Myelopathy and Radiculopathy.* (2022) University of Maryland Medical Center Advance Practice Provider Grand Rounds
- Robin Fencel, PA. *Spinal Trauma.* (2021) University of Maryland Medical Center Nurse Practitioner Fellowship Program

■ Research.

- “Development and Implementation of an Agitation Management Guideline to Reduce Agitation in Patients with Acute Traumatic Brain Injury” 2020 – ongoing.
- Awarded \$25,000 Innovation grant from the University of Maryland Medical Center
- Team Members: Karen A. McQuillan, MS, RN, Nursing, Shock Trauma Center; Gary Schwartzbauer, MD, PhD, FPI, Neurosurgery; Mehrnaz Pajoumand, PharmD, BCPS, Pharmacy; Paul Thurman PhD, RN, Nursing, Shock Trauma Center; Alivia Stenzel MS, RN, Nursing, Shock Trauma Center; Madeline Marks, PhD, Psychiatry; Nora Tamulevich, RN, BSN, Nursing, Shock Trauma Center; Alexandra Hunt, MSN, CRNP, Nursing, Shock Trauma Center; Juli Carbone, OTR/L, CBIS, Rehabilitation Services; Amy Madren, BS, BSN, Nursing, Shock Trauma Center; Katelyn Delauter (Ruhe) MS, RN, Nursing, Shock Trauma Center; Sara Le Maitre, MS, RN, Perioperative Services; Samantha Latorre, MD, Psychiatry; Samantha Adams, MS, RN
- This study, currently underway, aims to evaluate the effectiveness of a guideline to manage agitation inpatients with traumatic brain injury

■ **Quality Improvement/Evidence-Based Practice.** Our quality initiatives continue to focus on reducing hospital-acquired infections, with emphasis on ensuring daily chlorhexidine treatments; adhering to handwashing; staff re-education and regular monitoring of adherence to hospital-acquired infection

prevention interventions; ensuring removal of vascular catheters placed in the field or during resuscitation; and optimizing use of intermittent bladder catheterizations versus placement of indwelling catheters. The urinary catheter and central line usage standardized utilization ratio has remained below consistently below 1.0 for both NTCC and NTIMC.

- As a result of a performance improvement initiative to remove all vascular lines placed in the field and during resuscitation, our incidence of peripheral line phlebitis has decreased.
- Phlebitis prevention efforts implemented in NTCC to remove peripheral intravascular lines placed in the field or during resuscitation showed reduction in peripheral phlebitis, so implementation throughout the STC is planned.
- The Fecal Management to prevent CAUTIs initiated in NTCC was implemented throughout the Shock Trauma Center and shared with other units at the University of Maryland Medical Center.
- Staff re-education, trial of a bed and mattress surface decision making online program, creation of a heel protection algorithm, and changes to electronic documentation options related to patient positioning initiated to aid in prevention of hospital-acquired pressure injuries.
- An NTCC and NTIMC initiative is underway to reduce agitation prevalence, subsequently reducing falls, inadvertent line removal, patient “abuse toward staff” incidences and restraint use (See Research).
- Project led by Tammie Trinh, DNP, ACNP on NTIMC entitled *A Restraint Alternative Program on the Neurotrauma Intermediate Care Unit* educated staff on restraint alternatives, implemented a restraint decision making tool and initiated charge nurse rounding to optimize use of restraint alternatives and successfully reduce restraint use.

■ **Injury Prevention Programs and Initiatives.** The Center for Injury Prevention and Policy (CIPP) aims to reduce preventable injuries and violence, and their consequences throughout Maryland. Several injury-prevention programs, listed on page 36, operate within CIPP.

■ **Emergency Medical Services and Nursing Continuing Education.** The Neurotrauma Center incorporates didactic training and simulations on care of patients with traumatic brain injury and spinal cord injury as part of our Trauma Theory course. Four lectures and numerous articles on neurotrauma-related topics were made available to all staff at the STC. This ensured fulfillment of the mandatory Neurotrauma education credits needed by nursing staff.

■ **Research.** The Neurotrauma Center employs a multidisciplinary team of clinical experts that utilizes evidence-based treatment strategies designed to ensure immediate diagnostic and therapeutic access for patients with traumatic brain, spinal column, and spinal cord injuries. The staff and faculty of the

Neurotrauma Center avails its clinical and research expertise globally to healthcare providers. Trauma-related publications by Neurotrauma faculty in FY 2022 covered a variety of topics. Articles in peer-reviewed journals and Neurotrauma-related grant research projects have included advances in traumatic brain and spinal cord injury, such as defining the role of expansive duraplasty for severe spinal cord injury (SCI); the effect of blood pressure variations on TBI outcomes; and exploring predictive features of traumatic brain injury among older adults in a trauma center.

Newly activated and some relevant ongoing clinical trials include:

- Genetic analysis of trauma patients that will hopefully someday tailor trauma care
- Optimizing brain oxygen supply and outcomes following TBI using a brain oxygen monitor
- Assessing the utility of acupuncture for spinal cord injury patients
- Delivering optimal oxygen therapy to TBI patients through hyperbaric oxygen
- Cooling patients with spinal cord injury to improve outcomes
- Using virtual reality to both assess and treat TBI in older trauma patients
- An exciting multicenter trial looking to treat TBI patients with a drug developed by a University of Maryland researcher and neurosurgeon.

■ **Rehabilitation.** Part of the recovery process must start at the very instant patients arrive at the Neurotrauma Center, with the ultimate aim of stabilization of critical injuries, followed by early rehabilitation.

The Neurotrauma Center’s emphasis on early patient mobilization as the beginning of the rehabilitative process helps to decrease morbidity associated with neurologic injury. Post-acute inpatient and outpatient services are primarily provided by the University of Maryland Rehabilitation & Orthopedic Institute.

Rehabilitation Services

Designated trauma centers within the Maryland EMS system are required to provide for the rehabilitation needs of their patients, whether provided in-house or by way of affiliation with other facilities. This service is a critical element of the continuum of care for patients who have survived traumatic injury. Initiation of rehabilitation services begins as soon as possible following admission. Rehabilitation services are both in-patient and outpatient.

Patients who experienced multiple trauma injury and resulting in temporary or long-term disability benefit from a full range of rehabilitative services dedicated to enabling them to resume active, independent lives. The most frequent injuries requiring rehabilitation are spinal cord injury, traumatic brain injury, fractures, amputations, and gunshot wounds. The goal is

Top Destinations of Patients Who Went to Inpatient Rehabilitation Facilities (Aged 15 and Over) (June 2021 to May 2022) <i>Source: Maryland State Trauma Registry</i>	
Rehabilitation Center	Number
Adventist Health Care Rehabilitation	113
Autumn Lake Healthcare	16
Encompass Health	114
FutureCare	17
Johns Hopkins Bayview Specialty Hospital Programs	31
Inpatient Rehabilitation Center at MedStar Good Samaritan Hospital	16
Inpatient Rehabilitation Unit at the JHH	26
MedStar National Rehabilitation Hospital	40
ProMedica Senior Care	30
Sinai Rehabilitation Center	78
University of Maryland Rehabilitation & Orthopaedic Institute	320
<i>Note: Total patients aged 15 and over that went to rehabilitation centers = 1,379</i>	

Destinations of Patients Who Went to Inpatient Rehabilitation Facilities (Aged 14 and Under) (June 2021 to May 2022) <i>Source: Maryland State Trauma Registry</i>	
Rehabilitation Center	Number
The HSC Pediatric Center, DC	9
Kennedy Krieger Institute	6
MedStar National Rehabilitation Hospital	4
Mount Washington Pediatric Hospital	11
<i>Note: Total patients aged 14 and under that went to rehabilitation centers = 30</i>	

to enable the patient to resume their highest level of functioning by regaining strength range of motion, and cognitive healing. Individualized rehabilitative interdisciplinary treatment plans, developed with the patient, assist in meeting their needs and goals.

The initial rehabilitation team evaluates and monitors the patient, focusing on the prevention of morbidity associated with the patient's immobility, positioning, and nutrition. Rehabilitation services within the hospital setting are also useful for future rehabilitation planning, prognosis, and care. Following the acute care phase, trauma centers help the patient and/or family determine the most appropriate place to meet the patient's rehabilitation needs. Factors that affect the patient, such as functional outcomes, social needs, financial constraints, geographic location, and eligibility requirements, assist in consideration for rehabilitation placement.

There are three (3) main types of rehabilitation: physical, occupational, and speech therapy. The purpose of each rehabilitative therapy focuses on the patient's unique circumstances in order to enable the patient to resume the greatest level of functioning.

Physical Therapy

Physical Therapy goals are to relieve pain, improve movement, strength, balance, and flexibility following injury, and for teaching patients how to use devices to help the patient manage his or her mobility. A physical therapist visits the patient at the bedside or in a physical therapy setting while in the acute care hospital. Decreasing pain and limiting permanent disability ensures patients the best possible chance of returning to daily activities. Physical therapists assist patients following injuries to bones, muscles, nerves, the spinal cord, and the brain. Patients may continue to see a physical therapist at home or at an outpatient center after leaving the hospital.

Occupational Therapy

Occupational therapists focus on restoring a patient's ability to perform self-care, recreational activities, and everyday tasks such as getting dressed, eating, driving, and taking a shower. Occupational therapy may take place in the acute care hospital, outpatient center, and at home.

Speech Therapy

The goal of speech therapy is to combine speech mechanics with the use of language for enhancing patient outcomes for communication functioning. Speech therapy can help a wide variety of issues involving language, communication, voice, swallowing, and articulation. Frequently, speech therapies are employed following a traumatic brain injury. Speech therapists help patients to swallow, eat, and better comprehend language following an injury. Speech therapy takes place in the hospital, at home, or at an outpatient center, depending on a patient's condition and needs.

Maryland-National Capital Region Emergency Response System

Program Overview

The Maryland-National Capital Region Emergency Response System (MDERS) was instituted in 2014 to serve as the single point of collaboration between fire, rescue, emergency medical services, law enforcement, emergency management, and healthcare within Montgomery and Prince George's Counties. In service of its stakeholders, MDERS leads the building, implementation, and sustainment of critical response capabilities that protect over 1.9 million residents within the Maryland-National Capital Region.

In coordination with a Steering Committee, comprised of leaders from stakeholder agencies, MDERS identifies priority response capabilities within the region that require additional development and expansion. These capabilities and associated objectives are outlined in the MDERS Strategic Plan which guides all planning, organization, equipment, training, and exercise investments for a given fiscal year. MDERS executes these programs with a staff of 14 full-time employees that includes a Director, three Program Managers, three Emergency Response Planning Specialists, two Training and Exercise Specialists, a Financial Administrator, a Project Manager, and other support personnel.

To finance these programs, as well as the operations of MDERS, the National Capital Region (NCR) Homeland Security Executive Committee (HSEC) allocates a portion of its annual Urban Area Security Initiative (UASI) grant funding, which is administered by MDERS with the support of MIEMSS.

From June 1, 2021 – May 31, 2022, MDERS continued to assist stakeholders with enhancing response capabilities through the provision of plan and policy development, training and exercise development and delivery, and equipment acquisition to support the missions of its partner agencies.

Investment Overview

■ **Ballistic Protection for Fire/Rescue/EMS Personnel.** To better protect fire/rescue/EMS personnel that may be deployed to provide medical care in a "warm" or "hot" zone during an active threat event, MDERS procured a variety of protective equipment for Montgomery County Fire and Rescue Service (MCFRS) and Prince George's County Fire and EMS Department (PGFD). This equipment includes ballistic-rated body armor, armor plate carriers, and both ballistic-rated and non-ballistic eye and face protection. Additionally, MDERS provided modular medical supplies that mount to armored plate carriers, including shears, tactical emergency casualty care supplies, triage tape, etc., flashlights, and litters that may be used to transport patients or injured responders to a casualty collection point.

■ **Emergency Management Response and Recovery Professional Services.** MDERS continued its support of the diverse missions and functions of the Montgomery County

Office of Homeland Security and Emergency Management (OEMHS) and the Prince George's County Office of Emergency Management (OEM) through the provision of professional services. In Montgomery County, MDERS funds a full-time employee that supports OEMHS's emergency management and volunteer and donations management, as well as the provision of funding for as-needed contract support through the University of Maryland Center for Health and Homeland Security. In Prince George's County, MDERS funds four full-time employees. One dedicated to planning, one dedicated to training and exercises, and two dedicated to volunteer and donations management.

■ **Incident Command Tools.** To expand and enhance the incident command capability for use by current and future incident commanders in the public safety community, MDERS procured a variety of equipment, field reference materials, and software. These investments include the provision of video cameras, monitors, and other hardware and software that supports the Command Competency Labs, local training resources which allows incident commanders to train in immersive, simulated environments. Additionally, MDERS designed and provided hard-copy command guides for the Prince George's County Police Department (PGPD) to assist officers in establishing and maintaining incident command to a variety of common events.

■ **Innovation Fund.** In 2021, MDERS implemented the Emerging Homeland Security Pilot program, otherwise known as the "Innovation Fund". Through the Innovation Fund, stakeholder agencies are able to apply to procure, implement, and evaluate novel solutions to address emerging response challenges. After receiving and evaluating the specific technology, stakeholder agencies can then assess whether to proceed with further investments and operationalization. Some of the technology piloted through the Innovation Fund over the past year include:

- *Augmented Training Systems (ATS) Virtual Reality* provides MCFRS a portable solution to mass casualty triage training through the Oculus virtual reality headset.
- *MyEOP Mobile Application* provides Region V healthcare systems with a mobile application that serves as a document repository for critical response plans, reference information, or other documentation that can be accessed from any mobile device.
- *Leader Search Bluetooth Listening Devices* provide MCFRS's and PGFD's structural collapse rescue teams with a rapidly deployed sensor to listen for trapped victims.
- *PerSim Augmented Reality Patient Assessment Training System* provides MCFRS with an interactive patient assessment training tool utilizing the Microsoft HoloLens system, which can project injuries, as well as responses to patient care, on top of live patients or mannequins.
- *Situational Awareness Cameras for Law Enforcement Armored Vehicles* provide MCPD with vehicle-mounted cameras that can stream real-time footage of an incident

scene back to the incident command post.

- *Structural Collapse Training Mannequins* provide structural collapse and search and rescue teams with high fidelity patient simulators that can easily be transported to different training sites, but are durable enough for austere conditions.

■ **Law Enforcement Special Events Response.** MDERS supported the continued implementation of the Montgomery County Police Department's (MCPD) and PGPD's public order/civil disturbance capability through the procurement and provision of personal protective equipment (PPE) and specialized training for both departments Level 1 response teams. Officers equipped with this PPE and the knowledge, skills, and abilities provided during the Level 1 training enable MCPD and PGPD to respond to large-scale civil disturbance events with an operational posture informed by the most modern standards developed across the United States and Europe.

■ **Mass Casualty Incident Support.** MDERS continued its goal to better prepare its partners to triage, treat, and transport victims of a mass casualty incident through the procurement of a mobile mass casualty incident support cache. At the core of this cache, a 26' Ford F650 box truck that will be appropriately outfitted with necessary medical equipment and supplies by the Region V Healthcare Coalition. Available to any of the six major healthcare systems in Montgomery and Prince George's County, this cache serves as an on-demand resource that will deploy and support local healthcare facilities during an acute surge that exceeds existing capacity.

■ **Medical Resource Officers.** MDERS funded two, full-time medical resource officers (MROs), one each in Montgomery and Prince George's County, to bolster public health emergency preparedness and response capabilities. These MROs lead the coordination of the local Medical Reserve Corps (MRC) volunteers in both counties, including the recruitment, credentialing, planning, training, exercising, and deployment of volunteers. Through the coordination and oversight by the MROs, the county MRCs aim to strengthen individual, community, and workplace preparedness in the Maryland-National Capital Region. In both Montgomery and Prince George's County, the MROs and the MRC that they oversee instrumentally supported ongoing COVID-19 response efforts, including operating call centers, conducting surveillance efforts, and supporting testing and vaccination sites.

■ **Public Access Trauma Care (PATC).** MDERS continued the expansion of the PATC capability across Montgomery and Prince George's Counties. Designed to empower bystanders with the knowledge, skills, abilities, and supplies to deliver immediate medical care prior to the arrival of first responders, the PATC program deploys the equipment and training necessary to common injuries associated with life-threatening trauma. Over the past year, the PATC program provided a cache of 84 training kits to Montgomery County Public Schools (MCPS) for the continued delivery of training and education to students and faculty

in the county. In Prince George's County, MDERS procured 842 cabinets and five-pack kits that will be mounted in government buildings and public schools.

■ **Small Unmanned Aerial Systems (sUAS).** MDERS supported the ongoing deployment of the sUAS capability in Montgomery and Prince George's County public safety agencies through the acquisition and delivery of several sUAS flight platforms, peripheral and support accessories, and training for pilots. MDERS procured six flight platforms, a tethering system for extended flights, additional camera attachments, and battery/charging equipment to increase the operational capacity of existing sUAS systems in Montgomery County. In Prince George's County, MDERS purchased three sUAS flight platforms, a variety of sensors and GPS equipment, batteries, a generator, and additional chargers for longer duration flight operations. Through the provision of these investments, MDERS helped Montgomery and Prince George's County first responders maintain real-time situational awareness of complex, evolving incidents across the public safety enterprise.

■ **Tactical Equipment for Law Enforcement.** MDERS remains a critical partner in supporting MCPD's and PGPD's Special Weapons and Tactics (SWAT) team members. Over the past year, MDERS helped MCPD procure a variety of equipment for its SWAT team, including thermal imaging technology, night vision goggles, long-range targeting camera systems, ballistic shields, bomb disposal robotics, training supplies, cold weather gear, and upfitting response vehicles with essential tools and equipment. Simultaneously, MDERS provided PGPD's SWAT team members with bomb disposal robotics, gas masks, and the funding necessary to refurbish armored vehicles. Through these investments, MDERS supported MCPD's and PGPD's ability to expeditiously, effectively, and efficiently respond to and mitigate a variety of high-threat scenarios.

■ **Training and Exercise Program.** MDERS's Training and Exercise program offers numerous opportunities for stakeholders to develop and enhance capabilities through in-person, virtual, and hybrid curricula. These offerings range from highly specialized tactical trainings to policy-level and leadership theory. These events include:

- Advanced Law Enforcement Rapid Response Training (ALERRT) Conference
- Advanced Strategic Public Order Command
- Ambulance Service Manager Training
- Anatomy Gift Registry Lab
- Antioch University Climate Impacts Public Health Course
- Antioch University Climate Justice and Equitable Adaptation
- Antioch University Climate Response: Costs and Financing
- Assessment and Training Solutions Consulting Corporation (ATSCC) Tactical Emergency Casualty Care (TECC) Live Tissue Class

- Climate Ready Communities Seminar
- Direct Action Resource Center (DARC) Advanced Sniper Integration Course
- DARC Level 1 Training
- DARC Level 2 Training
- DARC Live Tissue Training
- DARC Night Vision Instructor Course
- DeconTect Train-the-Trainer Decontamination Training
- Drafting and Implementing Effective Fire Department Policies and Procedures
- EMT Tactical Basic Course
- Federal Aviation Administration (FAA) Unmanned Aerial Systems (UAS) Symposium
- Federal Bureau of Investigation (FBI) Law Enforcement Executive Development Association (LEEDA) Command Leadership Training
- Fire Department Instructors Conference (FDIC) International Conference
- FireStats
- First Receiver Operations Training (FROT)
- Gracie Survival Tactics Level I Course
- High Angle Sniper Course
- High Performance Leadership Academy
- International Association of Emergency Managers (IAEM) Annual Conference
- International Critical Incident Stress Foundation, Inc. (ICISF) Assisting Individuals in Crisis
- ICISF Techniques for Delivering Bad News for Crisis Personnel
- ICISF Suicide Awareness: Introduction for Crisis Responders
- Louisiana State University (LSU) Homeland Security Specialist MicroCert
- Massachusetts Institute of Technology (MIT) Crisis Management and Business Resiliency Course
- Master Tactical Breacher Course
- MDERS Annual Symposium
- MDERS Cybersecurity Workshop
- National Association of County and City Health Officials (NAACHO) Preparedness Summit
- National Association of Emergency Medical Services Physicians (NAEMSP) Annual Meeting
- National Homeland Security Association (NHSA) National Homeland Security Conference (NHSC)
- National Preparedness Leadership Initiative (NPLI) Emergency Response Meta-Leadership Virtual Seminar Series
- NPLI Meta-Leadership Virtual Seminar Series: Negotiation and Conflict Resolution
- NPLI Meta-Leadership Virtual Seminar Series: Transformational Connectivity
- Pinnacle Conference
- Resilient Virginia Conference
- Rigging Lab Academy

- Shooting, Hunting, and Outdoor Trade (SHOT) Show
- Sniper Marksmanship Course of Instruction (COI)
- Sniper Team Leader Course
- Special Operations Medical Association (SOMA) Scientific Assembly Conference
- Storm Mountain Aerial Platform Training: Basic Aerial Sniping
- Storm Mountain Aerial Platform Training: Advanced Aerial Sniping
- Storm Mountain Aerial Platform Training: Aerial Vehicle Takedown Course
- Structural Collapse Course
- Special Weapons and Tactics (SWAT) Command Decision-Making and Leadership I Course
- Tacflow Academy: Sniper Response to a Public Venue
- Tomahawk Fundamentals of Close Quarters Combat
- Tomahawk Fundamentals of Night Vision and Laser Operations

Additional Activities

■ **Support to Regional Workgroups.** MDERS staff supported or led workgroups and initiatives that inform the vision, deployment, expansion, and investment of critical response capabilities. Through these workgroups, MDERS identified necessary planning, organizing, equipping, training, exercising, and evaluation components necessary to enhance and sustain the Maryland-National Capital Region’s public safety enterprise. These workgroups include, but are not limited to, the Structural Collapse Workgroup, sUAS Workgroup, Public Order Workgroup, and the Command Competency Workgroup.

■ **Representation in Regional Activities.** In 2021-2022, MDERS continued to represent its stakeholders by holding positions on regional committees hosted through the Metropolitan Washington Council of Governments (COG). As a conduit between the local jurisdictions and the larger National Capital Region (NCR), MDERS minimized the burden on stakeholder agencies while ensuring their interests are represented and supported through regional funding. MDERS staff members participated in meetings and activities, including involvement in Regional Emergency Support Function (RESF) Committees; Regional Programmatic Working Groups; Regional Planning Guidance Working Group; the NCR Emergency Response System; the; and the NCR Homeland Security Executive Committee (HSEC), Policy Group, and Advisory Council.

Summary

MDERS remains committed to facilitating collaboration among regional emergency response stakeholders through the identification, development, and provision of planning, organization, equipment, training, exercise, and evaluation needs. In coordination with its Steering Committee, MDERS continues to oversee a comprehensive capability development process that builds, implements, and sustains priority response capabilities. Through this process, MDERS pursues its ultimate vision of achieve

integration that optimizes all capabilities and provides superior service to the near two million residents of Montgomery and Prince George’s Counties.

Department of Emergency Health Services, University of Maryland Baltimore County

The Department of Emergency Health Services (EHS) is a center of excellence for EMS and emergency public health education and research at the University of Maryland Baltimore County (UMBC). It provides undergraduate, master’s, and doctoral level education to future and existing prehospital and emergency public health clinicians, emergency management, and disaster health leaders.

Since its formation in the 1980s as the research and education arm of MIEMSS, EHS has graduated an impressive number of students, many of whom have become federal, state, and local EMS leaders, physicians, medical directors, researchers, and administrators. The 2021-2022 academic year saw a continued effort to respond to the challenges that COVID-19 has imposed upon the EMS and education systems, as the Department continued to strive to promote its mission of public service, education, and research for EHS during the COVID-19 pandemic and to graduate EHS professionals to continue to serve in Maryland and beyond. Faculty and students continued to function as clinicians and experts throughout the COVID-19 response.

The Department is very pleased to announce its new Chair and faculty member, Dr. Lauren Clay. Dr. Clay is a disaster scientist and public health researcher. Her research focuses on individual, household, and community recovery from disasters. She has studied Hurricanes Katrina, Sandy, Harvey, and Florence, the Deepwater Horizon Oil Spill, the 2013 Moore, Oklahoma, tornadoes, and the Camp Fire, among other disasters and public health emergencies. Her expertise is in disaster disruption to the local food environment and food insecurity. She has a PhD in Disaster Science and Management from the University of Delaware and a Master of Public Health from Drexel University.

Maryland Poison Center, University of Maryland School of Pharmacy

Mission

To decrease the cost and complexity of poisoning and overdose care while maintaining and/or improving patient outcomes.

A division of the University of Maryland School of Pharmacy, the Maryland Poison Center (MPC) is designated by MIEMSS as a specialty referral center and by the Maryland Department of Health (MDH) as a regional poison center for Maryland. MPC provides 24/7 emergency poison information to the public and health professionals across the state. MPC is accessed by calling

the nationwide poison help telephone number, 1-800-222-1222, or via the Emergency Medical Resource Center (EMRC).

This year, MPC is celebrating its 50th anniversary. Over the past half-century, MPC has managed more than 1.5 million human exposures and approximately 850,000 requests for poison information.

MPC is certified by the American Association of Poison Control Centers (AAPCC) as a regional poison center. It has provided poisoning treatment advice, education, and prevention services to Marylanders since 1972. Bruce D. Anderson, PharmD, DABAT, serves as MPC’s executive director, and Joshua King, MD, FACMT, is the medical director. The poison specialists who work at MPC are pharmacists and nurses who are certified as specialists in poison information (CSPI) by AAPCC. The 14 specialists at MPC have over 270 years of combined poison center experience, ensuring that callers have access to experienced, qualified, and well-trained staff.

In CY 2021, MPC managed more than 37,000 cases. While 30,000 of these cases involved a human exposure, the remaining 7,000 were requests for information or involved animal exposures. Children under the age of 6 accounted for 39% of poison exposures. The top five causes of poisoning were analgesics, household cleaners, cosmetics and personal care products, antidepressants, and cardiovascular drugs. More than 65% of the cases reported to MPC were managed at a site not providing health care, such as the home, school, or workplace. Maryland EMS clinicians consulted with MPC on 999 cases in CY 2021. In 20% of those cases, transportation by EMS to a healthcare facility was deemed unnecessary and avoided based on MPC advice. Safely managing patients at the site of the exposure avoids unnecessary health care costs and allows more efficient and effective use of limited healthcare resources.

MPC continues to work closely with the National Capital Poison Center and other state and national agencies to monitor for possible chemical and biological weapons exposures and public health events throughout Maryland and the Washington, DC, region. MPC’s data-collection system allows data to be submitted in real time to a nationwide poison center surveillance system. In addition to the astute clinicians covering the service 24 hours a day, automated symptom and substance outlier detection strategies are used to help identify evolving patterns or emerging clusters of exposures.

The center also partners with MDH’s Behavioral Health Administration and the Maryland Office of the Chief Medical Examiner to address the rise in opioid overdoses and deaths. MPC provides a vital service to the state’s Overdose Response Program by directly managing overdose cases as well as helping the state document naloxone administration by the lay public and law enforcement officers. In CY 2021, MPC was involved in over 450 reports of bystander naloxone administration. MPC shares its data with state and local health departments on a weekly basis to help them respond to the opioid epidemic.

Reason for Poisoning (CY 2021)

Circumstance	Number of Patients	Percentage
Unintentional	22,002	74.2
Intentional	6,063	20.5
Adverse Reaction	1,047	3.5
Other and Unknown	533	1.8
TOTAL	29,645	100.0

Medical Outcome of Poisoning (CY 2021)

Medical Outcome	Number of Patients	Percentage
No Effect/Minor Effect	24,811	83.7
Moderate Effect	2,082	7.0
Major Effect	792	2.7
Death	61	0.2
Other and Unknown	1,899	6.4
TOTAL	29,645	100.0

Location of Poisoning Exposure by MIEMSS Region (CY 2021)

Region	Number of Exposures	Percentage
Region I	710	2.4
Region II	2,382	8.0
Region III	17,838	60.2
Region IV	2,781	9.4
Region V*	3,235	10.9
Unknown County/Other state	2,699	9.1
TOTAL	31,377	100.0

*Routing for the nationwide telephone number automatically connects most callers from Montgomery and Prince George’s Counties to the National Capital Poison Center in Washington, D.C. This report reflects calls to the Maryland Poison Center only. Additional human exposures in Maryland may have been reported to the National Capital Poison Center.

MPC staff conduct research to advance the prevention, diagnosis, and treatment of poisonings. A sample of research published or presented at scientific meetings in CY 2021 included:

- “Exposures in Pregnant Patients Reported to United State Poison Centers.” *Clinical Toxicology* 2021; DOI: 10.1080/15563650.2021.1968420.
- “Clinical Effects and Outcomes of Perampanel Overdoses Reported to U.S. Poison Centers.” *Clinical Toxicology* 2021; DOI: 10.1080/15563650.2021.1945083.
- “Dangers of the TikTok Benadryl Challenge.” *Contemporary PEDIATRIC Journal* 2021; 38(1).
- “Tea for Two: Forget the Mountain Wild Honey – Suspected Grayanotoxin Poisoning in a Nepali Couple.” North American Congress of Clinical Toxicology, Virtual Meeting. Poster. Oct. 16-18, 2021.
- “Self-harm Exposures in Pregnant and Non-pregnant Cases Reported to US Poison Centers: A Case-control Study.” North American Congress of Clinical Toxicology, Virtual Meeting. Poster. Oct. 16-18, 2021.
- “Severe Bupropion Overdose Mimicking Brain Death Necessitating Prolonged Extracorporeal Membrane Oxygenation.” North American Congress of Clinical

Toxicology, Virtual Meeting. Poster. Oct. 16-18, 2021.

A complete list of MPC research efforts can be found in the Maryland Poison Center 2021 Annual Report (<https://bit.ly/2021MPCAnnualReport>).

MPC's public education efforts are intended to help prevent poisonings from occurring and to increase awareness of the Center's services. Angel Bivens, BS Pharm, MBA, CSPI, is MPC's assistant director of operations and public education and Emily Paterson, MPH, BS, CHES®, is MPC's public education and communication specialist. In CY 2021, MPC attended 21 programs throughout Maryland, reaching approximately 600 people. Organizations that partnered with MPC to provide education included fire and police departments, hospitals, health departments, pharmacies, hospital perinatal education programs, Head Start, Healthy Start, and local health improvement coalitions. Seventeen county school systems and daycare centers used educational materials from MPC in their classrooms. More than 113,000 pieces of educational materials (brochures, magnets, telephone stickers, Mr. Yuk stickers, teachers' kits, and more) were distributed at programs, schools, health fairs, and by direct mailings.

National Poison Prevention Week (March 21-27, 2021) activities included mailings to emergency departments throughout the state. To provide Poison Prevention Week toolkits to elementary schools, MPC partnered with six county school nurses to offer Poison Prevention Week Kits to elementary schools. Schools could choose from a list of activities to increase awareness of poison safety to the students and their families. In all, 19 schools participated, reaching over 7,000 students.

MPC publishes *Poison Prevention Press*, a bimonthly e-newsletter for the public that highlights poison safety topics. Articles published in 2021 included "Carbon Monoxide"; "Mr. Yuk's 50th Birthday"; "A Day in the Life of a Poison Center"; "What You Should Know About Delta-8-THC"; "What Tweens and Teens Should Know About the Poison Center"; and "The 100th *eAntidote* Post". MPC's Facebook page shares content with the public on topics related to poison prevention and safety. In CY 2021, MPC generated 194 posts and saw an increase of 23 followers. MPC's Twitter account (@MDPoisonCtr) also shares content for the public. In CY 2021, MPC shared 192 tweets and saw an increase of 114 followers. In CY 2021, MPC's blog, *e-Antidote*, had 23 new posts and 600 visitors.

MPC's Twitter account for healthcare providers, @MPCTox-Tidbits, posts clinical and medical toxicology content. The account tweeted 59 times in CY 2021, garnering more than 115,000 impressions and 12,000 engagements.

Health professional education is coordinated by Eric Schuetz, BS Pharm, CSPI. Programs and materials are designed to help health professionals better assess and manage poisoning and overdose cases. In CY 2021, 18 programs were presented by MPC staff at hospitals, EMS/fire departments, colleges, professional conferences (state, regional, and national), and through on-

line webinars. More than 815 physicians, nurses, EMS clinicians, pharmacists, physician assistants, and other health professionals attended these programs and webinars. MPC also provides on-site training for physicians, pharmacists, and EMS clinicians.

ToxTidbits is a monthly e-newsletter that covers important toxicology information, updates, and news for health professionals. Among the topics addressed in CY 2021 were "Colchicine", "Tramadol", "Antivenins", "Delta-8 THC", "Detergent Suicides", and "Pediatric Aripiprazole Ingestions". *ToxTidbits* is emailed to subscribers and faxed to every emergency department in MPC's service area.

National Study Center for Trauma and EMS

The Charles "McC." Mathias, Jr., National Study Center for Trauma and EMS (NSC) was established at the University of Maryland by the US Congress in 1986. In 2007, to further basic, translational, and clinical studies in injury research, the University of Maryland School of Medicine (UMSOM) designated NSC as part of the Shock, Trauma, and Anesthesiology Organized Research Center (STAR-ORC). Professor of Anesthesiology and Vice-Chair for Translational Research Wei Chao, MD, PhD, FAHA, and Professor of Surgery and Director of Translational Research Rosemary A. Kozar, MD, PhD, lead the STAR-ORC. Dr. Kozar is also the interim director of the NSC. Dr. Chao, Dr. Kozar, Dr. Thomas Scalea from the R Adams Cowley Shock Trauma Center (STC), and Dr. Peter Rock from the UMSOM Department of Anesthesiology form the STAR-ORC Executive Committee. In addition, Dr. Roumen Vesselinov, Dr. Margaret Lauerman, and Dr. Kartik Kaushik continue their roles as PI on the NSC projects.

NSC continues to collaborate with Chenfeng Xiong, PhD, from the University of Maryland College Park, Department of Civil and Environmental Engineering, and his students as part of the ongoing Transportation and Health Initiative (THI).

Research Activities

The NSC, in conjunction with R Adams Cowley Shock Trauma Center, has been a leading participant in the Crash Injury Research and Engineering Network (CIREN) funded by the National Highway Traffic Safety Administration (NHTSA). During the 2021 to 2022 contract year, approximately 76 patients were consented and 43 were enrolled into CIREN. A comprehensive investigation was conducted for each qualifying case. Monthly case reviews were held, and NSC virtually hosted NHTSA administrators and members of the Maryland Highway Safety Office (MHSO) on several occasions. CIREN cases are frequently used as part of biomechanics presentations at the STC. The CIREN team was invited to share its research at the Maryland Crash Reconstruction Committee Conference (MCRC) in September 2021 and Maryland State Firemen's Association Convention in June 2022.

The NSC continues working with the Crash Outcome Data Evaluation System (CODES), which is currently funded by MHSO. The CODES has been a continued data collection endeavor to produce a census of motor vehicle related crashes in the state.

NSC has compiled information from a variety of statewide databases to enable in-depth analyses of highway safety programs. The compiled CODES data sets are a valuable resource to Maryland's highway safety and injury prevention community. Data provided through the Maryland CODES program are used for portions of the Maryland Strategic Highway Safety Plan (SHSP), Federal Highway Safety Plan, MHSO Annual Report, and to support several problem identification and program evaluation activities across the state. NSC staff members facilitate the Traffic Records Coordinating Committee and participate as data coordinators on SHSP Implementation and Emphasis Area Teams. Each year, NSC produces Problem Identification Reports and Program Area Briefs for local jurisdictions to aid in the development of Local Strategic Highway Safety Plans.

Under a grant from MHSO, NSC serves as a key data analysis resource and partner for MHSO, MVA, and other state and local traffic safety partners. During the past year, NSC staff conducted analyses and provided reports, diagrams, graphs, or slides on: occupant protection; pedestrian and bicyclist fatalities and serious injuries; younger driver safety; "Move Over" law updates; child pedestrian fatalities; race/ethnicity variables in crash data; child passenger safety; injury patterns in young children; DUI arrests and adjudication analysis; laws regarding vulnerable road users (in partnership with the Carey School of Law); jurisdictional crash counts; motorcycle helmet usage; and window tinting citations. Some of these products are available at <https://zerodeathsmd.gov/resources/crashdata/>.

Recently, the NSC began creating a transformation of CODES to cover all injuries in the Injury Outcome Data Evaluation System (IODES). IODES is intended to produce a census and yield a complete picture for all injuries, including penetrating trauma such as gunshots and stabbings, and blunt trauma such as crashes, falls, and other injury producing incidents. IODES and CODES are both expected to benefit from recent data partners, including the Maryland Department of Transportation (MDOT) State Highway Administration (SHA), which provides data on roadway infrastructure, including lighting, crosswalks and sidewalks, guardrails, pavement condition, etc., and Maryland State Police, which provides crash data. The IODES expansion is anticipated to be far more comprehensive than available today and will supercharge the ability to pursue injury and lifesaving practices in Maryland.

The NSC was approached by the Partnership to Improve Safety on America's Roads (PARTS) to develop a Proof of Concept (POC) of data linkage involving vehicle specific identifiers. The goal of the POC was to demonstrate the NSC's ability to provide vehicle level injury severities to quantify the impact of Ad-

vanced Driver Assistance Systems (ADAS) on crash outcomes. The NSC similarly supported Impact Research to understand and quantify the advantages of the Advanced Automatic Crash Notification (AACN) system. Crash data were linked to EMS and hospital data for the State of Maryland to report on response time savings, response type (basic or advanced life support based on AACN telemetry), and hospital and injury outcomes, among other things. Both studies found that ADAS and AACN positively impact outcomes, and strongly indicated the requirement for more comprehensive studies. The NSC has been invited by PARTS to help develop a proposal for such a comprehensive study looking into the impacts of Pedestrian Automated Emergency Braking (PAEB) on pedestrian crash outcomes.

For the 10th consecutive year, NSC supervised and reported findings of the Maryland Front Seat Belt Use Project in June 2021. Results of the study were presented virtually at the Occupant Protection and Distracted Driving Emphasis Area Team Meeting of the MHSO in November 2021.

In addition, the NSC presented findings from an analysis of the Drug Recognition Expert (DRE) database and subsequent matching of DRE evaluations with citations issued by law enforcement officers at the ATSIP Traffic Record Forum in August 2021.

NSC continues its partnership with the University of Utah, the University of Kentucky, and Nationwide Children's Hospital (Ohio) on a Centers for Disease Control and Prevention (CDC) grant to use CODES data to examine the types and severity of injuries sustained by older occupants in motor vehicle crashes. This CDC CODES grant was awarded for three years and continued under a no-cost extension through May 2021. Based on linked Maryland crash and hospital data, an analysis was made of the cost of non-fatal motor vehicle crash injury in older adults (65 or older) for a future publication. In a separate study, toxicology findings obtained from the STC were integrated with the linked data to examine the types of drugs that are associated with crash and injury characteristics of older drivers. NSC has prepared a presentation related to the cost of non-fatal motor vehicle crash injury in older adults for the 2022 Traffic Records Forum.

In FY 2020, NSC and Impact Research, LLC, initiated a study to model the relationship between changes in key behavioral, economic, policy, environmental, and demographic factors in Maryland with observed county-level changes in serious and fatal injury crashes. NSC statisticians identified appropriate data sources and variables to be compiled for use in the modeling instruments and, in FY 2022, added 2020 data to the 2010-2019 data that are currently included in the model. These models will provide a better understanding of factors playing a role in crash trends in Maryland. A website to allow decision-makers and other stakeholders to estimate the expected change in injury-involved crashes expected for a given change in each risk factor was made available to MHSO and other state agency stakeholders in 2021.

Through the THI, funded by the USDOT, the NSC collabo-

rated to link crash and safety data for the Safety Data Initiative (SDI) covering Vulnerable Road Users (VRU), which includes pedestrians, bicyclists, e-scooters, and other micro-mobility vehicle users.

The NSC is responsible for the extraction of data from the R Adams Cowley Shock Trauma Registry (STCTR) for research protocols with appropriate permissions. Over the past year, NSC has written nearly 50 SQL queries to the STCTR. Query topic areas have been very diverse as demonstrated by the following limited list: predictive role of troponin in operative cardiac trauma; heterotopic ossification prophylaxis; risk factors for recurrent assault-related injury; using machine learning to predict trauma outcomes; e-scooter injury patterns and outcomes; blood transfusion outcome prediction; DCE limb salvage; splenic injury; and sedation requirements in patients with substance use history.

NSC provides statistical support for several research groups at UMB, including Acute Care Surgery and Lung Transplantation Survival Research, and for research grants funded by the National Institutes of Health (NIH), US Department of Defense, and US Army Medical research.

The NSC partnered with the Highway Safety Research Center (HSRC) at the University of North Carolina (UNC) on a proposal submission in response to NHTSA's Notice of Funding Opportunity targeting equity in traffic safety law enforcement, including developing a best practices guide for the Law Enforcement Liaison (LEL) network for other states to follow.

In 2021, the NSC launched several self-funded projects looking into a diverse array of cutting-edge traffic safety research areas. These areas focus on new modes, driver education, and infrastructure. The projects align with the Safe System Approach (SSA) adopted by the Federal Highway Administration (FHWA) and US Department of Transportation (USDOT) and related agencies including NHTSA. The findings from the studies are being presented at multiple conferences, including ATSIP (Association of Transportation Safety Information Professionals) Traffic Records Forum in Denver (August 7-10, 2022) and the Intelligent Transportation Systems World Congress in Los Angeles (September 18-22, 2022). The findings indicate that a majority of e-scooter riders in Baltimore are intoxicated, high-risk driving behaviors exhibited by teenagers are seldom rectified by adulthood, and crashes on local streets and arterials over the past six years produce graver injuries than high-speed, high-flow facilities like the Interstates.

Technical Support

In addition to in-house preparation of peer-reviewed research papers, NSC staff offer grant proposal, abstract, and manuscript preparation support, including technical writing, research design, and data analysis for university, hospital, and trauma center researchers. Partner agencies and the public can submit a specific data request to NSC epidemiologists and data analysts using the data request form on NSC's website (<https://issomweb02.com>).

[umaryland.edu/NSCTrauma/NSCData.aspx](https://www.umb.edu/NSCTrauma/NSCData.aspx)). NSC staff members were instrumental in the publication of manuscripts on various trauma and injury-related topics, such as ultrasound in critical care, fluid resuscitation in septic patients, emergency general surgery, and respiratory distress syndrome.

MIEMSS-NSC Memorandum of Understanding

In addition to staff from NSC, the Maryland Emergency Medical Services Systems Research Interest Group (MEMSS-RIG) is composed of members from MIEMSS, University of Maryland, and Johns Hopkins University. The group meets monthly to help further EMS research within Maryland and across the nation. Over the past five years, MEMSS-RIG members have published over 36 articles related to trauma and EMS. The group is currently working on a possible manuscript related to the epinephrine cardiac arrest study. NSC performed the analysis for two COVID-19 related manuscripts by authors from MIEMSS, Johns Hopkins University, and the Montgomery County Fire and Rescue Service.

Two papers with NSC co-authorship and RIG/MIEMSS were published during this period:

- “Decreases in Out of Hospital Cardiac Arrest (OHCA) Outcome Metrics Persist When Known COVID Patients are Excluded from Analysis,” Burns T, Touzeau C, Kaufman B, Butsch A, Vesselinov R. *American Journal of Emergency Medicine*, accepted October 2021.
- “A Statewide EMS Viral Syndrome Pandemic Triage Protocol: 24 Hour Outcomes,” Levy M, Chizmar T, Alemayehu T, Sidik M, Garfinkel E, Stone R, Wendell J, Vesselinov R, Mangolis A, Delbridge T. *Prehospital Emergency Care*, 2021.

NSC members continue to serve on several MIEMSS committees and help advance the agency's mission.

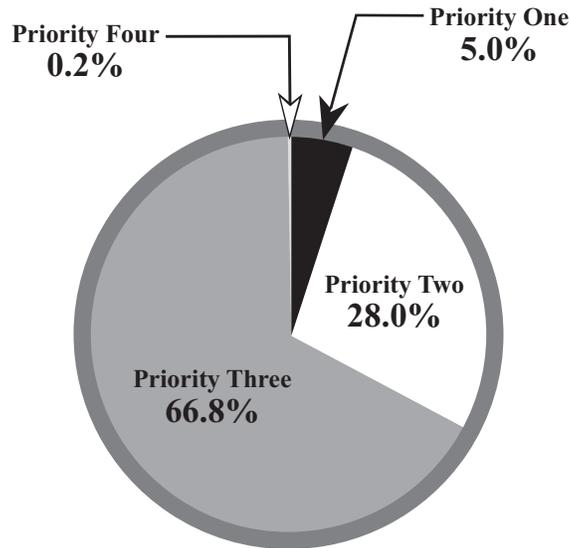


MARYLAND EMS STATISTICS

Types of EMS Calls

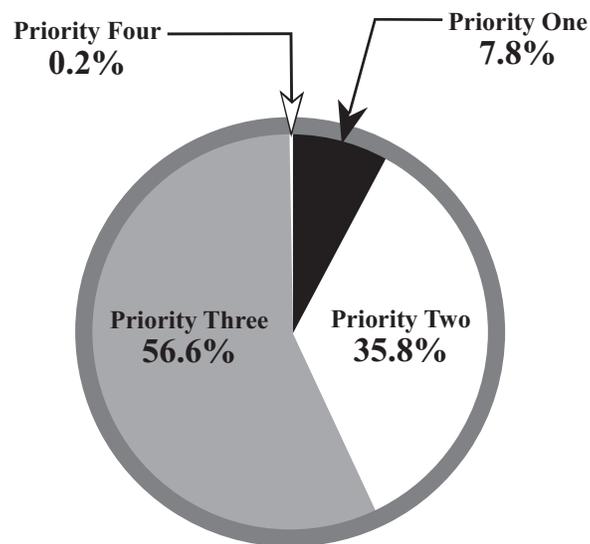
Patient Priority For Injury Transports

Fiscal Year 2022



Patient Priority For Medical Transports

Fiscal Year 2022



Source: electronic Maryland EMS Data System (eMEDS®)

Priority 1 - Patient critically ill or injured (immediate / unstable)
Priority 2 - Patient less serious (urgent / potentially life-threatening)

Priority 3 - Patient non-urgent
Priority 4 - Patient does not require medical attention

**Cardiac Arrest Registry to Enhance Survival (CARES)
CY 2021 Registry Data**

Demographic Information	Maryland	National
Mean Age (years)	62.8	61.9
% Males	60.1%	62.5%
% Females	39.9%	37.5%

Arrest Witnessed?	Maryland	National
Witnessed by Bystander	33.0%	37.5%
Witnessed by First Responder/EMS	12.3%	12.1%
Unwitnessed	54.7%	50.4%

Who Initiated CPR?	Maryland	National
Bystander	42.2%	40.7%
First Responder	24.7%	30.9%
Emergency Medical Services (EMS)	33.1%	28.4%

Who First Defibrillated the Patient?	Maryland	National
Not Applicable	74.6%	71.3%
Bystander	1.4%	1.3%
First Responder	3.1%	5.4%
Emergency Medical Services (EMS)	20.9%	22.0%

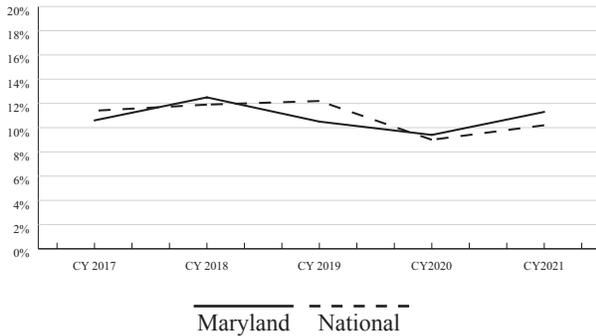
***Bystander Intervention Rates are calculated as follows:**

Bystander CPR: Arrests that occurred before the arrival of First Responders/EMS and that did not occur in a nursing home, health care facility, physician’s office or clinic, in which CPR was initiated by lay persons, out of all arrests that occurred before the arrival of First Responders/EMS and that did not occur in a home/residence, nursing home, health care facility, physician’s office, or clinic.

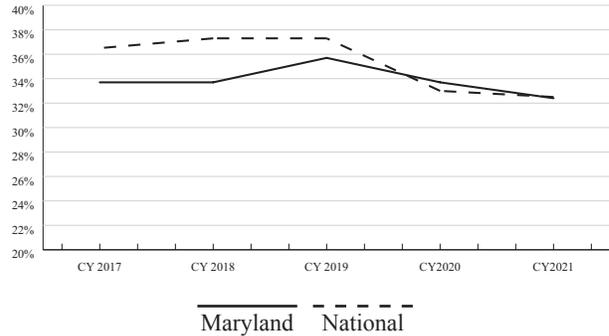
Public AED Use: Arrests that occurred before the arrival of First Responders/EMS and that did not occur in a home/residence, nursing home, health care facility, physician’s office or clinic, in which AEDs were initially applied by lay persons out of all arrests that occurred before the arrival of First Responders/EMS and that did not occur in a home/residence, nursing home, health care facility, physician’s office, or clinic.

Cardiac Arrest Registry to Enhance Survival (CARES) CY 2017 through CY 2021 (Source: CARES Registry)

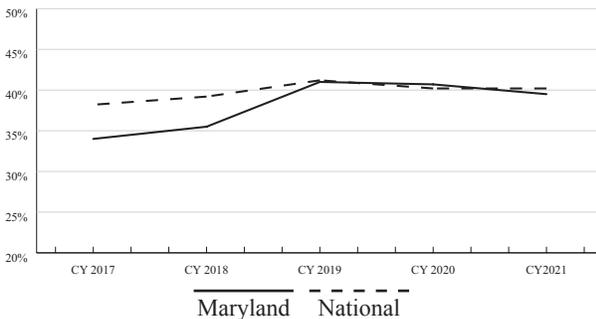
Maryland and National Public AED Use Rates



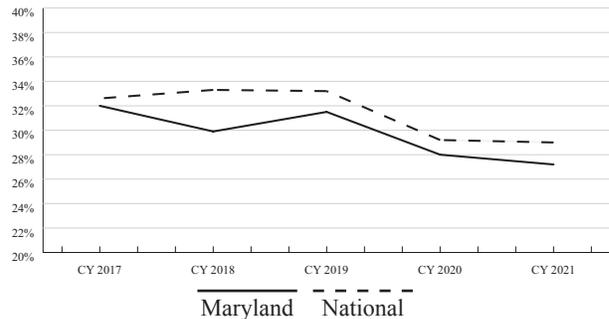
Survival Rates for Patients with Out of Hospital Cardiac Arrests With First Arrest Rhythms That Were Shockable and Witnessed by Bystanders and Bystanders Either Performed CPR and/or Applied AEDs



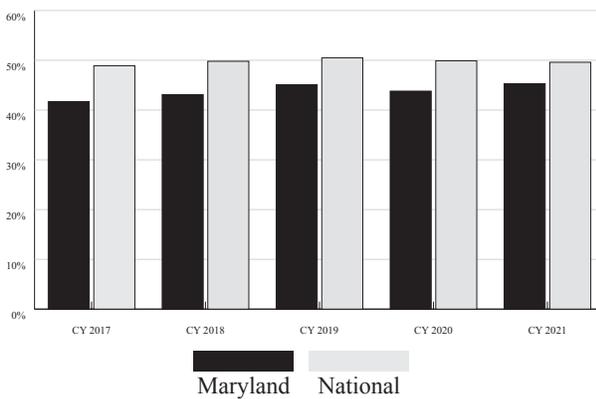
Maryland and National Bystander CPR Rates



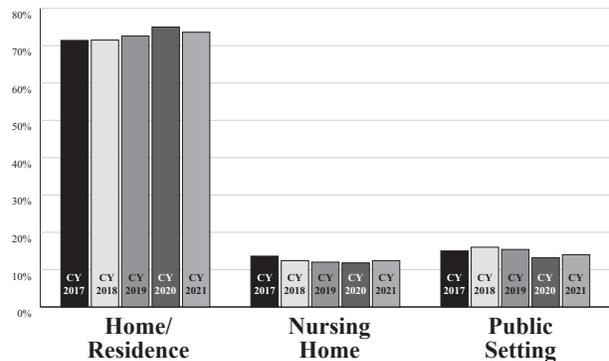
Survival Rates for Patients with Out of Hospital Cardiac Arrests That Were Witnessed by Bystanders and Had First Arrest Rhythms That Were Shockable



Percentage of Cardiac Arrests That Were Witnessed by Bystanders and/or First Responder/EMS by Calendar Year



Location of Cardiac Arrest



*See page 78 for intervention rate formulas.

Public Safety EMS Units

Patient Transportation Vehicles

Region	Ambulances								Ambulance Buses	
	BLS				ALS				Type I	Type II
	In-Service	Peak Hours	Ready Reserve	Unstocked, Unequipped Reserve	In-Service	Peak Hours	Ready Reserve	Unstocked, Unequipped Reserve	20 + Patients	10 - 19 Patients
Region I	2	1	0	0	16	0	16	0	0	0
Region II	37	0	2	5	12	2	5	1	0	1
Region III	13	4	14	7	128	21	38	37	1	1
Region IV	5	4	23	3	56	7	62	7	0	1
Region V	107	59	41	24	55	44	19	10	1	2
STATEWIDE TOTAL	164	68	80	39	267	74	140	55	2	5

NOTE: Excludes federal EMS Operational Programs.

Source: Vehicle data reported by the EMS Operational Programs

Patient Transportation Vehicle Definitions:

Basic Life Support (BLS) Transport Vehicle: A vehicle equipped to carry and treat a patient per EMT Protocols

Advanced Life Support (ALS) Transport Vehicle: A vehicle equipped to carry and treat a patient per Cardiac Rescue Technician (CRT, CRT99) or Paramedic protocols

Total Equipped: Includes units that are equipped as either BLS or ALS and that are available for staffing in the event of system surge

Staffed 24/7: EMS clinicians assigned and ready to respond to a 9-1-1 call

Ambu Bus: A passenger bus configured or modified to transport as many as 20 patients on stretchers

Public Safety/Non-Transportation Vehicles

Region	Non-Transport Support				Disaster Supplies		
	BLS Capable First Responder		ALS Capable First Responder		MCSU Type I	MCSU Type II	MCSU Type III
	Non-Suppression	Suppression	Non-Suppression	Suppression	100+ Patients	50 Patients	25 Patients
Region I	0	36	8	1	0	2	0
Region II	22	47	18	1	0	2	2
Region III	50	228	26	9	3	14	5
Region IV	50	81	38	4	1	55	4
Region V	42	108	32	44	3	7	0
STATEWIDE TOTAL	164	500	122	59	7	80	11

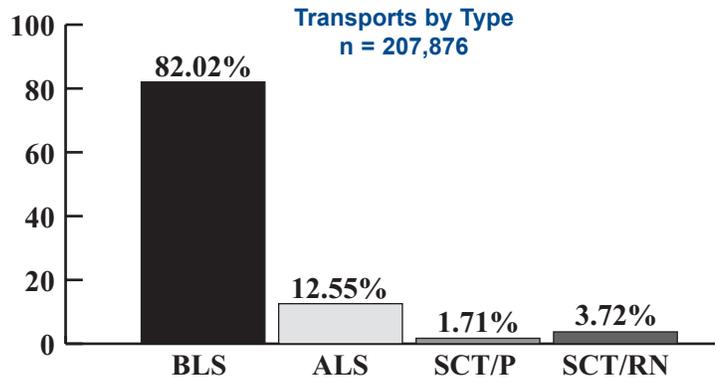
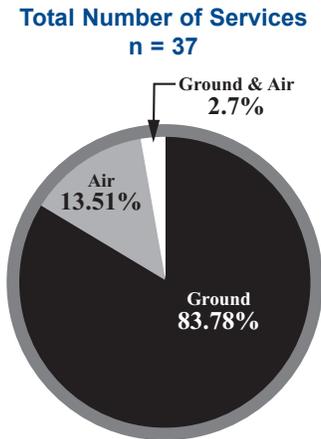
NOTE: Excludes federal EMS Operational Programs.

Source: Vehicle data reported by the EMS Operational Programs

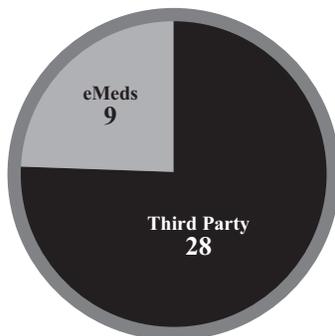
**MCSU = Mass Casualty Support Unit

Maryland-Licensed Commercial Ambulance FY 2022 Statistics

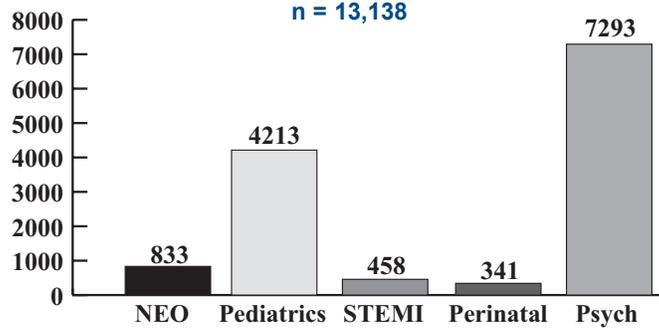
Source: MIEMSS Commercial Ambulance Licensing System



ePCR Reporting Software Platform
n = 37



Transports of Special Populations
n = 13,138



Patient Care Reporting Records Submitted to MIEMSS by Maryland Jurisdictions

The electronic Maryland EMS Data System (eMEDS®) is a third generation system, hosted by MIEMSS, that enables Maryland's EMS providers to document, submit, and produce an electronic patient care record (ePCR). Additionally, it serves as a primary resource to query data about EMS demand, response, and outcome. All 24 jurisdictional EMSOPs in Maryland use eMEDS® to document their call information. The EMSOPs can enter data either via a local device with internet connectivity or via a dedicated website. The table below displays the quarterly record volume for FY 2022.

eMEDS® Records Submitted to MIEMSS per Fiscal Year 2022 Quarter¹						
Reporting Between: 7/1/2021 - 06/30/2022						
Jurisdiction	Elite Implementation ²	1st Qtr. FY 2022	2nd Qtr. FY 2022	3rd Qtr. FY 2022	4th Qtr. FY 2022	Total
Allegany County	5/7/2018	4,500	4,360	3,822	4,197	16,879
Anne Arundel County*	5/29/2018	22,036	22,234	20,353	21,772	86,395
Baltimore City	12/3/2018	55,936	52,430	48,072	55,210	211,648
Baltimore County*	7/24/2018	36,383	36,289	32,608	34,994	140,274
Calvert County	8/28/2018	5,442	4,894	4,394	4,541	19,271
Caroline County	6/11/2018	1,745	1,798	1,716	1,707	6,966
Carroll County	1/2/2019	5,833	6,273	5,448	5,884	23,438
Cecil County	8/1/2018	5,605	5,474	5,190	5,232	21,501
Charles County	6/1/2018	7,995	7,364	7,325	7,492	30,176
Dorchester County	5/21/2018	2,012	1,800	1,867	1,921	7,600
Frederick County	10/1/2018	13,432	13,223	12,405	13,104	52,164
Garrett County	5/7/2018	1,186	1,135	1,101	1,154	4,576
Harford County*	3/30/2018	9,321	9,709	8,667	9,499	37,196
Howard County	12/11/2018	6,245	7,285	6,628	6,815	26,973
Kent County	6/11/2018	1,319	1,293	1,177	1,303	5,092
Montgomery County	9/4/2018	20,860	21,332	20,786	22,728	85,706
Prince George's County	10/1/2018	48,552	48,595	45,213	48,282	190,642
Queen Anne's County	12/18/2017	2,210	2,075	1,934	2,003	8,222
Somerset County	7/16/2018	843	726	706	740	3,015
St. Mary's County	7/16/2018	6,310	6,392	5,954	6,026	24,682
Talbot County	12/18/2017	1,944	2,005	1,809	2,065	7,823
Washington County	6/25/2018	9,079	9,219	8,405	8,667	35,370
Wicomico County	5/14/2018	4,914	4,998	4,390	4,782	19,084
Worcester County*	5/14/2018	4,660	2,857	2,436	3,660	13,613
Jurisdictional Total		278,362	273,760	252,406	273,778	1,078,306

*Jurisdictional EMSOPs not listed separately but incorporated herein include Aberdeen Proving Ground Fire Department, Annapolis City, BWI Airport Fire & Rescue, Ft. Meade Fire Department, US Naval Academy EMS, Martin State Airport, and Ocean City.

¹The number of records submitted to MIEMSS does not necessarily represent the number of individual patients treated. Duplicate records can be submitted for the same patient if more than one EMS company responds to treat that patient.

²MIEMSS has upgraded to ImageTrend's Elite Platform to support the eMEDS® patient care reporting system.

MARYLAND TRAUMA AND BURN STATISTICS

Age Distribution of Patients Treated at Pediatric or Adult Trauma Centers (3-Year Comparison)

Source: Maryland State Trauma Registry

Age Range	June 2019 to May 2020	June 2020 to May 2021	June 2021 to May 2022
Under 1 year	208	239	250
1 to 4 years	416	488	476
5 to 9 years	459	549	606
10 to 14 years	530	555	752
15 to 24 years	3,386	3,225	3,282
25 to 44 years	6,388	6,938	6,573
45 to 64 years	5,054	5,335	4,861
65+ years	6,463	7,581	7,461
Unknown	14	14	43
TOTAL	22,918	24,924	24,304

For children who were burn patients at Children's National Hospital or Johns Hopkins Pediatric Trauma Center, see Maryland Pediatric Burn Statistics.

MARYLAND ADULT TRAUMA STATISTICS

Legend Code

Johns Hopkins Bayview Medical Center	BVMC	Suburban Hospital – Johns Hopkins Medicine	SUB
The Johns Hopkins Hospital	JHH	TidalHealth Peninsula Regional	THPR
Meritus Medical Center	MMC	University of Maryland	
R Adams Cowley Shock Trauma Center	STC	Capital Region Health	UMCRH
Sinai Hospital	SH	UPMC Western Maryland	UPMCWM

Total Cases Reported by Trauma Centers (3-Year Comparison)

Source: Maryland State Trauma Registry

Trauma Center	June 2019 to May 2020	June 2020 to May 2021	June 2021 to May 2022
The Johns Hopkins Bayview Medical Center	4,044*	3,816	2,634
The Johns Hopkins Medical System	1,603	1,717	2,206
Meritus Medical Center	1,979	2,426	2,761
R Adams Cowley Shock Trauma Center	5,843	5,958	5,154
Sinai Hospital of Baltimore	2,016	2,273	2,565
Suburban Hospital – Johns Hopkins Medicine	1,256	1,957	2,007
TidalHealth Peninsula Regional	1,160	1,662	1,661
University of Maryland Capital Region Medical Center	3,096	3,021	2,872
UPMC Western Maryland	525	506	638
TOTAL	21,522	23,336	22,498

* Maryland Trauma Statistics are based on patient discharge data from June 2021 to May 2022.

**Occurrence of Injury by County:
Scene Origin Cases Only
(June 2021 to May 2022)**

Source: Maryland State Trauma Registry

County of Injury	Number
Allegany County	448
Anne Arundel County	831
Baltimore County	3,084
Calvert County	139
Caroline County	61
Carroll County	286
Cecil County	30
Charles County	202
Dorchester County	87
Frederick County	450
Garrett County	47
Harford County	501
Howard County	437
Kent County	58
Montgomery County	1,769
Prince George's County	1,888
Queen Anne's County	54
St. Mary's County	194
Somerset County	94
Talbot County	34
Washington County	1,666
Wicomico County	442
Worcester County	317
Baltimore City	4,147
Virginia	90
West Virginia	135
Pennsylvania	280
Washington, DC	65
Delaware	74
Other	22
Not Indicated	1,064
TOTAL	18,996

Note: Scene origin cases represent 84.4% of the total trauma cases treated statewide.

**Residence of Patients by County:
Scene Origin Cases Only
(June 2021 to May 2022)**

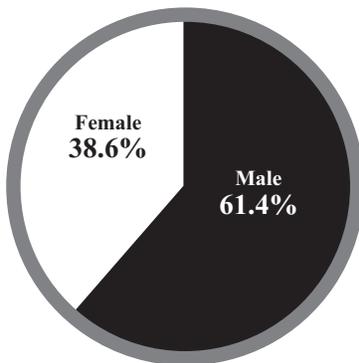
Source: Maryland State Trauma Registry

County of Residence	Number
Allegany County	393
Anne Arundel County	923
Baltimore County	3,181
Calvert County	154
Caroline County	64
Carroll County	327
Cecil County	48
Charles County	241
Dorchester County	82
Frederick County	422
Garrett County	23
Harford County	564
Howard County	390
Kent County	35
Montgomery County	1,697
Prince George's County	1,687
Queen Anne's County	49
St. Mary's County	194
Somerset County	107
Talbot County	32
Washington County	1,798
Wicomico County	501
Worcester County	224
Baltimore City	3,688
Virginia	337
West Virginia	225
Pennsylvania	505
Washington, DC	354
Delaware	183
Other	364
Not Indicated	204
TOTAL	18,996

Note: Scene origin cases represent 84.4% of the total trauma cases treated statewide.

**Gender Profile:
Primary Admissions Only
(June 2021 to May 2022)**

Source: Maryland State Trauma Registry



Note: "Primary Admissions" refers to all patients except those treated and released from the emergency department within 6 hours of emergency department arrival.

**Patients with Protective Devices at Time of
Trauma Incident: Primary Admissions Only
(3-Year Comparison)**

Source: Maryland State Trauma Registry

Protective Device	June 2019 to May 2020	June 2020 to May 2021	June 2021 to May 2022
None	22.9%	24.1%	22.6%
Seatbelt	11.6%	9.8%	9.8%
Airbag and Seatbelt	38.4%	37.2%	39.1%
Airbag Only	11.8%	13.3%	12.8%
Infant/Child Seat	0.2%	0.1%	0.1%
Protective Helmet	14.7%	15.1%	15.3%
Padding/Protective Clothing	0.1%	0.1%	0.1%
Other Protective Device	0.1%	0.2%	0.1%
Unknown	0.2%	0.1%	0.1%
TOTAL	100.0%	100.0%	100.0%

Note: Patients were involved in motor vehicle, motorcycle, bicycle, and sports-related incidents only. "Primary Admissions" refers to all patients except those treated and released from the emergency department within 6 hours of emergency department arrival.

Mode of Patient Transport to Trauma Centers: Scene Origin Cases Only

(June 2021 to May 2022)

Source: Maryland State Trauma Registry

Modality Type	BVMC	JHH	MMC	THPR	CRMC	SH	STC	SUB	WM	TOTAL
Ground Ambulance	93.3%	80.6%	76.8%	92.0%	85.7%	90.9%	80.9%	92.6%	79.0%	85.6%
Helicopter	0.2%	4.5%	0.6%	5.1%	12.3%	0.8%	16.9%	0.4%	1.0%	5.9%
Other	6.5%	14.9%	22.6%	2.9%	2.0%	8.3%	2.2%	7.0%	20.0%	8.5%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Note: Only patients brought directly from the scene to a trauma center are included in this table.

Origin of Patient Transport to Trauma Centers

(June 2021 to May 2022)

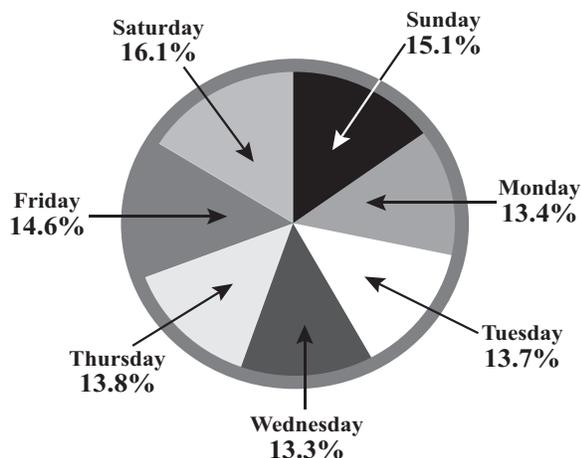
Source: Maryland State Trauma Registry

Origin Type	BVMC	JHH	MMC	THPR	CRMC	SH	STC	SUB	WM	TOTAL
Scene of Injury	94.9%	84.1%	96.9%	76.3%	88.5%	84.3%	68.5%	94.4%	97.4%	84.7%
Hospital Transfer	0.1%	7.8%	0.2%	1.8%	2.6%	12.0%	31.2%	3.3%	1.3%	10.1%
Other	5.0%	8.1%	2.9%	21.9%	8.9%	3.7%	0.3%	2.3%	1.3%	5.2%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Emergency Department Arrivals by Day of Week: Primary Admissions Only

(June 2021 to May 2022)

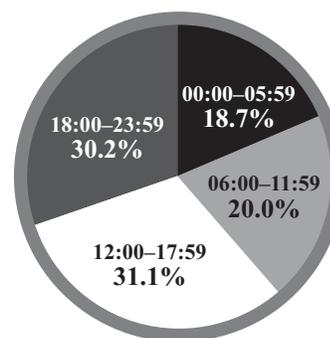
Source: Maryland State Trauma Registry



Emergency Department Arrivals by Time of Day: Primary Admissions Only

(June 2021 to May 2022)

Source: Maryland State Trauma Registry



Note: "Primary Admissions" refers to all patients except those treated and released from the emergency department within 6 hours of emergency department arrival.

Number of Deaths by Age
(3-Year Comparison)
Source: Maryland State Trauma Registry

Age	June 2019 to May 2020	June 2020 to May 2021	June 2021 to May 2022
Under 1 year	0	1	1
1 to 4 years	0	1	0
5 to 14 years	2	1	5
15 to 24 years	150	130	122
25 to 44 years	260	277	256
45 to 64 years	138	170	160
65+ years	280	299	312
Unknown	9	9	1
TOTAL	839	888	857
Deaths Overall as a Percentage of the Total Injuries Treated	3.9%	3.8%	3.8%

Note: Only pediatric patients who were treated at Adult Trauma Centers are included in this table. For patients treated at Pediatric Trauma Centers, see Maryland Pediatric Trauma Statistics.

Number of Injuries by Age
(3-Year Comparison)
Source: Maryland State Trauma Registry

Age	June 2019 to May 2020	June 2020 to May 2021	June 2021 to May 2022
Under 1 year	38	60	65
1 to 4 years	90	104	111
5 to 14 years	206	216	271
15 to 24 years	3,271	3,091	3,116
25 to 44 years	6,386	6,935	6,572
45 to 64 years	5,054	5,335	4,859
65+ years	6,463	7,581	7,461
Unknown	14	14	43
TOTAL	21,522	23,336	22,498

Note: Only pediatric patients who were treated at Adult Trauma Centers are included in this table. For patients treated at Pediatric Trauma Centers, see Maryland Pediatric Trauma Statistics.

Number of Injuries and Deaths by Age
(June 2021 to May 2022)
Source: Maryland State Trauma Registry

Age	Number of Injured Patients		Number of Deaths	
	Total	Maryland Residents	Total	Maryland Residents
Under 1 year	65	58	1	1
1 to 4 years	111	96	0	0
5 to 14 years	271	220	5	3
15 to 24 years	3,116	2,742	122	103
25 to 44 years	6,572	5,729	256	205
45 to 64 years	4,859	4,306	160	141
65+ years	7,461	6,819	312	288
Unknown	43	2	1	1
TOTAL	22,498	19,972	857	742

Note: Only pediatric patients who were treated at Adult Trauma Centers are included in this table. For patients treated at Pediatric Trauma Centers, see Maryland Pediatric Trauma Statistics.

**Etiology of Injuries:
Primary Admissions Only**
(3-Year Comparison)
Source: Maryland State Trauma Registry

Etiology	June 2019 to May 2020	June 2020 to May 2021	June 2021 to May 2022
Cut or Pierce	6.1%	5.2%	4.8%
Drowning/Submersion	0.1%	0.1%	0.1%
Fall	43.3%	45.6%	45.6%
Fire or Flame	0.4%	0.3%	0.3%
Hot Object or Substance	0.1%	0.2%	0.1%
Firearm	7.7%	8.0%	7.9%
Machinery/Mechanical	0.7%	0.7%	0.7%
Motor Vehicle Crash	22.9%	22.9%	23.5%
Motorcycle Crash	3.3%	3.7%	3.7%
Pedal Cycle Crash	1.9%	1.9%	1.7%
Pedestrian Incident	4.6%	4.4%	4.7%
Other Transport	0.1%	0.1%	0.1%
Natural or Environmental	0.5%	0.5%	0.5%
Poisoning	0.3%	0.3%	0.2%
Struck by or Against	6.8%	4.9%	4.5%
Other	1.2%	1.2%	1.6%
TOTAL	100.0%	100.0%	100.0%

Note: "Primary Admissions" refers to all patients except those treated and released from the emergency department within 6 hours of emergency department arrival.

Blood Alcohol Content of Patients*
Primary Admissions Only
(3-Year Comparison)
Source: Maryland State Trauma Registry

Blood Alcohol Content	June 2019 to May 2020	June 2020 to May 2021	June 2021 to May 2022
Negative	45.2%	45.4%	44.9%
Positive	20.7%	18.6%	16.4%
Undetermined	34.1%	36.0%	38.7%
TOTAL	100.0%	100.0%	100.0%

Note: "Primary Admissions" refers to all patients except those treated and released from the emergency department within six hours of emergency department arrival.

*Due to changes in the software and how the data was reported, the percentages have changed from what was reported in previous years.

Etiology of Injuries by Age: Primary Admissions Only
(June 2021 to May 2022)

Source: Maryland State Trauma Registry

Age	Motor Vehicle Crash	Motorcycle	Pedestrian	Fall	Gunshot Wound	Stab Wound	Struck by/ Against	Pedal Cyclist	Other	Total
Under 1 year	0.1%	0.0%	0.0%	0.2%	0.2%	0.1%	0.4%	0.0%	1.2%	0.2%
1 to 4 years	0.1%	0.0%	0.1%	0.2%	0.0%	0.3%	0.3%	0.0%	2.5%	0.2%
5 to 14 years	0.6%	0.0%	0.8%	0.6%	0.4%	0.0%	1.2%	2.4%	1.9%	0.6%
15 to 24 years	19.8%	15.3%	13.7%	2.3%	35.8%	19.0%	12.7%	12.9%	11.3%	11.9%
25 to 44 years	40.6%	47.0%	39.6%	9.6%	49.8%	55.1%	45.4%	31.0%	37.9%	28.1%
45 to 64 years	24.2%	30.3%	30.5%	19.3%	11.4%	20.7%	30.9%	38.0%	29.6%	22.0%
65+ years	14.6%	7.4%	15.3%	67.8%	2.4%	4.8%	9.1%	15.7%	15.6%	37.0%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Note: "Primary Admissions" refers to all patients except those treated and released from the emergency department within 6 hours of emergency department arrival. Only pediatric patients who were treated at Adult Trauma Centers are included in this table. For patients treated at Pediatric Trauma Centers, see Pediatric Trauma Center tables and graphs.

Etiology Distribution for Patients with Blunt Injuries: Primary Admissions Only
(June 2021 to May 2022)

Source: Maryland State Trauma Registry

Etiology	Percentage
Cut or Pierce	0.2%
Fall	52.5%
Machinery/Mechanical	0.7%
Motor Vehicle Crash	27.1%
Motorcycle Crash	4.3%
Pedalcyclist Crash	2.0%
Pedestrian Incident	5.4%
Other Transport	0.1%
Natural or Environmental	0.2%
Struck by or Against	5.2%
Other	1.3%
Not Valued	1.0%
TOTAL	100.0%

Note: "Primary Admissions" refers to all patients except those treated and released from the emergency department within 6 hours of emergency department arrival.

Etiology Distribution for Patients with Penetrating Injuries: Primary Admissions Only
(June 2021 to May 2022)

Source: Maryland State Trauma Registry

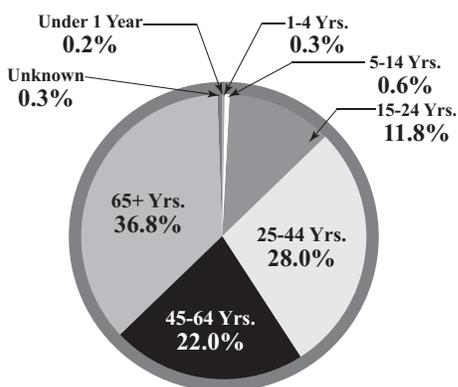
Etiology	Percentage
Cut or Pierce	35.4%
Fall	0.8%
Firearm	61.5%
Machinery/Mechanical	0.8%
Motor Vehicle Crash	0.1%
Struck by or Against	0.3%
Other	0.4%
Not Valued	0.7%
TOTAL	100.0%

Note: "Primary Admissions" refers to all patients except those treated and released from the emergency department within 6 hours of emergency department arrival.

Age Distribution of Patients: Primary Admissions Only

(June 2021 to May 2022)

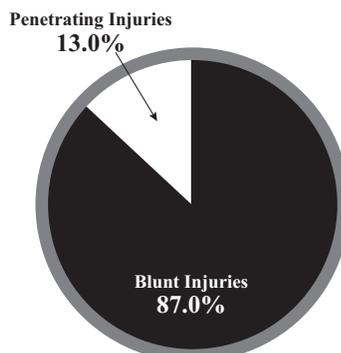
Source: Maryland State Trauma Registry



Injury Type Distribution of Patients: Primary Admissions Only

(June 2021 to May 2022)

Source: Maryland State Trauma Registry



Note: "Primary Admissions" refers to all patients except those treated and released from the emergency department within 6 hours of emergency department arrival. Only pediatric patients who were treated at Adult Trauma Centers are included in this table. For patients treated at Pediatric Trauma Centers, see Pediatric Trauma Center tables and graphs.

Note: "Primary Admissions" refers to all patients except those treated and released from the emergency department within 6 hours of emergency department arrival.

**Final Disposition of Patients:
Primary Admissions Only
(3-Year Comparison)**
Source: Maryland State Trauma Registry

Final Disposition	June 2019 to May 2020	June 2020 to May 2021	June 2021 to May 2022
Inpatient Rehab Facility	7.4%	8.4%	8.1%
Skilled Nursing Facility	10.5%	10.8%	13.4%
Residential Facility	1.3%	1.2%	1.2%
Specialty Referral Center	4.2%	4.4%	4.3%
Home with Services	6.3%	7.8%	8.1%
Home	56.3%	52.6%	51.2%
Acute Care Hospital	2.6%	3.0%	2.4%
Left Against Medical Advice	2.5%	3.2%	2.6%
Morgue/Died	5.3%	5.1%	5.0%
Left without Treatment	0.0%	0.0%	0.1%
Hospice Care	0.7%	0.9%	0.9%
Jail	1.2%	1.0%	0.9%
Psychiatric Hospital	1.3%	1.2%	1.3%
Elopement	0.3%	0.3%	0.3%
Other	0.1%	0.1%	0.2%
TOTAL	100.0%	100.0%	100.0%

Note: "Primary Admissions" refers to all patients except those treated and released from the emergency department within 6 hours of emergency department arrival.

**Injury Severity Scores of Patients with
Penetrating Injuries: Primary Admissions Only
(3-Year Comparison)**
Source: Maryland State Trauma Registry

ISS	June 2019 to May 2020	June 2020 to May 2021	June 2021 to May 2022
1 to 12	69.9%	68.8%	66.6%
13 to 19	12.1%	12.6%	13.4%
20 to 35	12.8%	13.7%	15.5%
36 to 75	5.2%	4.9%	4.5%
TOTAL	100.0%	100.0%	100.0%

Note: "Primary Admissions" refers to all patients except those treated and released from the emergency department within 6 hours of emergency department arrival.

**Injury Severity Scores (ISS) by Injury Type:
Primary Admissions Only
(June 2021 to May 2022)**
Source: Maryland State Trauma Registry

ISS	Blunt	Penetrating	Total
1 to 12	77.5%	66.6%	76.0%
13 to 19	12.5%	13.4%	12.6%
20 to 35	8.6%	15.5%	9.6%
36 to 75	1.4%	4.5%	1.8%
TOTAL	100.0%	100.0%	100.0%

Note: "Primary Admissions" refers to all patients except those treated and released from the emergency department within 6 hours of emergency department arrival.

**Injury Severity Scores of Patients with
Blunt Injuries: Primary Admissions Only
(3-Year Comparison)**
Source: Maryland State Trauma Registry

ISS	June 2019 to May 2020	June 2020 to May 2021	June 2021 to May 2022
1 to 12	78.1%	78.0%	77.5%
13 to 19	12.3%	12.2%	12.5%
20 to 35	8.3%	8.3%	8.6%
36 to 75	1.3%	1.5%	1.4%
TOTAL	100.0%	100.0%	100.0%

Note: "Primary Admissions" refers to all patients except those treated and released from the emergency department within 6 hours of emergency department arrival.

**Injury Severity Scores of Patients with Either Blunt or
Penetrating Injuries: Primary Admissions Only
(3-Year Comparison)**
Source: Maryland State Trauma Registry

ISS	June 2019 to May 2020	June 2020 to May 2021	June 2021 to May 2022
1 to 12	76.8%	76.8%	76.0%
13 to 19	12.3%	12.2%	12.6%
20 to 35	9.0%	9.1%	9.6%
36 to 75	1.9%	1.9%	1.8%
TOTAL	100.0%	100.0%	100.0%

Note: "Primary Admissions" refers to all patients except those treated and released from the emergency department within 6 hours of emergency department arrival.

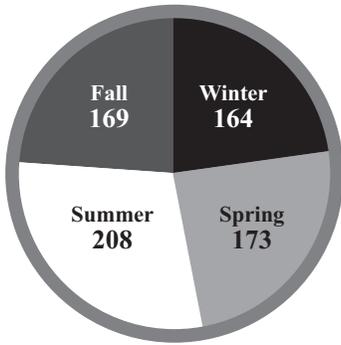
MARYLAND ADULT BURN STATISTICS

Total Number of Adult Burn Cases
Patients Aged 15 and Older Treated at Johns Hopkins Burn Center at Bayview (3-Year Comparison)
 Source: Maryland State Trauma Registry

Institution	June 2019 to May 2020	June 2020 to May 2021	June 2021 to May 2022
Johns Hopkins Burn Center at Bayview	754	834	714

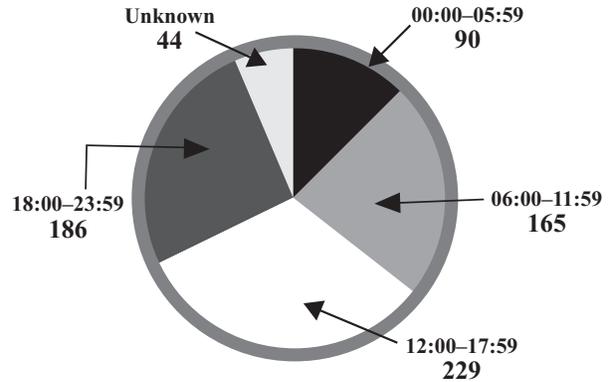
Season of Year Distribution

Patients Aged 15 and Older Treated at Johns Hopkins Burn Center at Bayview (June 2021 to May 2022)
 Source: Maryland State Trauma Registry



Time of Arrival Distribution

Patients Aged 15 and Older Treated at Johns Hopkins Burn Center at Bayview (June 2021 to May 2022)
 Source: Maryland State Trauma Registry



Place of Injury

Patients Aged 15 and Older Treated at Johns Hopkins Burn Center at Bayview (June 2021 to May 2022)
 Source: Maryland State Trauma Registry

Place of Injury	Number
Non-Institutional Private Residence	452
Institutional Private Residence	12
School, Other Institution and Public Administrative Area	8
Sports and Athletic Area	2
Street/Highway	19
Trade and Service Area	31
Industrial and Construction Area	22
Farm	1
Other Places	28
Unspecified Places	139
TOTAL	714

Occurrence of Injury by County

*Patients Aged Fifteen and Older Treated at
Johns Hopkins Burn Center at Bayview
(June 2021 to May 2022)*

Source: Maryland State Trauma Registry

County of Injury	Number
Allegany County	1
Anne Arundel County	52
Baltimore County	138
Calvert County	3
Caroline County	6
Carroll County	10
Cecil County	10
Dorchester County	7
Frederick County	13
Harford County	34
Howard County	29
Montgomery County	4
Prince George's County	7
Somerset County	1
St. Mary's County	2
Talbot County	2
Washington County	8
Wicomico County	4
Worcester County	7
Baltimore City	209
Virginia	6
West Virginia	7
District of Columbia	3
Pennsylvania	16
Other	4
Not Valued	131
TOTAL	714

Residence of Patients by County

*Patients Aged 15 and Older Treated at
Johns Hopkins Burn Center at Bayview
(June 2021 to May 2022)*

Source: Maryland State Trauma Registry

County of Residence	Number
Anne Arundel County	62
Baltimore County	162
Calvert County	5
Caroline County	6
Carroll County	12
Cecil County	11
Dorchester County	6
Frederick County	16
Harford County	47
Howard County	34
Kent County	1
Montgomery County	8
Prince George's County	10
Queen Anne's County	1
St. Mary's County	3
Somerset County	1
Talbot County	3
Washington County	11
Wicomico County	6
Worcester County	7
Baltimore City	240
Virginia	8
West Virginia	12
District of Columbia	6
Pennsylvania	28
Delaware	4
Other	4
TOTAL	714

Mode of Patient Transport

*Patients Aged 15 and Older Treated at
Johns Hopkins Burn Center at Bayview
(June 2021 to May 2022)*

Source: Maryland State Trauma Registry

Modality Type	Number
Ground Ambulance	332
Helicopter	29
Other*	294
Not Valued	59
TOTAL	714

**Note: The category "Other" includes patients who were brought in by fixed wing ambulance, private or public vehicles, or were walk-ins.*

Etiology of Injuries by Age

Patients Aged 15 and Older Treated at Johns Hopkins Burn Center at Bayview
(June 2021 to May 2022)

Source: Maryland State Trauma Registry

Age Range	Electrical	Chemical	Thermal			Inhalation	Other Burn	Other Non-Burn	Not Valued	Total
			Flame	Contact	Scald					
15 to 24 years	1	1	22	11	49	1	1	2	14	102
25 to 44 years	3	3	73	39	92	7	2	3	45	267
45 to 64 years	5	11	74	29	73	9	5	0	46	252
65 years and over	0	2	29	17	22	3	1	0	19	93
Total	9	17	198	96	236	20	9	5	124	714

Final Disposition of Patients

Patients Aged 15 and Older Treated at Johns Hopkins Burn Center at Bayview
(3-Year Comparison)

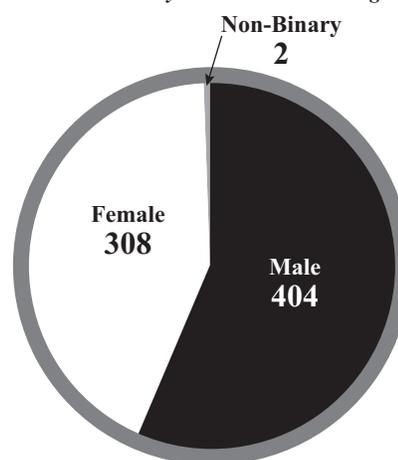
Source: Maryland State Trauma Registry

Final Disposition	June 2019 to May 2020	June 2020 to May 2021	June 2021 to May 2022
Home	592	688	572
Home with Services	78	65	32
Transfer to Another Acute Care Facility	0	1	0
Discharged to Extended Care Facility	1	0	1
Discharged to Alternate Caregiver	0	1	0
Rehabilitation Facility	5	5	2
Skilled Nursing Facility	23	22	14
Psychiatric Hospital	5	6	5
Morgue/Died	12	8	17
Left Against Medical Advice or Discontinued Care	21	22	19
Jail	6	3	5
Hospice	2	4	2
Other	0	2	0
Not Valued	9	7	45
TOTAL	754	834	714

Gender Profile

Patients Aged 15 and Older Treated at Johns Hopkins Burn Center at Bayview
(June 2021 to May 2022)

Source: Maryland State Trauma Registry



Number of Injuries by Age

Patients Aged 15 and Older Treated at Johns Hopkins Burn Center at Bayview
(3-Year Comparison)

Source: Maryland State Trauma Registry

Age Range	June 2019 to May 2020	June 2020 to May 2021	June 2021 to May 2022
15 to 24 years	103	104	102
25 to 44 years	310	348	267
45 to 64 years	237	270	252
65 years and over	104	112	93
TOTAL	754	834	714

MARYLAND PEDIATRIC TRAUMA STATISTICS

Legend Code	
Children's National Health System	CNHS
Johns Hopkins Pediatric Trauma Center	JHP

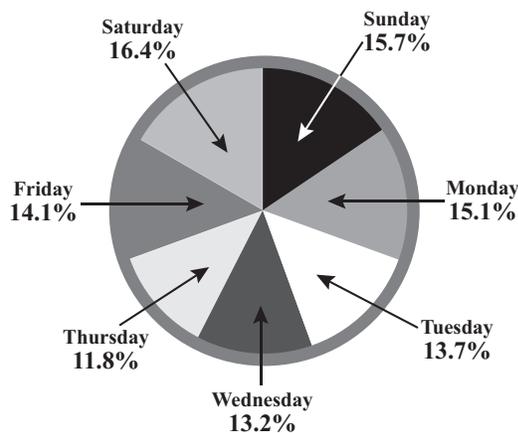
Total Cases Treated at Pediatric Trauma Centers (3-Year Comparison) Source: Maryland State Trauma Registry			
Trauma Center	June 2019 to May 2020	June 2020 to May 2021	June 2021 to May 2022
CNHS	689	826	912
JHP	707	762	894
TOTAL	1,396	1,588	1,806

Note: For children who were treated at Adult Trauma Centers, see Maryland Adult Trauma Statistics. Children's National Health System data include patients residing in Maryland and/or injured in Maryland. For children who were burn patients at each hospital, see Maryland Pediatric Burn Center Statistics.

Emergency Department Arrivals by Day of Week: Children Treated at Pediatric Trauma Centers

(June 2021 to May 2022)

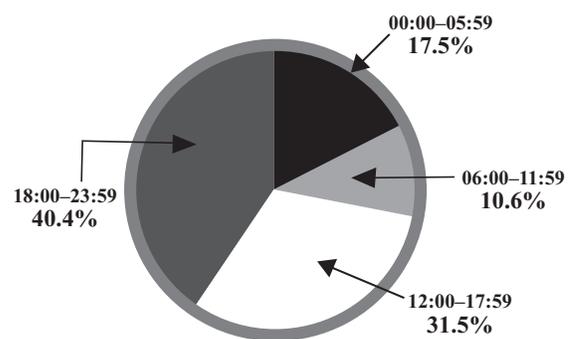
Source: Maryland State Trauma Registry



Emergency Department Arrivals by Time of Day: Children Treated at Pediatric Trauma Centers

(June 2021 to May 2022)

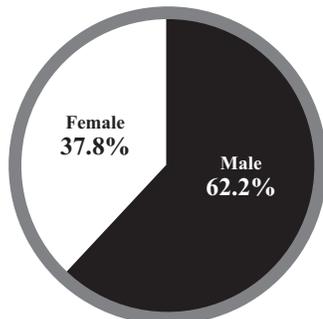
Source: Maryland State Trauma Registry



Gender Profile: Children Treated at Pediatric Trauma Centers

(June 2021 to May 2022)

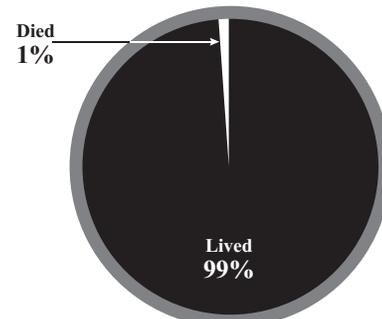
Source: Maryland State Trauma Registry



Outcome Profile: Children Treated at Pediatric Trauma Centers

(June 2021 to May 2022)

Source: Maryland State Trauma Registry



Note: For children who were treated at adult trauma centers, see Maryland Adult Trauma Report. Children's National Hospital data include patients residing in Maryland and/or injured in Maryland. For children that were burn patients at each hospital, see Maryland Pediatric Burn Center Statistics.

**Mode of Patient Transport by Center:
Scene Origin Cases Only**

*Children Treated at Pediatric Trauma Centers
(June 2021 to May 2022)
Source: Maryland State Trauma Registry*

Modality Type	CNHS	JHP	Total
Ground Ambulance	71.1%	68.7%	69.5%
Helicopter	17.4%	9.0%	11.9%
Other	11.5%	22.3%	18.6%
TOTAL	100.0%	100.0%	100.0%

Note: Only patients brought directly from the scene to a Trauma Center are included in this table. For children who were treated at Adult Trauma Centers, see Maryland Adult Trauma Statistics. Children's National Hospital data include patients residing in Maryland and/or injured in Maryland. For children who were burn patients at each hospital, see Maryland Pediatric Burn Center Statistics.

Origin of Patient Transport by Center

*Children Treated at Pediatric Trauma Centers
(June 2021 to May 2022)
Source: Maryland State Trauma Registry*

Origin	CNHS	JHP	Total
Scene of Injury	37.2%	71.8%	54.3%
Hospital Transfer	59.1%	23.7%	41.6%
Other	3.7%	4.5%	4.1%
TOTAL	100.0%	100.0%	100.0%

Note: For children who were treated at Adult Trauma Centers, see Maryland Adult Trauma Statistics. Children's National Hospital data include patients residing in Maryland and/or injured in Maryland. For children who were burn patients at each hospital, see Maryland Pediatric Burn Center Statistics.

Injury Type

*Children Treated at Pediatric Trauma Centers
(3-Year Comparison)
Source: Maryland State Trauma Registry*

Injury Type	June 2019 to May 2020	June 2020 to May 2021	June 2021 to May 2022
Blunt	92.2%	85.2%	86.5%
Penetrating	4.5%	6.8%	4.5%
Burn	0.0%	0.1%	0.0%
Near Drowning	0.9%	1.1%	0.7%
Hanging	0.0%	0.3%	0.4%
Ingestion	0.0%	0.1%	0.1%
Crush	0.0%	0.2%	0.1%
Animal Bite/Human Bite	2.4%	6.2%	7.5%
Other	0.0%	0.0%	0.2%
TOTAL	100.0%	100.0%	100.0%

Note: For children who were treated at Adult Trauma Centers, see Maryland Adult Trauma Statistics. Children's National Hospital data include patients residing in Maryland and/or injured in Maryland. For children who were burn patients at each hospital, see Maryland Pediatric Burn Center Statistics.

Mechanism of Injury

*Children Treated at Pediatric Trauma Centers
(3-Year Comparison)
Source: Maryland State Trauma Registry*

Mechanism of Injury	June 2019 to May 2020	June 2020 to May 2021	June 2021 to May 2022
Cut/Pierce	2.9%	3.0%	1.7%
Drowning/Submersion	0.9%	0.9%	0.4%
Falls	37.6%	36.2%	34.3%
Fire/Flame	0.1%	0.1%	0.0%
Firearm	1.4%	3.0%	2.4%
Machinery/Mechanical	0.4%	0.4%	0.5%
MVT - Occupant	23.2%	21.5%	20.0%
MVT - Motorcyclist	0.3%	0.6%	1.3%
MVT - Pedal Cyclist	6.5%	7.3%	4.5%
MVT - Pedestrian	6.9%	6.6%	8.9%
Other Transport	0.0%	0.3%	0.2%
Natural/Environmental	3.2%	6.9%	8.0%
Struck by/Against	7.8%	6.4%	9.7%
Abuse	5.2%	4.7%	4.1%
Other	1.4%	1.0%	2.3%
Not Valued	2.2%	1.1%	1.7%
TOTAL	100.0%	100.0%	100.0%

Note: For children who were treated at Adult Trauma Centers, see Maryland Adult Trauma Statistics. Children's National Hospital data include patients residing in Maryland and/or injured in Maryland. For children who were burn patients at each hospital, see Maryland Pediatric Burn Center Statistics.

Etiology of Injuries by Age

*Children Treated at Pediatric Trauma Centers (June 2021 to May 2022)
Source: Maryland State Trauma Registry*

Age	Motor Vehicle Crash	Motorcycle	Pedestrian	Fall	Gunshot Wound	Cut/Pierce	Struck by/ Against	Pedal Cyclist	Other	Total
Under 1 year	2.5%	0.0%	0.0%	15.2%	4.5%	3.2%	4.0%	0.0%	24.7%	10.3%
1 to 4 years	18.3%	4.3%	13.7%	28.6%	4.5%	9.7%	7.4%	6.1%	23.7%	20.0%
5 to 9 years	33.9%	17.4%	25.5%	31.5%	18.2%	19.4%	16.5%	23.2%	21.9%	27.3%
10 to 14 years	36.7%	65.3%	51.5%	20.3%	63.7%	64.5%	46.0%	62.2%	17.9%	33.0%
15+ years	8.6%	13.0%	9.3%	4.4%	9.1%	3.2%	26.1%	8.5%	11.8%	9.4%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Note: For children who were treated at Adult Trauma Centers, see Maryland Adult Trauma Statistics. Children's National Hospital data include patients residing in Maryland and/or injured in Maryland. For children who were burn patients at each hospital, see Maryland Pediatric Burn Statistics.

Number of Injuries and Deaths by Age

Children Treated at Pediatric Trauma Centers
(June 2021 to May 2022)

Source: Maryland State Trauma Registry

Age	Number of Injured Patients		Number of Deaths	
	Total	Maryland Residents	Total	Maryland Residents
Under 1 year	185	175	5	5
1 to 4 years	365	338	2	2
5 to 9 years	491	459	7	7
10 to 14 years	596	559	4	4
15+ years	169	161	0	0
TOTAL	1,806	1,692	18	18

Note: For children who were treated at Adult Trauma Centers, see Maryland Adult Trauma Statistics. Children's National Hospital data include patients residing in Maryland and/or injured in Maryland. For children who were burn patients at each hospital, see Maryland Pediatric Burn Center Statistics.

Number of Injuries by Age

Children Treated at Pediatric Trauma Centers
(3-Year Comparison)

Source: Maryland State Trauma Registry

Age	June 2019 to May 2020	June 2020 to May 2021	June 2021 to May 2022
Under 1 year	170	179	185
1 to 4 years	326	384	365
5 to 9 years	376	442	491
10 to 14 years	407	446	596
15+ years	117	137	169
TOTAL	1,396	1,588	1,806

Note: For children who were treated at Adult Trauma Centers, see Maryland Adult Trauma Statistics. Children's National Hospital data include patients residing in Maryland and/or injured in Maryland. For children who were burn patients at each hospital, see Maryland Pediatric Burn Center Statistics.

Number of Deaths by Age

Children Treated at Pediatric Trauma Centers
(3-Year Comparison)

Source: Maryland State Trauma Registry

Age	June 2019 to May 2020	June 2020 to May 2021	June 2021 to May 2022
Under 1 year	3	3	5
1 to 4 years	7	5	2
5 to 9 years	4	2	7
10 to 14 years	0	8	4
15+ years	0	2	0
TOTAL	14	20	18

Note: For children who were treated at Adult Trauma Centers, see Maryland Adult Trauma Statistics. Children's National Hospital data include patients residing in Maryland and/or injured in Maryland. For children who were burn patients at each hospital, see Maryland Pediatric Burn Center Statistics.

Final Disposition of Patients

Children Treated at Pediatric Trauma Centers
(3-Year Comparison)

Source: Maryland State Trauma Registry

Final Disposition	June 2019 to May 2020	June 2020 to May 2021	June 2021 to May 2022
Inpatient Rehab Facility	1.7%	1.8%	1.7%
Specialty Referral Center	0.1%	0.1%	0.1%
Home with Services	0.3%	0.6%	0.9%
Home	95.1%	93.7%	94.7%
Acute Care Hospital	0.6%	0.8%	0.3%
Left Against Medical Advice	0.0%	0.1%	0.0%
Morgue/Died	1.0%	1.3%	1.0%
Left without Treatment	0.0%	0.0%	0.1%
Foster Care	0.7%	1.1%	0.6%
Intermediate Care Facility	0.0%	0.1%	0.0%
Psychiatric Hospital	0.4%	0.4%	0.5%
Elopement	0.0%	0.0%	0.1%
Other	0.1%	0.0%	0.0%
TOTAL	100.0%	100.0%	100.0%

Note: For children who were treated at Adult Trauma Centers, see Maryland Adult Trauma Statistics. Children's National Hospital data include patients residing in Maryland and/or injured in Maryland. For children who were burn patients at each hospital, see Maryland Pediatric Burn Center Statistics.

Etiology of Injuries by Age

Children Treated at Pediatric Trauma Centers or Adult Trauma Centers (June 2021 to May 2022)

Source: Maryland State Trauma Registry

Age	Motor Vehicle Crash	Motorcycle	Pedestrian	Fall	Gunshot Wound	Cut/Pierce	Struck by/Against	Pedal Cyclist	Other	Total
Under 1 year	3.7%	0.0%	0.0%	16.8%	7.4%	6.1%	7.1%	0.0%	27.0%	11.9%
1 to 4 years	18.8%	4.8%	14.5%	29.7%	3.7%	15.2%	12.2%	7.5%	29.5%	22.4%
5 to 9 years	34.5%	19.0%	27.7%	32.3%	16.7%	18.1%	21.1%	23.7%	23.9%	29.1%
10 to 14 years	43.0%	76.2%	57.8%	21.2%	72.2%	60.6%	59.6%	68.8%	19.6%	36.6%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Note: Children's National Hospital data include patients residing in Maryland and/or injured in Maryland. For children who were burn patients at each hospital, see Maryland Pediatric Burn Center Statistics.

**Occurrence of Injury by County:
Scene Origin Cases Only**

*Children Treated at Pediatric Trauma Centers
(June 2021 to May 2022)*

Source: Maryland State Trauma Registry

County of Injury	Number
Allegany County	1
Anne Arundel County	56
Baltimore County	169
Calvert County	14
Caroline County	3
Carroll County	8
Cecil County	3
Charles County	26
Dorchester County	6
Frederick County	26
Garrett County	2
Harford County	30
Howard County	27
Kent County	4
Montgomery County	75
Prince George's County	160
Queen Anne's County	2
St. Mary's County	23
Somerset County	1
Talbot County	2
Washington County	9
Wicomico County	3
Worcester County	1
Baltimore City	306
Virginia	2
Washington, DC	11
Pennsylvania	2
Other	1
Not Indicated	8
TOTAL	981

Note: For children who were treated at Adult Trauma Centers, see Maryland Adult Trauma Statistics. Children's National Hospital data include patients residing in Maryland and/or injured in Maryland. Scene origin cases represent 54.3% of the total cases treated at Pediatric Trauma Centers. For children who were burn patients at each hospital, see Maryland Pediatric Burn Center Statistics.

**Residence of Patients by County:
Scene Origin Cases Only**

*Children Treated at Pediatric Trauma Centers
(June 2021 to May 2022)*

Source: Maryland State Trauma Registry

County of Residence	Number
Anne Arundel County	53
Baltimore County	153
Calvert County	17
Caroline County	2
Carroll County	10
Cecil County	5
Charles County	22
Dorchester County	7
Frederick County	25
Harford County	32
Howard County	28
Kent County	2
Montgomery County	78
Prince George's County	136
Queen Anne's County	3
St. Mary's County	22
Somerset County	1
Talbot County	1
Washington County	5
Wicomico County	2
Baltimore City	305
Virginia	9
West Virginia	1
Pennsylvania	12
Washington, DC	27
Other	23
TOTAL	981

Note: For children who were treated at Adult Trauma Centers, see Maryland Adult Trauma Statistics. Children's National Hospital data include patients residing in Maryland and/or injured in Maryland. Scene origin cases represent 54.3% of the total cases treated at Pediatric Trauma Centers. For children who were burn patients at each hospital, see Maryland Pediatric Burn Center Statistics.

Children with Protective Devices at Time of Trauma Incident

*Children Treated at Pediatric Trauma Centers
(3-Year Comparison)*

Source: Maryland State Trauma Registry

Protective Device	June 2019 to May 2020	June 2020 to May 2021	June 2021 to May 2022
None	41.4%	45.0%	45.7%
Seatbelt	4.8%	4.5%	3.9%
Airbag & Seatbelt	20.0%	15.2%	18.9%
Airbag Only	5.9%	10.1%	9.9%
Infant/Child Seat	15.1%	13.1%	11.0%
Protective Helmet	12.6%	11.8%	10.2%
Padding/Protective Clothing	0.2%	0.0%	0.2%
Other Protective Device	0.0%	0.3%	0.2%
TOTAL	100.0%	100.0%	100.0%

Note: Children were involved in motor vehicle, motorcycle, bicycle, and sports-related incidents only. For children who were treated at Adult Trauma Centers, see Maryland Adult Trauma Statistics. Children's National Hospital data include patients residing in Maryland and/or injured in Maryland. For children who were burn patients at each hospital, see Maryland Pediatric Burn Center Statistics.

MARYLAND PEDIATRIC BURN STATISTICS

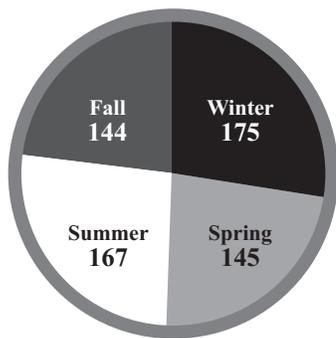
Total Number of Pediatric Burn Cases
Patients Treated at Pediatric Burn Centers and Patients Less Than Age 15 Treated at Johns Hopkins Burn Center at Bayview (3-Year Comparison)
 Source: Maryland State Trauma Registry

Institution	Legend Code	June 2019 to May 2020	June 2020 to May 2021	June 2021 to May 2022
Children's National Health System Pediatric Burn Center	CNHSPBC	233	280	267
Johns Hopkins Pediatric Burn Center	JHPBC	355	336	322
Johns Hopkins Burn Center at Bayview	JHBC	38	1	42
TOTAL		626	617	631

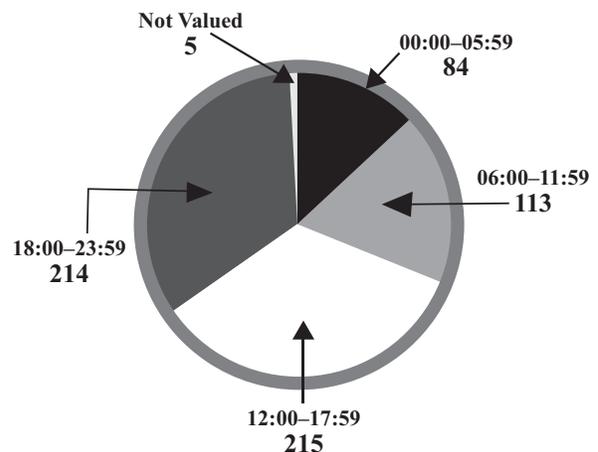
Place of Injury
Patients Treated at Pediatric Burn Centers and Patients Less Than Age 15 Treated at Johns Hopkins Burn Center at Bayview (June 2021 to May 2022)
 Source: Maryland State Trauma Registry

Place of Injury	Number
Non-Institutional Private Residence	557
School, Other Institution and Public Administrative Area	6
Street/Highway	4
Trade and Service Area	11
Other Places	22
Unspecified Places	31
TOTAL	631

Season of Year Distribution
Patients Treated at Pediatric Burn Centers and Patients Less Than Age 15 Treated at Johns Hopkins Burn Center at Bayview (June 2021 to May 2022)
 Source: Maryland State Trauma Registry



Time of Arrival Distribution
Patients Treated at Pediatric Burn Centers and Patients Less Than Age 15 Treated at Johns Hopkins Burn Center at Bayview (June 2021 to May 2022)
 Source: Maryland State Trauma Registry



Occurrence of Injury by County

Patients Treated at Pediatric Burn Centers and Patients Less Than Age 15 Treated at Johns Hopkins Burn Center at Bayview (June 2021 to May 2022)

Source: Maryland State Trauma Registry

County of Injury	Number
Anne Arundel County	27
Baltimore County	87
Calvert County	4
Carroll County	12
Cecil County	4
Charles County	11
Dorchester County	2
Frederick County	13
Harford County	15
Howard County	18
Kent County	1
Montgomery County	86
Prince George's County	125
Queen Anne's County	3
St. Mary's County	9
Talbot County	2
Washington County	12
Wicomico County	3
Worcester County	1
Baltimore City	121
Virginia	2
West Virginia	2
Pennsylvania	10
Washington, DC	2
Delaware	1
Other	1
Not Valued	57
TOTAL	631

Residence of Patients by County

Patients Treated at Pediatric Burn Centers and Patients Less Than Age 15 Treated at Johns Hopkins Burn Center at Bayview (June 2021 to May 2022)

Source: Maryland State Trauma Registry

County of Residence	Number
Anne Arundel County	31
Baltimore County	98
Calvert County	4
Carroll County	12
Cecil County	4
Charles County	11
Dorchester County	2
Frederick County	12
Harford County	20
Howard County	20
Kent County	1
Montgomery County	94
Prince George's County	127
Queen Anne's County	3
St. Mary's County	9
Talbot County	4
Washington County	13
Wicomico County	3
Worcester County	1
Baltimore City	140
Virginia	3
West Virginia	2
Pennsylvania	9
Washington, DC	3
Delaware	1
Other	4
TOTAL	631

Mode of Patient Transport to Burn Center

Patients Treated at Pediatric Burn Centers and Patients Less Than Age 15 Treated at Johns Hopkins Burn Center at Bayview (June 2021 to May 2022)

Source: Maryland State Trauma Registry

Modality Type	CNHSPBC	JHPBC	JHBC	Total
Ground Ambulance	96	142	3	241
Helicopter	5	12	0	17
Other*	165	165	38	368
Not Valued	1	3	1	5
TOTAL	267	322	42	631

**Note: The category "Other" includes patients who were brought in by fixed wing ambulance, private or public vehicles, or were walk-ins.*

Origin of Patient Transport by Burn Center

Patients Treated at Pediatric Burn Centers and Patients Less Than Age 15 Treated at Johns Hopkins Burn Center at Bayview (June 2021 to May 2022)

Source: Maryland State Trauma Registry

Origin Type	CNHSPBC	JHPBC	JHBC	Total
Scene of Injury	95	133	22	250
Hospital Transfer	69	110	0	179
Other	92	38	18	148
Not Valued	11	41	2	54
TOTAL	267	322	42	631

Etiology of Injury by Age of Patients

Patients Treated at Pediatric Burn Centers and Patients Less Than Age 15
Treated at Johns Hopkins Burn Center at Bayview
(June 2021 to May 2022)

Source: Maryland State Trauma Registry

Age Range	Electrical	Chemical	Thermal			Inhalation	Other Burn	Other Non-Burn	Unknown	Total
			Flame	Contact	Scald					
Under 1 year	0	2	1	20	38	1	4	0	3	69
1 to 4 years	3	1	15	130	139	2	3	1	19	313
5 to 9 years	2	0	18	52	51	6	1	1	6	137
10 to 14 years	0	0	12	19	35	2	2	0	7	77
15 years and over	0	0	4	8	19	0	2	0	2	35
Total	5	3	50	229	282	11	12	2	37	631

Final Disposition of Patients

Patients Treated at Pediatric Burn Centers and
Patients Less Than Age 15 Treated at
Johns Hopkins Burn Center at Bayview
(3-Year Comparison)

Source: Maryland State Trauma Registry

Final Disposition	June 2019 to May 2020	June 2020 to May 2021	June 2021 to May 2022
Home	578	581	591
Home with Services	19	20	14
Transfer to an Acute Care Facility	5	0	10
Rehabilitation Facility	10	4	2
Skilled Nursing Facility	0	2	0
Morgue/Died	1	1	4
Left Against Medical Advice	3	1	0
Alternate Caregiver	2	4	3
Foster Care	5	2	2
Transfer to Inpatient Psychiatric Facility	1	1	2
Not Valued	2	1	3
TOTAL	626	617	631

Total Body Surface Area (TBSA) Burned by Length of Stay in Days

Patients Treated at Pediatric Burn Centers and
Patients Less Than Age 15 Treated at
Johns Hopkins Burn Center at Bayview
(June 2021 to May 2022)

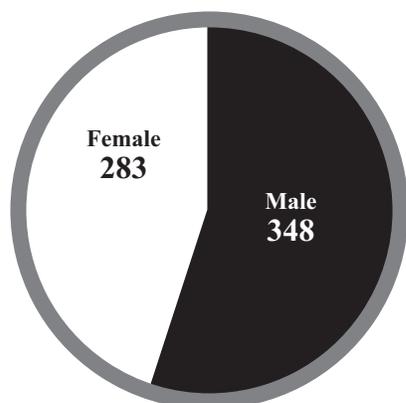
Source: Maryland State Trauma Registry

Length of Stay	Less Than 10% TBSA	10 - 19% TBSA	20% or Greater TBSA	Not Valued	Total
1 Day	413	2	2	64	481
2 - 3 Days	61	3	0	16	80
4 - 7 Days	18	3	0	2	23
8 - 14 Days	16	6	0	4	26
15 - 21 Days	2	3	0	1	6
22 - 28 Days	2	1	0	0	3
Over 28 Days	0	0	1	0	1
Not Valued	10	0	1	0	11
TOTAL	522	18	4	87	631

Gender Profile

Patients Treated at Pediatric Burn Centers and
Patients Less Than Age 15 Treated at
Johns Hopkins Burn Center at Bayview
(June 2021 to May 2022)

Source: Maryland State Trauma Registry



Number of Injuries by Age

Patients Treated at Pediatric Burn Centers and
Patients Less Than Age 15 Treated at
Johns Hopkins Burn Center at Bayview
(3-Year Comparison)

Source: Maryland State Trauma Registry

Age Range	June 2019 to May 2020	June 2020 to May 2021	June 2021 to May 2022
Under 1 year	79	72	69
1 to 4 years	329	330	313
5 to 9 years	117	121	137
10 to 14 years	83	74	77
15 years and over	18	20	35
TOTAL	626	617	631

Number of Patients Treated at the Pediatric Burn Clinics at Johns Hopkins Pediatric Center and Children's National Hospital

(3-Year Comparison)

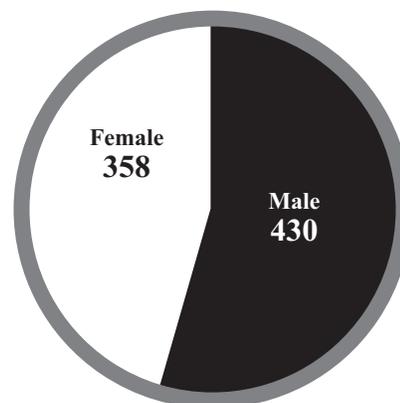
Source: Maryland State Trauma Registry

	June 2019 to May 2020	June 2020 to May 2021	June 2021 to May 2022
Unique Patients	709	718	788
Total Pediatric Burn Clinic Visits	1,416	1,383	1,545

Gender Profile

Patients Treated at the Pediatric Burn Clinics at Johns Hopkins Pediatric Center and Children's National Hospital (June 2021 to May 2022)

Source: Maryland State Trauma Registry



Number of Patients by Age Treated at the Burn Clinics at Johns Hopkins Pediatric Center and Children's National Hospital

(3-Year Comparison)

Source: Maryland State Trauma Registry

Age Range	June 2019 to May 2020	June 2020 to May 2021	June 2021 to May 2022
Under 1 year	78	70	77
1 to 4 years	373	381	398
5 to 9 years	133	146	164
10 to 14 years	103	92	105
15 years and over	22	29	44
TOTAL	709	718	788

Etiology of Injuries by Age

Patients Treated at the Pediatric Burn Clinics

At Johns Hopkins Pediatric Center and Children's National Medical Center (June 2021 to May 2022)

Source: Maryland State Trauma Registry

Age Range	Electrical	Chemical	Thermal			Inhalation	Other Burn	Other Non-Burn	Unknown	Total
			Flame	Contact	Scald					
Under 1 year	0	1	0	25	43	0	5	0	3	77
1 to 4 years	1	1	10	196	176	0	4	0	10	398
5 to 9 years	0	0	15	76	61	1	4	1	6	164
10 to 14 years	0	2	12	32	47	0	4	2	6	105
15 years and over	0	0	5	10	28	0	1	0	0	44
Total	1	4	42	339	355	1	18	3	25	788

GOVERNOR OF MARYLAND

Larry Hogan

LIEUTENANT GOVERNOR

Boyd K. Rutherford

MARYLAND EMS BOARD (July 2021–June 2022)

Clay B. Stamp, NRP

Board Chairperson

Public at Large

Molly K. Marra

Secretary, Maryland Department of Health, Designee

James Scheulen, PA, MBA

Hospital Administrator

Stephan Cox

Volunteer Firefighter

William Frohna, MD

Emergency Medical Services Physician

E. Albert Reece, MD, PhD, MBA

Board of Regents, Designee

Sally Showalter, RN

Public at Large <175,000

Mary Alice Vanhoy, MSN, RN, CEN, CPEN, NREMT-P

Emergency Medical Services Nurse

Dany Westerband, MD, FACS

Trauma Physician

Wayne Tiemersma, NRP

Statewide EMS Advisory Council Chairperson

Vacant – Career Firefighter

STATEWIDE EMS ADVISORY COUNCIL (July 2021–June 2022)

Wayne Tiemersma, NRP

SEMSAC Chairperson, Representing EMS Region I Advisory Council

Eric Smothers, NREMT-P

SEMSAC Vice Chairperson, Representing EMS Region II Advisory Council

Kristie Snedeker, DPT

Representing R Adams Cowley Shock Trauma Center

Timothy J. Kerns, PhD

Representing Maryland Department of Transportation

Chief Gordon E. Wallace, Jr.

Representing Metropolitan Fire Chiefs

Chief James U. Matz

Representing EMS Region III Advisory Council

Scott A. Haas, NREMT-P

Representing Region IV EMS Advisory Council

Chief Alan L. Butsch

Representing EMS Region V Advisory Council

Erik R. Abrahamson

Representing Helicopter Pilots

Linda Dousa, CRT-I

Representing Maryland State Firemen's Association

Michael Cox

Representing Maryland Fire and Rescue Institute

Rosemary Kozar, MD, PhD

Representing National Study Center for Trauma and Emergency Medical Systems

Jeffery L. Fillmore, MD

Representing the EMS Regional Medical Directors

Michael J. Rosellini

Representing Maryland Commercial Ambulance Services

Jeffrey S. Sagel, DO

Representing MedChi, The Maryland State Medical Society

Major Michael Tagliaferri, Commander

Representing Maryland State Police Aviation Command

Katherine Burroughs, MS, PA-C

Representing Maryland Hospital Association

Wayne Dyott

Representing General Public in a county with a population of < 175,000

Lisa C. Tenney, RN

Representing General Public

Kathleen Grote, NREMT-P

Representing General Public

Lisa M. Lisle, RN, CEN

Representing the Maryland Emergency Nurses Association

Elliott R. Haut, MD, PhD, FACS

Representing Maryland TraumaNet

Jennifer Anders, MD, FAAP

Representing American Academy of Pediatrics, Maryland Chapter

Michael G. Millin, MD, MPH, FACEP, FAEMS

Representing American College of Emergency Physicians, Maryland Chapter

Justin L. Orendorf

Representing Volunteer Field Providers

Linda W. Young, MD

Representing Maryland Society of Anesthesiologists

Vacant – Representing American Association of Critical Care Nurses, Maryland Chapter

Vacant – Representing State Emergency Number Systems Board

Vacant – Representing Professional Fire Fighters of Maryland

Vacant – Representing American College of Surgeons, Maryland Chapter

Vacant – Representing Maryland Board of Physicians

Maryland Institute for Emergency Medical Services Systems (MIEMSS)

Theodore R. Delbridge, MD, MPH, FACEP, FAEM – Executive Director

653 W. Pratt Street, Baltimore, MD 21201-1536



Maryland Institute for Emergency Medical Services Systems
653 W. Pratt Street, Baltimore, MD 21201-1536
www.miemss.org