

Annual Report



2015-2016

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 providers, and conducting other EMS Board business. MIEMSS also provides the administrative and staff support for the Statewide EMS Advisory Council (SEMSAC) and five EMS regional councils.



2015–2016 ANNUAL REPORT

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Mission/Vision/Key Goals

MISSION

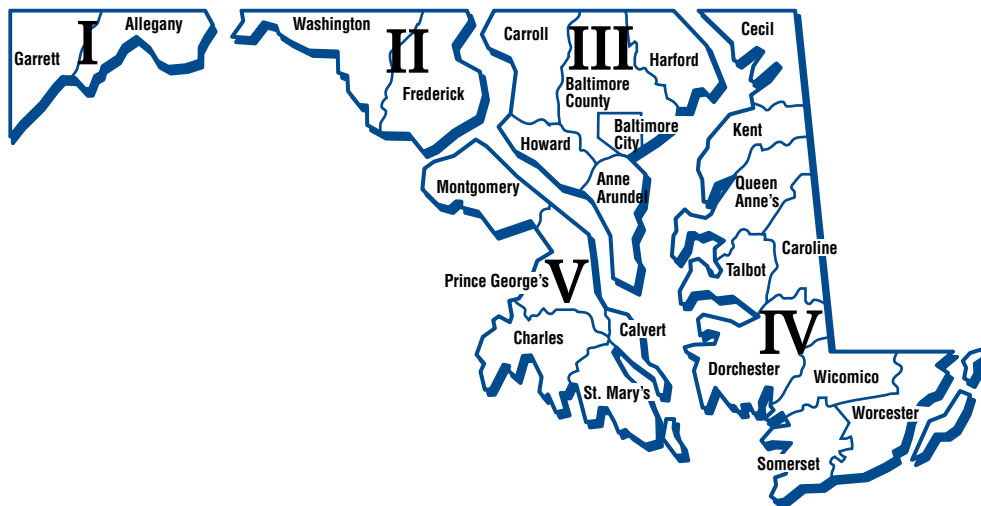
Consistent with Maryland law and guided by the EMS Plan, to provide the resources (communications, infrastructure, grants, and training), leadership (vision, expertise, and coordination), and oversight (medical, regulatory, and administrative) necessary for Maryland's statewide emergency medical services (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.





Donald L. DeVries, Jr., Esq.
Chairman, EMS Board

FROM THE CHAIRMAN OF THE STATE EMS BOARD

*I*t is no accident that Maryland has a world-renowned EMS System. From our dedicated volunteer and career providers, to our statewide protocols, effective prehospital care and medical direction, statewide medical communications system, and emergency departments and designated trauma and specialty care centers – the Maryland system represents the very best of emergency medical services.

Ensuring that Maryland EMS remains a leader requires that we successfully meet new challenges and make meaningful improvements to our system to help make certain that our future is as bright as our past. Our work during this past year to meet challenges presented by the transition to National Registry testing for Basic Life Support providers exemplified this need.

Maryland recently began requiring National Registry testing for Maryland certification of Emergency Medical Technicians (EMT) and Emergency Medical Responders (EMR).¹ Initial results from this testing became available during this past year. Results indicated that Maryland needed to undertake concerted efforts to better prepare students for testing and to improve testing pass rates.

In response, in October 2015, the EMS Board convened a Committee on National Registry Testing for BLS Providers and charged the Committee with conducting an in-depth review of Maryland's first-year experience using National Registry testing for EMTs and EMRs. The Committee, comprised of members of the EMS Board, MIEMSS, Maryland State Firemen's Association, Maryland Fire Rescue Institute, as well as representatives from Maryland educational programs, was tasked with examining ways to improve testing and pass rates for Maryland students.

The Committee reviewed the first year of National Registry testing results in Maryland and considered ways to improve test performance, discussed problems and issues associated with testing, monitored actions taken to mitigate problems, and developed recommendations for moving forward. The Committee directed that special assistance be provided to EMT students from the first year of testing who were unsuccessful in their initial attempt at National Registry testing. This assistance included access to a Test Prep Course developed by Howard County Department of Fire and Rescue Services to help prepare students for National Registry testing, as well as payment by MIEMSS of test fees for subsequent National Registry testing. MIEMSS also improved and streamlined access to National Registry testing and provided assistance to students needing help registering to take the test. Additionally, MFRI completed comprehensive revisions to its EMT program, including increased use of educational resources, the addition of pre- and post-tests for each module, modification of module exams to National Registry-type questions, feedback to each student after every exam and a practice comprehensive final exam.

I am pleased to report that these and other improvements that we have put in place have had a significantly positive impact. Maryland's most recent National Registry EMT test results from the second year of testing indicate that Maryland's EMT pass rate now exceeds the national average pass rate for National Registry testing. While the Committee's work will continue into the next year to ensure ongoing improvement, it is clear that we are on the right path.

The extraordinary efforts of our BLS students, EMS providers, Maryland's educational programs, officials from every Maryland jurisdiction, our Committee members, and stakeholders that were marshalled in order to meet this challenge is an outstanding example of the cooperative excellence that is the hallmark of our EMS system. As Chairman of the EMS Board, I am extremely proud of the contributions, hard work and dedication of these individuals and institutions, and I thank them for their efforts. Simply put, no matter how hard the task, EMS always finds a way to get the job done.

I would also like to thank Dr. Kevin Seaman for his service as MIEMSS Executive Director. I have worked closely with Dr. Seaman over the past two years, and his dedicated efforts and thoughtful perspectives have helped ensure the continued success of our EMS system. The EMS Board and I wish him every success as he moves on to other health care initiatives.

On behalf of the EMS Board, I want to convey our sincere gratitude to Maryland's EMS providers for their commitment and unselfish dedication that have made our Statewide emergency medical system effective not only in meeting the needs of our citizens, but also in providing a model for the entire country. We look forward to continuing to work with all of our partners.

¹ The National Registry for Emergency Medical Technicians (National Registry) was established in 1970 in response to President Lyndon Johnson's Committee on Highway Traffic Safety recommendation for a national certifying agency for Emergency Medical Technicians in order to establish and standardize training requirements.



*Kevin G. Seaman, MD, FACEP
Executive Director, MIEMSS*

MIEMSS

FROM THE EXECUTIVE DIRECTOR

*T*he Maryland EMS system operates through the ongoing collaborative efforts of many individuals and institutions, founded upon thousands of front-line volunteer and career field and hospital EMS providers. Through their daily efforts, we deliver timely, superior care to critically ill and injured patients. The high level of coordination in the delivery of care—from the first 9-1-1 call to definitive care in the hospital—ensures Maryland’s EMS system remains a leader among other EMS agencies. Together we help this great system to grow, adapt, and evolve to confront new challenges and changing expectations. In reflection, much has been accomplished this year in reaching our goals and in improving our excellent EMS system.

In 2015 the EMRC/SYSCOM Communications Center in our Baltimore headquarters was successfully upgraded, including major facility improvements, new console technology, and integration with the Maryland FIRST 700 MHz radio system, in order to reduce system risks and vulnerabilities. Yet, more work remains to be done. MIEMSS has released a request for proposals to modernize the communications infrastructure by replacing existing analog systems with IP-based technologies, providing additional capabilities and redundancies to meet growing EMS communications needs.

Health care reform has stimulated much discussion and planning for changes to the health care system. Through advocacy work, the EMS Board will now have input when hospitals elect to convert from full general services hospitals to free-standing medical facilities, ensuring that the quality of care and the availability of EMS service to the community will be maintained.

We have made great strides implementing the Cardiac Arrest Registry to Enhance Survival (CARES) program in Maryland. Currently, 22 of 24 EMS Operational Programs (EMSOP) and the hospitals within their jurisdictions are participating in this important initiative; we anticipate that all EMSOPs and hospitals will be fully engaged by the end of the year. With CARES, we will be able to measure the impact of EMS provider and hospital care on patient outcomes and improve patient survival from sudden cardiac arrest, the primary cause of adult death in Maryland.

Ensuring provider safety is a major concern for MIEMSS. Our providers face increased risks each day in their efforts to help others. To improve their safety on the job, MIEMSS established the Ambulance Safety Task Force to evaluate interventions that can help protect EMS and public safety workers, including developing consensus guidelines and key recommendations for improving ambulance safety across Maryland.

MIEMSS’ Licensure and Certification staff worked tirelessly in FY 2016 to configure and implement a new provider licensure and certification system, to be launched in late 2016, that will allow EMS providers 24/7, web-based, self-service access to their information and to electronically conduct functions previously only accomplished by MIEMSS staff.

This past year saw increased discussions nationally and locally on mobile integrated health care and how it creates new opportunities and challenges for EMS services to respond to health care needs within their communities. A subcommittee of the Statewide EMS Advisory Council has been evaluating new partnerships with local health departments to identify patients who frequently activate the EMS system to access health care, and to help them make better choices, resulting in better health. Thus far, a pilot program in Queen Anne’s County has shown great success.

In addition, our system experiences transitions. We have had to say goodbye, and offer our sincere thanks, to many of our partners. I, too, am stepping down from my position as Executive Director of MIEMSS. In this capacity, I was honored to have the opportunity to enhance and coordinate numerous initiatives focused on improving patient outcomes. I recognize the value of Maryland’s unique EMS system, especially the strong partnerships that define it. I will miss the wonderful providers and the staff of MIEMSS, the living embodiment of the system. Thank you for your support and your friendship.

MIEMSS

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 payables and receivables, maintains employee leave records, processes payroll, 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.

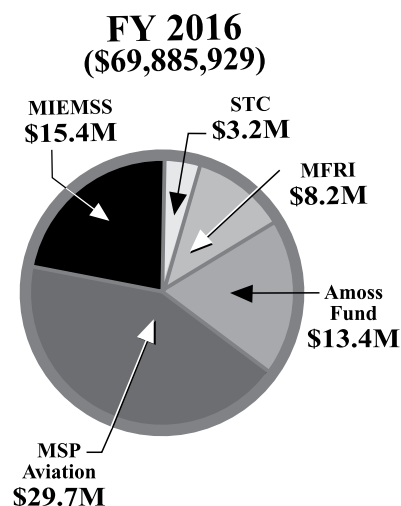
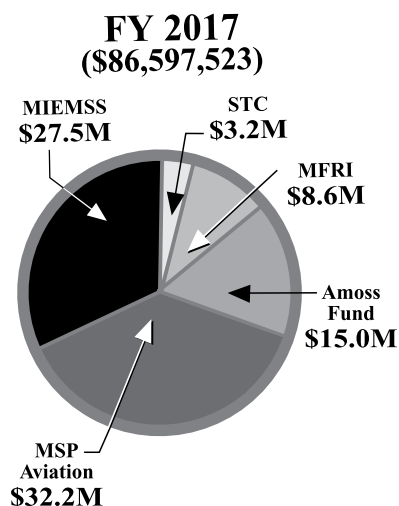
Administration is also responsible for inventory control, fleet management, travel services, and building operations and maintenance.

MIEMSS budget information is displayed by state object code in the charts to the right.

MIEMSS FY 2016 Expenditure by Object Code (Includes All Funds)

FY 2016	Actual
Salaries and Wages	\$9,178,846
Technical/Special Fees	1,319,569
Communication	1,524,207
Travel	874,344
Fuel and Utilities	135,111
Motor Vehicle Operations and Maintenance	254,287
Contractual Services	2,621,957
Supplies and Materials	161,319
Equipment—Replacement	216,373
Equipment—Additional	44,415
Fixed Charges	151,137
Grants	1,029,589
Total Expenditure	\$17,511,154

EMS Operations Fund



MFRI = Maryland Fire and Rescue Institute
STC = R Adams Cowley Shock Trauma Center
MSP = Maryland State Police



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 2016 there were 2,242 patients transported by the Maryland State Police Aviation Command (MSPAC). Of these patients, 2,228 (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 include the following:

• Motor vehicle crashes.....	991
• Falls	515
• Pedestrians.....	122
• Assaults.....	93
• Gunshot wounds.....	55
• Stabbings	44
• Industrial accidents.....	41
• Burns.....	32

After the recent successful transition to the AugustaWestland 139 (AW-139) model of aircraft, FY 2016 saw continued growth in the crew resource management method of care, made possible by the use of a two-person medical crew with dual pilot operation. These new aircraft utilize the most current safety technology, as recommended by the National Transportation Safety Board, and are powerful enough to carry two patients and two EMS providers despite the challenging heat and humidity of the summer months.

The MSPAC continued its participation in the adult and pediatric rapid sequence intubation (RSI) pilot programs as defined in *The Maryland Medical Protocols for Emergency Medical Services Providers*. Designed to address the needs of patients with severe head injuries, these pilot 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 International Trauma Life Support training, allowed life-like 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 providers 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, and contracts, including technology initiatives. The office also assisted in the administration of several state and federal grant programs.

The Attorney General's Office reviewed and prosecuted 50 cases of alleged prohibited acts by EMS providers and applicants. The office staff also provided legal advice and support to the State Office of Commercial Ambulance Licensing and Regulation in all compliance matters, including contested cases. In addition, responses were prepared to 85 public information act requests, 10 subpoenas, and 10 research requests. The Attorney General's Office represented MIEMSS in one employment case.

In FY 2016 the assistant attorneys general worked with MIEMSS to review and revise various regulations, including Base Station standards. The assistant attorneys general also provided support to the Perinatal Advisory Committee and the Perinatal Referral Center reverification process, the Commercial Ambulance Advisory Committee, and the Pediatric Emergency Medical Advisory Committee. The assistant attorneys general also supported the Office of Hospital Programs in monitoring specialty referral centers for compliance with their requirements and Licensure and Certification

in enforcing standards for EMS education programs. The office participated in drafting several information technology procurements, including a renewal of the electronic Maryland EMS Data System (eMEDS)¹ contract, software maintenance agreements, build-out of the statewide EMS communications system, and several business associate agreements under the Health Insurance Portability and Accountability Act (HIPAA). Other tasks completed in FY 2016 included providing advice on MIEMSS' social media policy, various intellectual property issues, drafting agreements for designation of out-of-state medical facilities, reviewing interagency memoranda of understanding, and reviewing and providing advice concerning designation of Trauma and Specialty Centers.

The office also provided advice on the feasibility of Maryland EMS providers participating in community paramedicine and mobile integrated health programs and supported the MIEMSS response to emerging infectious diseases.

In FY 2016 the assistant attorneys general made educational presentations at several venues, including Advanced Disaster Life Support training, and served on the Maryland Health Information Exchange Policy Board, the Governor's Inter-Agency Heroin and Opioid Coordinating Council, the Attorney General's Opioid/Heroin Work Group, and the Air Medical Committee of the National Association of State EMS Officials. The assistant attorneys general continued to support the Maryland Orders for Life Sustaining Treatment (MOLST) program, and wrote an article on the program for EMS providers for *Maryland EMS News*, MIEMSS' monthly newsletter.

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.

FY 2016 began with the third phase of the physical renovation of the EMRC/SYSCOM facility located in downtown Baltimore, including the reconstruction of outer support offices and kitchen areas. These areas had been combined to form a temporary operations center for dispatchers during the in-place renovation at the Baltimore City headquarters. In addition, final renovations took place in the equipment room, which was critical to protect during the renovation process.

One of the challenging aspects of the renovation was remaining operational continuously while the renovations took place. This required establishing an area for temporary operations that contained all the electrical, fire protection, and connectivity needs of the existing center. The renovation is a small part of a multi-year plan



to transform the EMS communications system statewide from outdated analog technologies to modern voice over internet protocol (VoIP) technologies. During the physical renovation, system specification development for the EMS system upgrade continued with assistance from a communications consultant.

The EMRC/SYSCOM logging recorder was expanded to include the ability to digitally capture the computer monitors of all EMRC and SYSCOM workstations. This provides the ability to review not only the audio recordings but also all visual data available to the operator at any given time, providing a greater ability to understand each event and a greater level of quality assurance to operations. In addition, MIEMSS has added the ability to record all of the Digital Emergency Medical Services Telephone (DEMSTEL) phones located in hospital emergency departments in preparation for the EMS system upgrade, and has also added the ability to natively record all MIEMSS' talkgroups on Maryland FiRST (MFiRST), the state's 700 MHz radio project.

The successful completion of the EMRC/SYSCOM renovation, without any downtime, would not have been possible without the skills of the communications staff, especially EMS Engineer Robert Chamberlin, who served as the project manager overseeing the contractors. Also of special note was Sherry Alban, who served as the procurement specialist, and Dave Balthis, who supervised the contracts with the construction company.

Also in FY 2016, in an effort to enhance security concerns that were identified several years ago, MIEMSS undertook the installation of an integrated security access and control system with cameras in key locations in and around its headquarters, improving security and situational awareness.

Because MIEMSS shares infrastructure with many public safety partners, Communications Engineering Services must react to many internal and external pressures throughout the year. One of these unforeseen challenges was the construction of a 15-story building on the University of Maryland campus in Baltimore City. It was discovered that this building would block a critical

¹ The electronic Maryland EMS Data System (eMEDS) is a service mark owned by MIEMSS and registered on the Principal Register of the United States Patent and Trademark Office.

microwave communications path, from downtown Baltimore to Sinai Hospital, that feeds all tower sites located in Harford, Baltimore, and Cecil Counties. The department worked with Sinai Hospital and the management of the Maryland State Office Building to construct two microwave paths around the building. The department was able to design, license, procure equipment, and construct the microwave links within one month of beginning the project. The department then transitioned all of the MIEMSS traffic as well as the traffic of its public safety partners with minimal outage time. The success of this unplanned project relies primarily on Director of Maintenance Charles Rollman and the outstanding staff who worked tirelessly to mitigate the potential communications interruption.

MIEMSS remains an active partner in the MFiRST program. MIEMSS personnel were key players in shared tower site preparations in Western Maryland that were necessary to allow the fourth-phase equipment to be installed. Because MIEMSS operates the Western EMRC in the phase four design area, the department has been active in the specific technical design needed to interface these EMS communications systems into MFiRST. These interfaces will allow MIEMSS to directly interoperate with MFiRST, supporting field providers operating on this system and allowing all field providers in the Western EMRC serving area to obtain medical direction via the EMRC. The agency was also involved in designing and planning the program's fifth phase, which is expected to be completed in 2018.

Communications Engineering Services continues to lead in the design, implementation, and maintenance of the Statewide Public Safety Microwave System, which supports all state agency and many county radio systems. The department has continued its partnership role with other state agencies by designing and implementing communication circuits in support of MIEMSS, the Maryland State Police (MSP), the Maryland Department of Natural Resources, Maryland State Highway Administration (SHA), county radio systems, and many other federal and state partners, including MFiRST. MIEMSS continues to play a leadership role in the day-to-day maintenance of the Public Safety Microwave System. MIEMSS' microwave assets made it possible to bring areas of central Maryland online sooner than originally anticipated.

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 supporting critical data and voice communications managed by MIEMSS. It is a network deployed to MSP barracks, MIEMSS regional operating centers, jurisdictional emergency operations centers and primary/backup PSAPs/9-1-1, state and

jurisdictional health departments, hospitals, and other allied agencies. Funding sources have included Public Safety Interoperable Communications grants, Urban Area Security Initiative grants, MIEMSS operating funds, the MFiRST program, the Maryland Department of Health and Mental Hygiene, and local interoperability project funds. Interoperability applications that currently operate on PSInet include MFiRST, DEMSTEL, Central Maryland Area Radio Communications, Maryland Eastern Shore Interoperability Network, Washington-Allegany-Garrett Interoperable Network, Coordinated Highways Action Response Team, Maryland Incident Management Interoperability Communications System, Maryland Law Enforcement Information Network, and systems monitoring/controlling the state's public safety microwave network and tower infrastructure. The department also implemented new services to address security enhancements on PSInet with the addition of Cisco secure servers, new geographically diverse Cisco Adaptive Security Appliance firewalls, PSInet domain name servers, and a Cisco configuration archive server.

MIEMSS has continued to expand its network monitoring and alarm monitoring system, which has enabled staff to be more efficient and to respond to system repairs more decisively. Work continues to integrate the MFiRST system alarms into the MIEMSS master alarm system, providing daily insight into maintenance and performance issues. This leverages the state's investment in the master alarm system and allows a global view of the MFiRST radio infrastructure and the MIEMSS microwave system to be shared among its partner agencies, allowing quicker diagnosis of system problems.

Many other notable system enhancements and projects were completed in FY 2016:

- Supported 9-1-1 centers through participation on the Emergency Number Systems Board
- Expanded MIEMSS' radio programming template to include all the remaining counties compatible with the Motorola APX radios
- Participated in the newly-formed Radio Control Board as a member agency, overseeing MFiRST
- Enhanced the backup center located in the basement of the R Adams Cowley Shock Trauma Center by separating MIEMSS Region III EMRC and Region V console positions
- Worked with MFiRST on a new design for the air-to-ground system for medical communications from the Maryland State Police medevac helicopters utilizing a 700 MHz multicast approach
- Assisted Talbot County with their PSAP renovation by relocating MIEMSS Region IV EMRC operations to the Cambridge Police Department during the building expansion

- Worked with Allegany County to ensure uninterrupted MIEMSS Region I EMRC operations during renovation of their primary and backup PSAPs
- Installed new microwave equipment at Hagerstown SHA tower in preparation for relocating into an adjacent shelter. This is a complex project due to the criticality of this location to the EMS system and MIEMSS' public safety partners.
- Developed and deployed new 11 GHz licensed microwave paths to improve the reliability of connectivity for the EMS system: 1) from the Towson tower to University of Maryland St. Joseph Medical Center and Greater Baltimore Medical Center hospitals and 2) between the Millersville Fire Department tower and University of Maryland Baltimore Washington Medical Center
- Added microwave capacity between the Ellicott City tower and the Timbers of Troy tower by using repurposed 6 GHz OC3 microwave equipment and sharing an existing antenna system, allowing deployment at minimum cost
- Relocated all critical communications equipment from a facility in Prince George's County to a new communication shelter, prior to the former structure being demolished. The communication shelter was a cooperative effort with Prince George's County and the Washington Suburban Sanitary Commission.
- Assisted Maryland State Police Golden Ring and Westminster barracks with transition to the MFiRST system by providing conventional communication circuits on MIEMSS infrastructure
- Began enhancements to PSInet on the Eastern Shore in preparation for the next-generation EMS system
- Continued to work with Queen Anne's, Talbot, and Caroline Counties as they transitioned to the MFiRST radio system, ensuring that their subscriber radios have the proper EMS talkgroups
- Acquired the Network Maryland Eastern Shore microwave system, allowing continued use of the system by MIEMSS and its public safety partners, eliminating the need to build a replacement system and saving taxpayers the cost of dismantling the current system. MIEMSS is currently adding these assets to its network monitoring system.

Despite the work force shortages and the complex renovation project in Baltimore City, the department was successful in completing many important projects while managing constantly changing priorities statewide. MIEMSS will continue to migrate systems to new, more



resilient technologies that enhance services provided to the EMS community. None of the successes seen this year would be possible without the dedicated staff in the department and MIEMSS' public safety partners.

COMPLIANCE OFFICE

Mission: To ensure the health, safety, and welfare of the public as it relates to the delivery of EMS by EMS providers throughout Maryland. To that end, the Compliance Office is responsible for ensuring quality of care by investigating complaints and allegations of prohibited conduct.

The Compliance Office works closely with the EMS Board, the Office of the Attorney General, the Incident Review Committee (IRC), and the Provider Review Panel (PRP). The PRP is a 13-member panel comprised of physicians representing the Maryland Board of Physicians, Maryland Medical Chirurgical Society, and EMS Operational Program Medical Directors; all levels of EMS providers are also represented. The PRP reviews complaints, as well as the results of the investigations conducted by the Compliance Office, and recommends to the EMS Board any further action. The State EMS Medical Director and MIEMSS' Executive Director serve as ex-officio members on the PRP.

Compliance Office Activity in FY 2016

- EMS Operational Program reverification applications reviewed3
- Criminal background investigations completed8,188
- Incidents reported to IRC201
- IRC investigations initiated195
- IRC investigations conducted.....186
- IRC investigations (FY 2015) continued.....15
- IRC complaints forwarded to PRP52
- Complaints dismissed by PRP.....2
- Complaints forwarded to EMS Board50
- Complaints requiring service.....8

EMS Board Action

• Reprimands.....	6
• Probation.....	19
• Suspensions.....	13
• Revocations.....	9
• Remedial training.....	3
• Surrenders.....	0
• Evaluations.....	3
• Applications denied.....	0
• Case resolution conferences.....	5
• Dismissed.....	2
• Counseling.....	2
• Rehab.....	21
• Random testing.....	215
• OAH hearings requested.....	5
• OAH hearings conducted.....	1
• OAH hearings defaulted.....	1
• Settlement agreements.....	4

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 providers through state-of-the-art technology.

Educational Support Services 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.

This 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 emailed to hospital, prehospital, and emergency services personnel, and printed copies are sent to volunteer fire stations throughout the state. The newsletter keeps EMS personnel in touch with local, state, and national EMS issues. Recent topics included updates on Maryland events such as the annual Maryland Stars of Life Awards, EMS Week, and protocol and medical news and information. MIEMSS continues to contribute to the *Maryland Fire Dispatch* and the Maryland State Firemen's Association's *Trumpet*, which also disseminate information to Maryland's emergency services community. MIEMSS engages the EMS community and the public through social media, including Facebook, Twitter, and YouTube.

Educational Support Services assists with conference planning and provides technical and audiovisual support to regional and MIEMSS-sponsored 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 prehospital and hospital providers. This department provides assistance and support with in-house web conferencing, video conferencing, and teleconferencing, which are done in collaboration with other MIEMSS entities, including EMS for Children.

In FY 2016 Educational Support Services completed the 2016 update to *The Maryland Medical Protocols for Emergency Medical Services Providers* (Protocols), including editing, layout, and design. This document can be found on the MIEMSS website. Both the popular spiral-bound and pocket versions of the Protocols were edited, designed, and printed by this department. Copies of the pocket version were distributed to EMS providers statewide.

During EMS Week in May 2016, the annual Presentation of Maryland EMS Awards was held in the Miller Senate Office Building in Annapolis. Both EMS for Children's Right Care When It Counts Awards and the Maryland Stars of Life Awards were presented, as were Governor's proclamations in recognition of EMS for Children Day and EMS Week. This year, Roy McGrath, Maryland Governor Larry Hogan's chief of staff, joined MIEMSS Executive Director Kevin Seaman, MD, FACEP, and EMS Board member Dany Westerband, MD, FACS, in presenting the awards. Press releases were distributed statewide and media coverage was obtained on the winners.

Media events, press releases, and social media were used during the year to reach target audiences on many EMS-related issues. Press releases regarding high-risk dangers to infants and young children, such as hyperthermia resulting from being left alone in a vehicle, helped get the word out to the public and reduce preventable incidents. Social media messages also had a tremendous reach to EMS providers and the public throughout the year. As of June 30, 2016, over 9,000 users had liked MIEMSS' Facebook page, and nearly 1,000 users were following its Twitter feed. Posts on Facebook during this period had a total reach of over 1.1 million, meaning at least that many Facebook users saw MIEMSS' posts through news feeds, subscriptions, likes by other people, or shares. MIEMSS posted social media messages on various topics of interest to EMS providers, including important messages specifically for Maryland providers, as well as illness and injury prevention messages intended for the public. Information about EMS conferences and EMS Week celebrations for providers,

behind-the-scenes looks at Educational Support Services projects (such as field video and photo services), safety reminders and tips, and much more were shared on social media throughout the year.

With the assistance of Educational Support Services, several tours of MIEMSS were conducted for local, national, and international visitors throughout the year. Visitors from Germany, China, England, Korea, and Ireland were among the international audiences that came to learn about Maryland's trauma and EMS system. Tours were also provided during the EMS Today Conference for national and international visitors to MIEMSS.

Educational Support Services provides media support, including photography, design, and fabrication, for MIEMSS exhibits that disseminate information about the EMS system and topics in injury and illness prevention. In FY 2016 exhibits that were created with the assistance of this department were on display at the Maryland State Firemen's Association (MSFA) annual convention, the annual Maryland Association of Counties convention, and various other EMS conferences and open houses.

In FY 2016 MIEMSS produced an updated version of an EMS training video, Meet the Protocols, to explain the changes and additions to the Protocols for 2016. The production was posted on MIEMSS' Online Training Center, which allows EMS providers to acquire continuing education through the MIEMSS website. The program was uploaded to YouTube this year to make it more convenient for providers to view the information. DVD versions were also produced for company drill distribution. Educational Support Services produced the video and graphics to augment both the online and DVD training.

Several other training modules were produced by Educational Support Services during the past year. Video projects completed this year included 1) an EMS Week "thank you" message to providers from Dr. Seaman, 2) documentation of multi-casualty disaster drills throughout the state, 3) car seat safety messages produced in collaboration with EMS for Children, 4) the Mid-Atlantic Life Safety Conference opening video, and 5) the annual memorial service program, video eulogies, and slide show for MSFA's convention.

Statewide prevention initiatives were developed through partnerships with other state and local government agencies. Educational Support Services worked collaboratively on multiple prevention projects with the Maryland Department of Transportation's Occupant Protection Emphasis Area Team, the Motorcycle Safety Task Force, the Bicycle/Pedestrian Emphasis Area Team, the Impaired Drivers Emphasis Area Team, the Maryland Partnership for a Safer Maryland, the

American Trauma Society, the Maryland Committee on Trauma, and the Center for Injury Prevention and Policy at the R Adams Cowley Shock Trauma Center.

EMERGENCY HEALTH SERVICES DEPARTMENT, UNIVERSITY OF MARYLAND, BALTIMORE COUNTY

Mission: To provide leadership in the field of emergency health services through excellence in education, supported by an active research agenda, service to the University and EMS communities, and provision of professional continuing education. The Emergency Health Services Department recognizes as constituents the University of Maryland, Baltimore County; MIEMSS; and the Maryland, national, and international EMS communities.

The department had another successful year of providing undergraduate and graduate education to emergency services providers. Interest in the undergraduate paramedic program remains strong with a mixture of local, national, and international students. The program continues to attract a large number of students from Saudi Arabia. The undergraduate management track continues to enroll both students new to EMS as well as transfer students from community college EMS clinical programs. At the graduate level, enrollment also remains strong with the continuing trend of attracting international students.

In FY 2015 the department was authorized to conduct a search for a senior faculty member. A search committee comprised of department faculty and staff, other UMBC faculty, former MIEMSS Executive Director Robert Bass, MD, FACEP, and program alumni conducted an international search, reviewed and vetted applications, and conducted candidate interviews. In FY 2016 the committee submitted its recommendation to the dean and Jennifer Lee Jenkins, MD, FACEP, an associate professor at the Johns Hopkins School of Medicine, was hired and tenured as an associate professor within the department. Dr. Jenkins is well-known to the department having received a master's degree from the program. She will assume chairmanship of the department in August 2016.

A new curriculum for the paramedic program, the result of accreditation and National Registry of Emergency Medical Technicians requirements as well as faculty input, was implemented in fall 2015. The curriculum includes the reinstatement of two semesters of chemistry as a preparatory requirement.

Given the increasing emphasis on community paramedicine, the department recognized the need to

address this area both in terms of paramedic preparation and program management. Clinical Assistant Professor Diane Flint is heading the department's work in this area.

The department continues to work with the Maryland Department of Health and Mental Hygiene in areas related to public health and emergency response. Professor Richard Bissell is the principal investigator on an ongoing grant project titled *Public Health Risk Assessment Tool*.

The department's professional and continuing education program continues to provide opportunities to local, regional, and national EMS providers. The program's signature course, Critical Care Emergency Medical Transport Program, continues to grow, and the revised Pediatric and Neonatal Critical Care Transport course is now being implemented.

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 providers 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) program is responsible for the development of statewide guidelines, regulations, and resources for pediatric care; quality review of pediatric emergency care and implementing pediatric facility regulations and designation; coordination of pediatric education programs; and collaboration with other agencies and organizations focused on childhood health and illness/injury prevention. The program coordinates the state Pediatric Emergency Medical Advisory Committee (PEMAC) and its subcommittees; the Maryland Pediatric Quality Improvement Committee (QIC) and the Pediatric Data Analysis and Research Team (DART); designated Pediatric Base Stations; pediatric trauma and burn programs; and the pediatric activities within the five Regional EMS Advisory Councils. Grants related to children and families in EMS are coordinated through the program, including a federal EMS for Children partnership grant, continuously funded since 1994; the Child Passenger Safety

and Occupant Protection Health Care grant project, continuously funded since 2001; and research activities related to EMS for children in Maryland. MIEMSS, and EMS for Children in particular, is the lead agency for the Safe Kids Maryland state coalition.

EMS for Children Program Activities

The state PEMAC meets on a bimonthly basis using web-based meeting technology for those unable to attend in person. The PEMAC website includes meeting handouts, state and federal resources for EMS for children, and relevant publications for committee members. PEMAC has three standing subcommittees: Pediatric Protocol Development, Pediatric Education, and Prevention and Life Safety. Maryland's EMS for Children program has a Family Advisory Network (FAN) Council that reviews the Right Care When It Counts award nominations and promotes the public messaging for this initiative. The FAN Council also plays a key role in the injury prevention activities at the annual Maryland State Firemen's Association (MSFA) convention and recruits youth from across Maryland to teach children and families (see RISK WATCH discussion below). PEMAC's working task forces meet on a regular basis to update documents and procedures for the Voluntary Ambulance Inspection Program (VAIP), interfacility transport and transfer, and pediatric facility recognition. Bimonthly forums are held in conjunction with PEMAC meetings with specific focuses: March and September are joint meetings with Safe Kids Maryland, May is family-centered care, July is protocols, and November is pediatric research. Through *The Maryland Medical Protocols for Emergency Medical Services Providers* (Protocols) review process, current state-of-the-art clinical approaches to managing childhood emergencies continue to be developed and implemented.

Associate State EMS Medical Directors for Pediatrics Allen Walker, MD, MBA, FAAP, and Jennifer F. Anders, MD, FAAP, serve on the MIEMSS EMS Protocol Review Committee to revise existing protocols, review new protocols, and recommend modifications founded on evidence-based practices and the 2015 American Heart Association's new guidelines. Cynthia Wright-Johnson, EMS for Children's director, serves as liaison, designated by the National Association of State EMS Officials' (NASEMSO) Pediatric Emergency Care Council, to the American Academy of Pediatrics (AAP) Committee on Pediatric Emergency Medicine and the Pediatric Education for Prehospital Professionals (PEPP) Steering Committee.

The MIEMSS Pediatric Quality Improvement Committee (QIC) continues to coordinate training for pediatric transport teams and for designated Pediatric Base Stations. Two Pediatric Base Stations, at Children's

National Health System and The Johns Hopkins Children's Center, provide statewide coverage for online and offline pediatric medical direction. Their primary focus is on prehospital communication and education with an ongoing commitment to consultation for community hospitals and designated Adult Trauma Center emergency departments across Maryland. Through ongoing QI activities, recommendations are made that directly impact protocol development, revision, and advancement, as well as targeted pediatric education at conferences and seminars. The Pediatric QIC and the DART have established a bimonthly meeting schedule and have three ongoing data projects: 1) a descriptive report of a 12-year experience with pediatric rapid sequence intubation (RSI) conducted by public safety aeromedical teams (Maryland State Police and US Park Police) in partnership with The Johns Hopkins Hospital and Children's National Health System; 2) review of pediatric trauma patient triage and transport decisions by EMS providers through retrospective electronic Maryland EMS Data System (eMEDS) review and annual review of pediatric trauma admissions at Adult Trauma Centers, and 3) development of EMS transport reports for medical and trauma pediatric patients. Dr. Anders, chair of Pediatric QIC and DART, conducted a survey of EMS providers to gain a better understanding of the decision-making process they use with injured children when applying the trauma triage decision tree in the Protocols. The results were presented at the Annual EMS Medical Directors Symposium, Trauma Coordinators QIC, and PEMAC.

EMS for Children Day was celebrated on May 18, 2016, at an annual awards ceremony that recognized children and youth in Maryland who had demonstrated one of the "10 Steps to Take in an Emergency" or one of the "10 Ways to Be Better Prepared for an Emergency." Five children in Maryland received awards for their actions that ensured another person would receive "The Right Care When It Counts." Also on May 18, Stevenson University Professor Laurel Moody received the Maryland EMS for Children Award in recognition of her leadership in revising the *Guidelines for Emergency Care in Maryland Schools* (2015, 2nd edition). Included in this revision process were MIEMSS Educational Support Services and EMS for Children, Maryland Department of Health and Mental Hygiene's (DHMH) Maternal Child Health Services, Maryland State Department of Education, Stevenson University, and nursing supervisors in school health.

Again this year, the EMS for Children/FAN panda bear mascot and his escorts reached out to children and families to encourage them to learn safety at home and in the community at the MSFA convention in Ocean City.



EMS for Children Grant Activities

Federal EMS for Children grants are coordinated through MIEMSS' EMS for Children program and involve statewide projects, targeted issues, projects, and research initiatives at academic universities. MIEMSS is in the 11th year of an 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. The 2014-2017 EMS for Children Partnership Grant focuses on the continued integration of EMS for Children into the Maryland EMS system using both the federal Maternal Child Health Core Performance Measures and the federal EMS for Children Performance Measures as targeted projects. The specific grant goals remain the same as the 2009-2013 Partnership Grant (see MIEMSS 2012-2013 Annual Report).

During FY 2016 the Maryland EMS for Children team continued to advocate for the adoption of the VAIP Seal of Excellence and served on the special SEMSAC committee on minimum equipment standards. The federal program has supported the American College of Surgeons' revision of equipment standards for all ground ambulances used for patient assessment and treatment. The EMS for Children program continued to provide leadership in the coordination of the 10 states and territories in the EMS for Children Atlantic Region. These coordinators meet annually in December to share resources as all states work on the federal EMS for Children Performance Measures and continue to promote pediatric educational programs within state and local conferences. In August 2015, 16 state EMS for Children grantees met in Philadelphia at a regional symposium focused on both clinical practice advances in pediatric emergency care and on EMS system enhancements for pediatrics.

Emergency Medical Services for Children continues to support the Maryland Emergency Nurses Association (ENA) Council and three local ENA chapters by providing meeting logistics for the Pediatric Committee

Pediatric Emergency Care Education Across Maryland

Month and Location	Conference Title	Pediatric Components
July 2015 Baltimore, MD	APLS: The Pediatric Emergency Medicine Resource Course	Physician hybrid course developed by AAP and ACEP – offered in Region III
July 2015 Baltimore, MD	Neonatal Resuscitation Program	Developed by the AAP and AHA with a focus on newborn stabilization; offered jointly with SOCALR
August 2015 Cumberland, MD	APLS: The Pediatric Emergency Medicine Resource Course	Physician hybrid course developed by AAP and ACEP – offered in Region I with Western Maryland Health System
September 2015 Ocean City, MD	PRMC Trauma Conference	Display: Medication Safety
September 2015 Laurel, MD	Mid-Atlantic Life Safety Conference	Display: Occupant Protection for Everyone, Every Ride
October 2015 Gaithersburg, MD	ENA Barbara Proctor Conference	Display: Medication Safety
October 2015 Baltimore, MD	APLS: The Pediatric Emergency Medicine Resource Course	Physician hybrid course developed by AAP and ACEP – offered in Region III
December 2015 Leonardtown, MD	APLS: The Pediatric Emergency Medicine Resource Course	Physician hybrid course developed by AAP and ACEP – offered in Region V with MedStar St. Mary's Hospital
January 2016 Tilghman Island, MD	Winterfest Conference	Preconference: Responding to Emergencies – Children with Special Health Care Needs Workshops: Transporting Children Safely in Ambulances – Tools, Techniques, and Training; What's New in the Care of Newly Born Infants Displays: High-Performance CPR; CPS and OP Health Care Project
February 2016 Hagerstown, MD	PEPP BLS/ALS Hybrid	Local program offering
February 2016 Bel Air, MD	APLS: The Pediatric Emergency Medicine Resource Course	Physician hybrid course developed by AAP and ACEP – offered in Region III with University of Maryland Upper Chesapeake Health
March 2016 College Park, MD	Public Fire and Life Safety Educator Seminar	Display: What to Expect When You Dial 9-1-1 Workshops focused on practical tips for fire and life safety programs
April 2016 Rocky Gap, MD	Miltnerberger Emergency Services Seminar	Preconference: Responding to Emergencies – Children with Special Health Care Needs Workshops: Ouch – It Hurts! Pediatric Pain Assessment and Management in the Field; Spinal Immobilization vs. Spinal Protection – What the Kids Need You to Know; Do You See What I See? Battered, Broken, and Burned
April 2016 Marriottsville, MD	MIEMSS Annual Medical Directors' Symposium	Pediatric Protocols: 2016 changes and work related to pediatric termination of resuscitation
May 2016 Ocean City, MD	EMS Care	Preconference: ALS/BLS Hybrid PEPP Course; Responding to Emergencies – Children with Special Health Care Needs Workshops: Spinal Immobilization vs. Spinal Protection – What the Kids Need You to Know; Does "One Crash Then in the Trash" Still Hold True?; More Than A-B-C and 1-2-3: Responding to School Emergencies; Peds-Ready ED and Emergency-Ready Families; Too Close to the Water's Edge: Pediatric Drowning Displays: Pediatric Protocol Changes; CPS and OP Health Care Project; Ambulance Safety
May 2016 Linthicum, MD	ENA by the Bay	Preconference: Emergency Nurse Pediatric Course – Instructor Course, supported in part by EMSC State Partnership Grant Display: CPS and OP Health Care Project; Pediatric Readiness – Is Your ED Ready for Children?
June 2016 Ocean City, MD	MSFA Convention	Workshops: Does "One Crash Then in the Trash" Still Hold True?; More Than A-B-C and 1-2-3: Responding to School Emergencies; Peds-Ready ED and Emergency-Ready Families Child and Family Interactive Stations: RISK WATCH and Safe Kids: Steps to Safety (Make the Right Call: 9-1-1 Access, Home Fire Safety, Senior Fall Prevention and Home Safety, Child Passenger Safety, and Teen Driver Awareness) Displays: Safe Kids "My High 5" Priorities; Building Prevention Resources at Your Home Station

of ENA and the Emergency Nurse Pediatric Course (ENPC) instructor updates. Also, a Maryland EMS for Children State Partnership Grant supported the ENPC instructor course held at the state ENA annual conference in May. MIEMSS hosted the annual ENA delegate preparation meeting in August prior to their national General Assembly. Lastly, the EMS for Children Director serves on the Institute for Quality Safety and Injury Prevention at the ENA national level, and chairs its Maryland committee.

Pediatric EMS and Hospital Education

During each of the EMS and emergency nursing educational seminars and conferences in Maryland in FY 2016, pediatric displays and/or pediatric topics, listed in the annual continuing education chart on page 12, were presented to highlight Pediatric DART projects and recent changes in the Protocols. Each conference also included a new workshop on children with special health care needs that was expanded to a full-day program with didactic and hands-on skills training and case-based presentations. This workshop was expanded from a 2004 EMS for Children grant product and now includes the use of audience response system feedback. This system will supply both provider level and regional information that will be used for future course development. PEPP-3 hybrid courses for both ALS and BLS providers were offered in Washington County and at the EMS Care 2016 conference.

Maryland EMS for Children continues to partner with the pediatric emergency medicine departments at The Johns Hopkins Children's Center, University of Maryland Hospital for Children, and Children's National Health System to offer the Advanced Pediatric Life Support (APLS) course to hospital physicians, nurse practitioners, and physician assistants. APLS is offered in Maryland in a hybrid format with pre-course work completed online and one-day, in-person training that includes three essential lectures, high fidelity cases and mock codes, and specific low-volume, high-risk case scenarios. In 2016 the faculty and education specialists expanded the course to include a high fidelity infant manikin that will further enhance simulation experiences for participants. The evaluations have been very positive and courses are scheduled for the 2016-2017 academic year.

Maryland EMS for Children continues to participate in NASEMSO projects that focus on safe transport of children in ambulances. The Ad Hoc Committee on Safe Transport of Children has met from October through June to bring together state EMS for Children managers, federal partners, restraint industry manufacturers, and engineers. Recommendations



from this committee will be shared with the ongoing MIEMSS Ambulance Safety Committee and the regional educational council teams. In fall 2015 EMS for Children staff launched a five-part online training course through MIEMSS' Online Training Center on best practices for safe transport of children in ambulances using currently available technology. This training will be updated as federal standards and national recommendations are generated by NASEMSO partners.

Child Passenger Safety and Occupant Protection Health Care Project

In 2015 a total of 520 Marylanders lost their lives due to motor vehicle crashes. This is a 17% increase since 2014 and exceeds the 8% increase seen nationally. Safety experts are reviewing the data, but they speculate that the main causes may be increases in speed limits and the growing number of drivers who are distracted by their cell phones. Recognizing that the problem of motor vehicle crash deaths and injuries is not going away, the Maryland Department of Transportation's Highway Safety Office continued its funding of Maryland EMS for Children's Child Passenger Safety and Occupant Protection Health Care Project for the 15th year.

The goals of the project are to disseminate up-to-date and culturally-relevant occupant protection (OP) and child passenger safety (CPS) information and best practices through training health care providers and creating and distributing educational materials. The project focuses on Maryland hospitals, EMS providers, pediatricians, health departments, and nurses, and it works closely with Maryland Kids in Safety Seats (KISS), Maryland Safe Kids Coalition, and others to meet the needs of all residents.

This year project staff distributed more than 13,000 pieces of CPS and OP educational material to approximately 855 agencies across the state. Seven interactive exhibits at EMS, emergency nurse, or occupational therapist conferences taught best practices in child



passenger safety, reaching more than 2,000 providers. For EMS providers, skills training sessions were held four times this year on how to properly use child restraint devices on ambulance stretchers and about occupant restraints for special needs children. Two hospitals hosted trainings for neonatal intensive care unit (NICU)/ newborn nursery staff on CPS and two other hospitals used EMS for Children's archived webinars for staff training. Project staff arranged to have a pediatrician/ CPS expert come to the University of Maryland Medical Center and give a grand rounds talk on CPS that was attended by 50 doctors, nurses, and other providers. The project coordinator participated in MIEMSS' NICU recertification site visits at four hospitals, using that opportunity to promote best practices in occupant protection. The coordinator also worked closely with three hospitals to enhance their CPS policies. Eleven car seats were given to hospitals or health departments to assist in their local CPS efforts and four car seats were lent to properly transport children with special needs.

To disseminate child passenger safety messages more widely, health care and EMS providers were recruited to become child passenger safety technicians (CPST). This year MIEMSS approved the provision of 20 continuing education credits to EMS providers who take the CPST course. Six scholarships for the course registration fee were awarded to health care providers. The project coordinator helped teach nine certification or renewal classes across the state, and also assisted at 19 safety seat check-up events across the state, educating families and mentoring technicians. Social and print media was used frequently to spread the Buckle Up Everyone, Every Ride campaign message throughout the Maryland EMS community as well as the Maryland Academy of Pediatrics' membership. The project director and coordinator also participated in a "community of practice on teen distracted/impaired driving" consortium that was hosted by the Maryland DHMH.

Injury Prevention and Life Safety

Maryland EMS for Children staff participates in national, state, and local Safe Kids coalitions, the Maryland division of the American Trauma Society (ATS), the ENA's injury prevention programs, Partnership for Safer Maryland, the Maryland Trauma Center Network (TraumaNet), the Maryland Occupant Protection Area Emphasis Team, and the Child Passenger Safety Board coordinated by Maryland KISS. This collaboration provides a consistent flow of information to the five MIEMSS Regional Advisory Councils and the state PEMAC on injury prevention resources and initiatives. The EMS for Children Director was appointed to the Maryland State Child Fatality Review Committee and provides liaison to these injury prevention partners. In September 2015 PEMAC and Safe Kids Maryland held a prevention forum with program updates from the Safe Kids Childhood Injury Prevention Convention in July, along with local coalition highlights. The March 2016 joint meeting included updates from the Maryland Poison Center (MPC) and Prince George's County Fire Department.

The Maryland RISK WATCH community is led by EMS for Children in collaboration with the Office of the State Fire Marshal and the MSFA Fire Prevention and Life Safety Committee, along with Safe Kids Maryland and its seven local coalitions. Other partners in RISK WATCH include the Cecil County Department of Emergency Services, Johns Hopkins Pediatric Emergency Department, Peninsula Regional Medical Center, the MPC, the Maryland Chapter of the ATS, and the Maryland Department of Natural Resources. During the 19 years of the RISK WATCH program in Maryland, communities have placed it into classrooms, before and after-school programs, summer camps, child and parent educational programs in hospitals, and injury prevention programs. Currently, there are 16 communities, which are listed on the MIEMSS and MSFA websites, working with RISK WATCH materials.

Emergency Medical Services for Children's RISK WATCH program at MSFA's convention in 2016 reached a wide age range of both children and youth during the four days of displays. An orientation was led for youth and adult volunteers on prevention/safety messages and mascot training. Three mascots (EMS for Children/FAN Panda, ATS TraumaRoo, and Cecil County's Sparky the Fire Dog) lead children to the interactive skills stations. The stations were strategically placed between the main MSFA meeting room and the educational classrooms to increase visibility and traffic. These fire and injury prevention interactive stations are designed to provide information to the entire family. Participants completed

the “Steps to Safety” and EMS/fire learning stations and were then asked to list their own “My High 5” prevention priorities for home safety. The “My High 5” message is a new 2016 program from Safe Kids Worldwide. Many youth and young adults volunteered this year, enabling mentors to rotate them through a number of different risk areas. While providing coaching to the young volunteers, adult experts were able to walk MSFA and its Ladies Auxiliary members through the steps to develop similar programs at the local stations.

As the lead organization of the Safe Kids Maryland coalition, EMS for Children holds spring and fall meetings. The state coalition website (www.safekidsmd.org) has been expanded to include a variety of online resources. Coalition meetings have incorporated conference call-in and GoToMeeting web-based platforms to enable more participation. Again in FY 2016, the Maryland Safe Kids coalition dedicated their website and various press releases to high-risk injuries. Many of the new Safe Kids Day materials were used during the four-day program at the MSFA convention. Medication safety infographics from 2015 and 2016 were featured along with home safety messaging for TV anchoring and for safely and securely storing laundry soap pods. Safe Kids Buckle Up programs are integrated into RISK WATCH training and are shared with hospital and EMS professionals through the CPS and OP health care project.

Both EMS for Children and Safe Kids Maryland continue to promote efforts to reach the public through social and print media on the subject of hyperthermia in kids left in cars. The “ACT” poster (Avoid heatstroke, Create reminders, Take action) was distributed to EMS and fire stations and to hospital emergency departments across Maryland. In spring 2016 monthly social media messages were shared on the first Wednesday of every month and a new digital temperature display to demonstrate heat exposure in vehicles was ordered with funding from MSFA’s Fire and Injury Prevention Committee.

EMRC/SYSCOM

Mission: The Maryland EMS Communications Center is a statewide coordination and operation center for Maryland’s EMS system, which functions 24 hours, 365 days a year. The Communications Center has two integrated components: Systems Communications (SYSCOM) and Emergency Medical Resource Center (EMRC).

SYSCOM receives requests and coordinates helicopter resources for medevac missions. The Maryland State Police Aviation Command (MSPAC) Operational Control Center is located within SYSCOM.

SYSCOM staff assists MSPAC Duty Officers with missions involving medevac, search and rescue, law enforcement, homeland security, and disaster assessment.

EMRC has a three-fold mission:

- 1. Providing communications linkages and facilitating medical consultations between prehospital EMS providers and emergency departments, Trauma Centers, and Specialty Referral Centers*
- 2. Maintaining and sharing situational awareness of the activities, capabilities, and capacities of the prehospital system and hospitals*
- 3. Providing initial alerting and coordination of resources and the distribution of patients during major medical incidents*

In FY 2016 the Emergency Medical Resource Center (EMRC) handled 234,489 telephone calls and 181,548 radio calls. Of these 416,037 calls, 150,978 were communications involving a patient or incidents with multiple patients, while 10,248 of these calls involved on-line medical direction.

In FY 2016 the Systems Communications Center (SYSCOM) handled 26,208 telephone calls and 1,638 radio calls. Of these 27,846 calls, the majority were related to requests for medevac helicopters.

As part of a cooperative agreement, EMRC/SYSCOM answered over 750 calls for the Maryland Department of Health and Mental Hygiene (DHMH) 24-hour duty officer. This service ended in May 2016 when DHMH transferred responsibility for after-hours calls to Springfield Hospital Center.

EMRC/SYSCOM continues to participate in the National Disaster Medical System. Utilizing the Facility Resource Emergency Database (FRED), EMRC/SYSCOM obtains hospital bed status information for significant events and routine quarterly exercises. The FRED system is also utilized by EMRC/SYSCOM in support of local emergencies and exercises conducted statewide.

EMRC/SYSCOM moved back to the newly-renovated communications center in May 2015. The engineering staff and the operators continue to fine-tune the equipment to improve EMRC/SYSCOM operation. Improvements to the building security system were installed providing a more secure environment for this critical component of the statewide EMS communications system. The new facilities provide more efficient and flexible operations, allowing staff to better manage the workload when activity levels are high. A more complete description of enhancements made is covered in the Communications Engineering Services report on page 5.

GOVERNMENT AFFAIRS

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 health care issues. MIEMSS works on proposed legislation that affects all the various components of the statewide EMS system, the emergency care system, and Maryland's health care system as a whole. MIEMSS partners with EMS providers, physicians, nurses, hospitals and other health care providers to ensure that EMS system issues are accounted for in legislation considered by the Maryland General Assembly.

EMS-related legislation that was passed during the 2016 session of the Maryland General Assembly included the following:

- Hospitals may now convert to a freestanding medical facility without obtaining a Certificate of Need if certain requirements are met. These requirements include that the conversion “will maintain adequate and appropriate delivery of emergency care within the statewide emergency medical services system as determined by the State Emergency Medical Services Board.” Since passage of the law, MIEMSS has developed regulations that identify the factors the EMS Board will consider in making such a determination, as well as a timeline for the process. The Maryland Health Care Commission (MHCC) is also promulgating regulations that identify their processes and requirements for hospitals seeking to convert to a freestanding facility. MIEMSS is working with the MHCC to coordinate the regulations so that the new law can be implemented seamlessly.
- Efforts to curb impaired driving were strengthened by the passage of the Drunk Driving Reduction Act of 2016. Also known as “Noah’s Law,” the bill was named for Montgomery County Police Officer Noah Leotta who was killed by a drunk driver. The law requires mandatory participation in the Ignition Interlock System Program for individuals convicted of driving under the influence of alcohol, or driving while impaired by alcohol, drugs, or a combination thereof.
- Criminal penalties were increased for adults who knowingly and willfully allow individuals under the age of 21 to possess or consume alcohol while at a residence where the adult resides. The new law established penalties of up to one year in prison and/or a fine of up to \$5,000 for a first offense.

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.

Primary and Comprehensive Stroke Centers

Maryland's statewide regional system approach to stroke care continues to evolve as new literature and data findings on current stroke care is published. The stroke system of care approach helps to ensure prompt and appropriate care of the acute stroke patient. This statewide regional approach to stroke care has led to the designation of 34 Primary Stroke Centers and 2 Comprehensive Stroke Centers in Maryland. (See page 39 for a complete list of Primary and Comprehensive Stroke Centers.) In FY 2016 two hospitals submitted applications for initial designation as Primary Stroke Centers and one hospital submitted an application for initial designation as a Comprehensive Stroke Center. All Stroke Centers are redesignated every five years to assure that each continues to meet regulations and performance standards for stroke care.

The Primary and Comprehensive Stroke Centers submit 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 established by the AHA and American Stroke Association (ASA). (See page 18 for a list of the core performance measures.) Data from the GWTG-Stroke registry also allows MIEMSS to benchmark Maryland's compliance rate with the established core measures for standard of care for the stroke patient to national compliance rates. Compliance with the core performance measures has been shown to improve patient outcomes. The AHA/ASA has set a minimal compliance rate of 80% for each of the 10 core performance measures. The annual state aggregate data for CY 2015 revealed Maryland had a compliance rate of 88% or greater for each of the core performance measures.

The Stroke Quality Improvement Committee (QIC) is comprised of representatives from each designated Stroke Center. In FY 2016 the QIC continued to focus on improving door to intravenous tissue plasminogen activator (IV t-PA) times utilizing the GWTG data. The Stroke Centers used this data to support changes to their

stroke alert protocols and improve their response times, and to share best practices and processes with each other. It has been well established that the sooner a patient is treated with the fibrinolytic t-PA, the better his or her outcome. The AHA/ASA Target: Stroke program has established a minimal compliance rate of 50% of stroke patients—those who are eligible to receive the clot busting drug t-PA—to have a time from hospital arrival to initiation of drug (door to t-PA) of 60 minutes or less. For CY 2015 Maryland’s mean door to t-PA time was 55.1 minutes, while the national mean was 60.6 minutes. The Stroke QIC also developed guidelines and criteria for the interfacility transport of stroke patients requiring endovascular therapy.

EMS Base Stations

Hospital Programs staff continued to collaborate with the MIEMSS’ Medical Director’s Office. In FY 2016 work began on updating the Base Station regulations (COMAR 30.03.06), with promulgation and implementation of the regulations to occur in FY 2017. In October 2015 MIEMSS held the third annual Base Station Coordinators Meeting. This all-day meeting covered all aspects of the responsibilities and requirements of the Base Station coordinator and provided updates to new protocols and regulations. In FY 2016, 13 hospitals applied for redesignation as a MIEMSS-approved Base Station by completing an application and a self-assessment survey, which are then reviewed by MIEMSS and followed by a site visit. The survey team was comprised of MIEMSS staff, a MIEMSS regional medical director, and a MIEMSS regional administrator.

Trauma System

Maryland citizens are served with a trauma system accessible statewide. The Maryland trauma system is regionalized and tiered, which ensures prompt and appropriate care of the trauma patient.

Under COMAR 30.08, MIEMSS is responsible for oversight of the Maryland trauma system. Five-year reverification of designated Trauma and Specialty Referral Centers was ongoing throughout FY 2016. The trauma system is built around the nine designated Adult Trauma Centers and five types of Specialty Referral Centers (pediatric trauma, adult and pediatric burn, neurotrauma, eye, and hand/upper extremity). This balance of designated Trauma Centers of all levels provides for appropriate resources necessary for the care of the injured across the state.

Maryland Trauma and Specialty Referral Centers by Region

Region I	Western Maryland Regional Medical Center - Adult Level III Trauma Center
Region II	Meritus Medical Center - Adult Level III Trauma Center
Region III	R Adams Cowley Shock Trauma Center (University of Maryland Medical Center) - Primary Adult Resource Center (PARC) and Neurotrauma Center The Johns Hopkins Hospital - Adult Level I Trauma Center, Pediatric Level I Trauma Center, Pediatric Burn Center, and Eye Trauma Center (Wilmer Eye Institute) Johns Hopkins Bayview Medical Center - Adult Level II Trauma Center and Adult Burn Center MedStar Union Memorial Hospital - Hand and Upper Extremity Trauma Center Sinai Hospital - Adult Level II Trauma Center
Region IV	Peninsula Regional Medical Center - Adult Level III Trauma Center
Region V	Prince George’s Hospital Center - Adult Level II Trauma Center Suburban Hospital–Johns Hopkins Medicine - Adult Level II Trauma Center

Memoranda of Understanding (MOU) are in place with out-of-state hospitals to facilitate trauma services for the injured patient requiring a higher level of care in outlying areas of the state.

Out-Of-State Hospitals with MOUs

Newark, Delaware	Christiana Care Health System - Adult Level I Trauma Center
Washington, DC	Children’s National Health System - Pediatric Level I Trauma Center and Pediatric Burn Center MedStar Washington Hospital Center - Adult Level I Trauma and Adult Burn Center

The Maryland State Trauma Registry (MTR) conversion to a web-based platform, including MTR legacy data dating back to CY 2005, was ongoing throughout FY 2016, allowing both MIEMSS and the Trauma Centers access to the data in the updated format. The Trauma and Specialty Referral Centers access trauma patient EMS care information for inclusion into

Stroke Core Measures (5-Year Comparison)

Core Measure	CY 2011	CY 2012	CY 2013	CY 2014	CY 2015
Percent of acute 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	86.5%	88.5%	86.9%	90.9%	91.4%
Percent of patients with ischemic stroke or TIA who receive antithrombotic therapy by the end of hospital day two	97.2%	97.6%	98.0%	98.5%	98.6%
Percent of patients with an ischemic stroke, or hemorrhagic stroke, who receive VTE prophylaxis the day of or the day after hospital admission	74.9%	90.2%	96.2%	98.1%	98.2%
Percent of patients with an ischemic stroke or TIA prescribed antithrombotic therapy at discharge	97.9%	98.4%	98.7%	98.9%	99.3%
Percent of patients with an ischemic stroke or TIA with atrial fibrillation/flutter discharged on anticoagulation therapy	96.0%	94.6%	95.6%	97.2%	96.1%
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	96.6%	97.7%	98.8%	97.7%	98.1%
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	90.8%	93.3%	96.0%	97.1%	97.9%
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	84.7%	85.9%	89.5%	87.6%	87.7%
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	89.5%	91.7%	93.6%	95.8%	96.9%
Percent of patients with stroke who were assessed for rehabilitation services	97.5%	98.0%	98.5%	98.7%	98.7%
<i>Source: Get With the Guidelines-Stroke Registry</i> IV t-PA = Intravenous Tissue Plasminogen Activator VTE = Venous Thromboembolism LDL = Low Density Lipoprotein (bad cholesterol) TIA = Transient Ischemic Attack					

the MTR via the electronic Maryland EMS Data System (eMEDS). International Classification of Diseases (ICD) 10 codes (medical reference sets) have been added to the MTR with the necessary mapping to better identify a patient's injury and subsequent treatment. The Eye Trauma Registry was upgraded to a web-based version with ICD 10 codes. The Burn Trauma Registry ACS (TRACS), American Burn Association, National Burn Repository is being upgraded (V6) with ICD 10 codes and burn outpatient data. Maryland is currently the only state to use the outpatient data module for capturing all care delivered by its burn centers.

The Maryland Burn Collaborative was convened for the Burn Centers to focus on burn data and submission, standard audit indicators, burn regulation revision, and to address similar issues such as performance improvement.

The Trauma Quality Improvement Committee (TQIC) is comprised of trauma program coordinators/manager/directors, trauma performance improvement staff, trauma registrars, and injury prevention and education staff. The TQIC uses a trauma quality improvement scorecard to review, monitor, and trend compliance with the quality metrics (see below).

TQIC Scorecard – FY 2016 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 48 hours of extubation
- The patient had an unplanned visit to the intensive care unit
- The patient had an unplanned visit to a critical care area
- The patient had an unplanned visit to the operating room
- Trauma surgeon notification to arrival time was within 30 minutes
- Trauma bypass hours per month

In 2015 all Maryland Adult and Pediatric Trauma Centers submitted data to the National Trauma Data Bank, which assists the centers in benchmarking against other centers around the country.

On April 6, 2016, the TQIC joined together for a statewide injury prevention initiative on distracted driving. Each Trauma Center in Maryland participated to get the word out about the perils of distracted driving. A brochure was developed and distributed to each Trauma Center for use in various initiatives. The day's events highlighted the need for drivers to be more aware of



what can happen when they drive distracted. The TQIC efforts were well received.

The Adult Trauma Center Standards Workgroup was convened to review and align the current COMAR 30.08.05 Trauma and Specialty Referral Center Standards with the American College of Surgeons' Committee on Trauma report, *Resources for Optimal Care of the Injured Patient*. The workgroup is continuing to work on the revisions for consensus with all Adult Trauma Centers.

Perinatal Referral Centers

MIEMSS has the statutory authority for the designation of Perinatal Referral Centers. In FY 2015 the Department of Health and Mental Hygiene (DHMH) Perinatal Clinical Advisory Committee convened to update the perinatal standards. MIEMSS' Perinatal Advisory Committee (PAC) approved and adopted the standards for use in the Perinatal Referral Center designation process. The standards have been promulgated as MIEMSS regulations, and MIEMSS has proceeded with the redesignation process using these standards. The redesignation of the Level IV Perinatal Referral Centers, The Johns Hopkins Hospital and the University of Maryland Medical Center, was completed in December 2015. The redesignation process of the Level III Perinatal Referral Centers began in February 2016. (See page 39 for a complete list of Perinatal Referral Centers.)

Hospitals participating in the Maryland perinatal system submit patient care data to DHMH 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.

New in FY 2015 and ongoing in FY 2016 was the development and implementation of the MIEMSS perinatal database. Perinatal Referral Centers now

have the ability to upload their annual perinatal report data directly into the database, which was designed to give hospitals and MIEMSS timely access to data for quality improvement. All centers have entered both their maternal and neonatal data for CYs 2010 through 2014. This data will provide perinatal information on the current status of care and health outcomes in Level III and Level IV Perinatal Referral Centers. The definitions of several of the maternal indicators were updated, resulting in the need to modify maternal data for CYs 2010, 2011, and 2012 to reflect the definition changes. Consequently, this emphasized the importance of validating both the maternal and the neonatal data to ensure its usefulness. This is a very tedious and time-consuming process and the Perinatal Referral Centers have been granted an extension to complete this procedure as needed, but it is expected to be completed by September 2016. The MIEMSS PAC will use this database to identify and focus on areas common to all centers that indicate a need for improvement, as well as to highlight and share best practices. Defined data elements/indicators will include variables related to maternal and infant health.

MIEMSS continues to work closely with DHMH in supporting all Perinatal Referral Centers that have the ability to participate in the Vermont Oxford Network. This system provides each Perinatal Referral Center the ability to benchmark their center's data to data from all centers in the network.

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 the community.



Public Access Automated External Defibrillator Program

The Maryland Public Access Automated External Defibrillator (AED) Program continues to grow throughout the state. The program permits facilities that do not provide health care, but meet certain requirements, including registration with MIEMSS, to have an AED onsite for use in the event of a sudden cardiac arrest (SCA) until EMS arrives. With the exception of public high schools, middle schools, and county- or municipality-owned or operated swimming pools, which are required to have AEDs, Maryland's program is 100% voluntary. Additionally, some counties have passed local ordinances requiring AEDs at public and semi-public pools. Montgomery County also requires AEDs at health clubs.

Beginning in FY 2016, MIEMSS stopped accepting paper applications and implemented program registration using an online Maryland AED registry. MIEMSS received and approved 615 applications in FY 2016. The registry provides automated notifications regarding battery and electrode expirations, program renewals, and AED recalls. The program also allows for the connection to an application called "AED Link" that, for a fee, allows an interested EMS Operational Program (EMSOP) to see all the AED locations within their jurisdiction that are registered with the program, without having to manually enter the AED site addresses into the 9-1-1 center database. The new AED registry, www.marylandaedregistry.com, can also be accessed from the MIEMSS website.

Currently, there are 5,784 actively registered locations with AEDs onsite, with thousands of individuals trained in cardiopulmonary resuscitation (CPR) and AED use.

The Maryland Public Access AED Program has had 180 (24.8%) successful AED uses out of 726 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, 414 were witnessed, and 129 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

In 2012 MIEMSS reorganized the former AED Task Force into the Cardiac Arrest Steering Committee and broadened the focus to address multiple components, including 9-1-1 dispatch, prehospital provider treatment, community response, and data collection and reporting. While some of the membership from the AED Task

Force is the same, there are many new members. The committee is chaired by MIEMSS Executive Director Kevin Seaman, MD, FACEP, who has been working diligently to model efforts that have been successful in Seattle, Washington, through the National Resuscitation Academy. Howard County Department of Fire and Rescue Services worked with MIEMSS to establish the Maryland Resuscitation Academy, which holds two training sessions annually. Using a multi-focused approach to address out-of-hospital cardiac arrest, the Cardiac Arrest Steering Committee has established three subcommittees: Emergency Medical Dispatch (EMD), EMS, and Public. The EMD subcommittee is focusing on providing early dispatch of EMS to cardiac arrest calls and providing dispatch-assisted CPR instructions to the caller until EMS arrives. The EMS subcommittee is promoting high-performance CPR to all EMSOPs in Maryland. The Public subcommittee educates and encourages the public to learn CPR and how to use an AED. Communities that have incorporated all of these elements have improved rates of survival from SCA. Many of the initiatives of the Cardiac Arrest Steering Committee are consistent with recommendations from a report published in 2015, *Strategies to Improve Cardiac Arrest: A Time to Act*, by the Institute of Medicine, now the Health and Medicine Division of the National Academies of Sciences, Engineering, and Medicine.

Maryland STEMI System

Several years since the designation of Maryland's 23 Cardiac Interventional Centers and 4 out-of-state centers, the statewide system continues to evolve. (See page 39 for a complete list of Cardiac Interventional Centers.) All Cardiac Interventional Centers had site surveys and were redesignated by MIEMSS in 2014.

Designation as a Cardiac Interventional Center indicates that a hospital complies with state standards to receive patients (transported by EMS) who are experiencing the most common type of heart attack called an ST-elevation myocardial infarction, or STEMI. For these patients, primary percutaneous coronary intervention (pPCI) (also known as balloon angioplasty) is recognized by the American College of Cardiology and the AHA as the treatment of choice and is generally associated with fewer complications and better outcomes than other forms of treatment. It has also been well-established that the sooner a patient is treated to relieve the blockage causing the STEMI, the better the heart muscle will recover. Reducing the time from the onset of symptoms to treatment requires that there be a high degree of coordination and integration of care between EMS providers in the field and medical staff in the hospital.

EMS providers who have identified a STEMI patient may transport that patient to the closest designated Cardiac Interventional Center, bypassing non-designated hospitals in accordance with *The Maryland Medical Protocols for Emergency Medical Services Providers* (Protocols). In instances, however, when a Cardiac Interventional Center is not within an additional 45-minute drive time, patients may be transported to the closest emergency department for rapid assessment and treatment, and then transferred to a Cardiac Interventional Center. In these instances, consideration of thrombolytic administration may also be appropriate.

All Cardiac Interventional Centers submit data quarterly to the American College of Cardiology Foundation's ACTION Registry-GWTG, part of their National Cardiovascular Data Registry. MIEMSS is able to measure care for STEMI patients in Maryland as compared to national data by obtaining the Mission Lifeline regional reports that are created by Duke Clinical Research Institute from the data entered into ACTION Registry-GWTG. The goal for first medical contact (FMC) to intervention in the cardiac catheterization lab, referred to as FMC to device time, is 90 minutes or less. In the most recent *Mission Lifeline System Report for Maryland*, the median FMC to device time for Maryland's Cardiac Interventional Centers was 79 minutes for STEMI patients transported by EMS, just slightly below the national median FMC to device time of 80 minutes. The median value includes all hospitals in the nation that submit data to ACTION Registry-GWTG and participate in Mission Lifeline.

Regional STEMI committees were formed to address the treatment of STEMI patients in Maryland. Regional committees were originally charged to address three objectives:

1. Assess the current status of STEMI care in the region, including availability of resources within and adjacent to the region.
2. Develop a regional-based plan for optimizing outcomes of STEMI patients consistent with the Protocols and COMAR Title 30.
3. Continue to meet as necessary to monitor data and the implementation of the plan.

Based on the data reported in one Maryland region, the original plan for treatment and transport of STEMI patients was modified to provide better care. The process is an excellent example of an evidence-based approach to planning and collaboration among prehospital and hospital providers to achieve the optimal plan of care for STEMI patients. The regional STEMI plans are available under the Hospitals tab on the MIEMSS website.

INFORMATION TECHNOLOGY, DATA MANAGEMENT, AND SECURITY INFORMATION

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.

The Information Technology, Data Management, and Security Information Departments worked on several areas of growth in FY 2016 to improve services and resources for the EMS community and for MIEMSS, and to make those services more reliable and secure.

electronic Maryland EMS Data System Elite Project

The electronic Maryland EMS Data System (eMEDS) uses commercial-off-the-shelf software provided and hosted by ImageTrend, Inc. (ImageTrend), the industry leader for emergency patient care reporting. The acquisition of eMEDS in May of 2010 was made possible by a Maryland Department of Transportation's Highway Safety Office grant and agency funds. The eMEDS system software is licensed for statewide use, permitting EMS services to use it at no cost and no additional burden on local funding. All 24 of Maryland's jurisdiction-based and most commercial EMS Operational Programs (EMSOP) submit patient care reports (PCRs) directly into eMEDS. Maryland now has one of the few truly comprehensive prehospital patient care reporting systems in the nation.

MIEMSS implemented eMEDS for data needs for several reasons: (1) to improve data collection and reporting on prehospital medical care provided by emergency medical personnel, (2) to become compliant with reporting to the National EMS Information System (NEMSIS), (3) to support research and improvements to medical care by analysis of statewide data that is collected in a common system, and (4) to support quality improvement of emergency medical care by EMSOPs by allowing medical directors and local leadership to analyze EMS response data.

All Maryland hospitals are using the eMEDS hospital dashboard to access prehospital patient care reports. Implementation of a new hospital hub dashboard program began in 2016. This will provide an improved user interface and additional functions, and will allow hospitals more control of their data while still maintaining the original dashboard features. MIEMSS develops and maintains platforms that populate prehospital data into the Maryland State Trauma Registry. MIEMSS is pursuing additional initiatives that will facilitate hospital

outcome information coming back to EMSOPs through eMEDS.

In 2015 MIEMSS began an 18-month project to upgrade eMEDS to ImageTrend's Elite platform, a modern new software system that will make eMEDS compliant with NEMSIS v3, pave the way toward HL7 compatibility, allow functionality on electronic tablets, and add many new and enhanced features requested by EMS services. The Elite platform will improve performance for data collection, reporting, and analysis, and will maintain compliance with national data standards from NEMSIS, the National Association of State EMS Officials' EMS Compass Initiative, and the Cardiac Arrest Registry to Enhance Survival (CARES).

Cares Program

The CARES program was originally piloted by the Howard County Department of Fire and Rescue Services and Howard County General Hospital in FY 2015. CARES is an out-of-hospital cardiac arrest (OHCA) registry developed in 2004 by collaboration between the Centers for Disease Control and Prevention (CDC) and Emory University School of Medicine's Department of Emergency Medicine. The goal of CARES is to help communities increase OHCA survival rates.

In FY 2016 MIEMSS deployed the CARES program, which is to be used statewide in all Maryland EMS systems and hospitals. CARES has been integrated with eMEDS, enabling Maryland EMS services and hospitals to participate in the program based on data collected and reported through this system. MIEMSS has designated a program coordinator to work with hospitals, train users in CARES program, monitor compliance, and assist hospitals and EMS services with data quality assurance.

National Study Center Collaboration

The Information Technology (IT) and Data Management departments continued to advance the agency's ability to analyze and report on collected data by continuing its collaboration with the National Study Center for Trauma and Emergency Medical Systems (NSC). The NSC has assisted MIEMSS in designing and developing EMS system performance measures and reports, GIS maps for evaluating transport times, EMS vehicle crash data, reports for producing evidence-based guidelines for EMS care, and other important analytical projects.

In FY 2016 the NSC continued work with MIEMSS to use eMEDS data to develop baseline performance reports for EMS services, focusing on call run times and other metrics of service performance, and securely distribute these reports to jurisdictions.

MIEMSS, with the assistance of the NSC, is in the initial phases of working with EMS Compass, an initiative to establish a process for developing standardized EMS performance measures that will lead to improved performance in both clinical and non-clinical areas. In working with EMS Compass, MIEMSS aims to design EMS performance measures to build consensus and ensure that the measures are appropriate and usable and will lead to better EMS systems and patient outcomes.

New Provider Registry

The IT Department worked with MIEMSS' Licensure and Certification and ImageTrend to implement a new provider registry to replace the aging Maryland Prehospital Provider Registry (MPPR) system. The new system will use ImageTrend's License Management software, a hosted web-based product. The new software will automate many processes through online forms and email notifications, and also offer many self-service functions.

Ongoing Missions

The IT Department continued to support several existing programs in FY 2016, as described below.

electronic Maryland Ambulance Information System

The electronic Maryland Ambulance Information System (eMAIS) is no longer used to collect patient care reports as of FY 2014. However, the system is archived in a "report only" mode. eMAIS reports will continue to be available from MIEMSS by request as needed to provide legal reports and historical data for analysis.

Maryland Ambulance Information System

In FY 2016 the IT Department completed archiving Maryland Ambulance Information System (MAIS) and Commercial Maryland Ambulance Information System (CMAIS) paper patient care report forms submitted by jurisdictions. These databases were migrated to modern, more resilient storage devices with updated user interfaces for data retrieval.

eMEDS - electronic Maryland EMS Data System

MIEMSS continues to monitor and improve eMEDS while supporting its users. In FY 2016 MIEMSS completed major portions of the work required to upgrade eMEDS to the ImageTrend Elite platform. The EMS applications coordinator continues to improve processes by assisting jurisdictions and hospitals with reports, forms, quality assurance activities, training, and measures to improve data quality. The IT Department provides prompt support to EMS users statewide to solve problems with user credentials and system use.



MEMRAD

The IT Department continues to support MIEMSS' emergency operations through the use and deployment of the Maryland Emergency Medical Resource and Alerting Database (MEMRAD), which operates on the HC-Standard software system provided by Global Emergency Resources. The software and data are hosted by MIEMSS. In FY 2015 the MEMRAD system was expanded to include separate training and test databases and servers. MIEMSS is currently testing and training users on a new version of MEMRAD in preparation for a major system upgrade in FY 2017. The IT Department supports the following applications, via the MEMRAD system, that are critical in EMS operations and for disaster response.

- ***County Hospital Alert Tracking System (CHATS)***
CHATS is a public web-based application that shows EMS services and health care providers the status of hospitals throughout Maryland and in surrounding jurisdictions. It is used daily to support life-critical decisions about the delivery of patients to hospitals by monitoring and displaying hospital capacity and status.
- ***Facility Resource Emergency Database (FRED)***
FRED, an application in use since 2004, alerts all health care partners of an incident and allows them to indicate what resources they have to lend to the response. The number of users has nearly doubled with the addition of long-term care facilities.
- ***Patient Tracking System (PTS)***
PTS is important electronic tool for Maryland's disaster preparedness that allows instant, on-site data collection in a disaster situation. Data on numerous patients can be tracked and instantly updated so that emergency operations, hospitals, and other agencies are aware of the status and locations of patients and various medical resources at all times.

Trauma Registries

The IT Department continues to host and support Maryland trauma and specialty registries. These important databases collect detailed information on the condition, treatment, and outcomes of trauma patients. The data supports a wide variety of medical and emergency services research on the state and national level. There are three registries currently included under the Maryland registry reporting process: (1) The Maryland State Trauma Registry, used by 16 designated facilities, including nine Adult Trauma Centers and two Pediatric Trauma Centers (including one out of state); (2) the Maryland Eye Registry used by the Wilmer Eye Institute at The Johns Hopkins Hospital, and (3) the Burn Trauma Registry ACS (TRACS), American Burn Association, National Burn Repository, which represents records from the designated Adult Burn Center and will eventually include data from the two designated Pediatric Burn Centers. MIEMSS will soon be adding a hand trauma registry to track and record traumatic hand injury patients. Data from the registries are forwarded to MIEMSS monthly, quarterly, and annually for reporting purposes. The IT Department continues to support the integration of prehospital treatment data from eMEDS to these registries.

Flight Vector

MIEMSS hosts, supports, and maintains Flight Vector, the Maryland State Police Aviation Command's (MSPAC) aviation computer aided dispatch (CAD) system. This application, launched in 2012, is used by MIEMSS and MSPAC to streamline the process of selecting, assigning, and tracking aircraft to respond to medevac requests in and around Maryland. Prior to obtaining Flight Vector, both agencies had to coordinate information across multiple systems in order to dispatch and track MSPAC and allied agency aircraft. Along with accelerating the request and dispatch process, the system improves MSPAC flight safety by providing real-time, automated tracking of MSPAC aircraft. The system also permits MIEMSS to automate a previously paper-based

system used to track Emergency Medical Resource Center (EMRC) consults. The system includes a disaster recovery instance located at a Maryland State Police data center that is geographically separate from MIEMSS locations.

Help Desk and User Support

A major ongoing mission for the IT Department is support of end users, both agency staff and EMS providers statewide, in the use of their PC equipment and applications. MIEMSS' dedicated and skilled user support staff helps agency personnel navigate technology by creating, supporting, maintaining, and improving IT infrastructure and protecting data and systems through improved IT security, and by providing quick resolutions to PC and application software issues.

EMRC/SYSCOM Support

The IT Department continues to provide technical support to EMRC/SYSCOM in coordination with MIEMSS' Communications Engineering Services, including 24/7 computer support for EMRC and MSPAC functions in SYSCOM.

Project Management

The IT Department provides project management services throughout the agency. In FY 2016 additional personnel were assigned and trained for project management roles, and an expert in the field was consulted. Recent efforts included upgrading email services, data center facilities, and security services. Projects continuing into FY 2017 include upgrading eMEDS to the new Elite platform, implementing a new licensure system to replace the MPPR, implementing a new licensing system for the State Office of Commercial Ambulance Licensing and Regulation, further improvements to MIEMSS' IT security, full implementation of new backup and network monitoring systems, planning and development of off-site backup capability, and planning for an enterprise document management and data management program.

Number of EMDs and EMRs (Includes Current, Extended, Jeopardy, Military Status, and Inactive)

Level	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	As of 7/7/2016
EMD	1,088	1,182	1,113	1,163	1,189	1,230
EMR	3,436	3,478	2,821	2,258	2,256	2,270

Number of EMTs, CRTs and Paramedics (Includes Current, Extended, Jeopardy, Military Status, and Inactive)

EMT	18,295	18,982	18,847	19,377	19,282	19,604
CRT	849	824	781	746	757	759
Paramedic	2,924	3,055	3,207	3,424	3,605	3,562
TOTAL	22,068	22,861	22,835	23,547	23,644	23,925

Initiatives for FY 2017

Security Improvements

The IT Department previously completed a Cyber Security Resilience Review by the US Department of Homeland Security and an assessment of MIEMSS practices in light of the Maryland Information Security Policy. These reviews provided a baseline for the agency's information security status relative to the maturity model presented in those documents and highlighted a number of areas for improvement. The overall conclusion was that MIEMSS' network and its data are secure, but that the systems and processes providing that security need to be documented and clarified in policy and procedure, and that modernization and improvements to security systems are needed. To that end, in FY 2015 MIEMSS hired its first dedicated information security officer (ISO) responsible for overall development, implementation, and maintenance of the agency's IT security program, including all media, such as hard copy, electronic data transmission, electronic databases, information systems, and communications systems.

MIEMSS made a significant improvement to its perimeter security by investing in and implementing new unified threat management technology. This provides enhanced web and email filtering, email encryption capabilities, data loss prevention, and increased visibility through centralized logging. In FY 2017 MIEMSS' ISO will continue leading a program of upgrading and expanding security policies and practices at the agency, and expand upon and evaluate emerging security technology solutions to meet the agency's security objectives. The ISO will assist the IT Department with procurement and implementation of vendor security evaluation and testing, training, computer systems, and programs to improve IT systems and data security. MIEMSS will implement additional structured IT security training for all end-users, full disk encryption for data at rest, multi-factor authentication as required, data classification, IT system certification and accreditation, and will continue to address new or ongoing security concerns.

Continue to Develop eMEDS

The IT Department plans to continue work with EMSOP system managers to improve eMEDS and make sure it supports local operational and state data analysis needs. MIEMSS is exploring integration of eMEDS patient care reports into Chesapeake Regional Information System for our Patients (CRISP), the statewide health information exchange. The IT Department continues to operate and support a robust change management process to safeguard eMEDS, and contributes to the work of a quarterly statewide eMEDS steering committee consisting of jurisdictional and hospital leaders throughout Maryland.

Improve Computer Resources, Network Reliability, and Disaster Preparedness

In FY 2017 the IT Department will continue implementation of computer hardware and software to upgrade VMware and network operations, finish migration of all equipment and services to a new data center, and implement off-site backup capabilities for critical applications and services. This will include a new network monitoring system, off-site data storage and system restore capability, and additional VMware tools for backing up, restoring, and upgrading computer systems. Upgrading all legacy end-user computing systems will continue to take place in phases.

Strengthen Data Analysis

Recognizing the importance of accurate, timely, and accessible prehospital patient care data in EMS systems, data analysis capability will be expanded in FY 2017 by emphasizing statistical reporting, quality improvement and assurance, and practical applications of EMS and hospital data. MIEMSS will continue to work with the NSC on this effort. New tools in eMEDS will be available for data analysis and quality assurance. These will be used both in-house and disseminated to EMSOPs and providers to improve the quality of EMS care statewide.

LICENSURE AND CERTIFICATION

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.

Licensure and Certification continues to monitor the implementation of the *EMS Agenda for the Future: A Systems Approach* by evaluating the standards defined in the National Highway Traffic Safety Administration's National EMS Education Standards publication, as they apply to current providers and students attending EMS education programs. Licensure and Certification continues to offer courses through the MIEMSS Online Training Center and is developing a new licensure system.

Licensure and Certification had a steady workload in FY 2016 issuing 2,199 initial prehospital provider certifications and licenses and renewing 5,337 certifications and licenses. The vast majority of entrants into Maryland EMS are through an emergency medical technician (EMT) initial provider course. Licensure and Certification tested 1,230 EMT students from 89 courses in FY 2016.

In FY 2016 the total number of Maryland EMS providers increased. The number of emergency medical dispatchers (EMD) remained steady. The number of

emergency medical responders (EMR) also remained steady, primarily due to the issuance of EMR cards to qualifying EMT students successfully completing courses during FY 2015 (see discussion in “NREMT Cognitive Examination for Initial BLS Certification,” below). The number of EMTs increased, although there were challenges resulting from the move to National Registry of Emergency Medical Technicians (NREMT) cognitive testing for basic life support (BLS) certification. The number of cardiac rescue technicians (CRT) held steady this year as providers approach the end of their transition period with the NREMT, which will no longer certify providers at the Intermediate/99 level after the transition period. Maryland, however, will continue to license CRTs. The number of paramedics increased to an all-time high as many providers transitioned to paramedic during the NREMT transition period. The breakdown of Maryland providers for the last five fiscal years is shown on page 24. Licensure and Certification worked with other MIEMSS departments to supply provider data and trends (eg, prehospital care provider by recruitment and retention and NREMT pass rates) to various statewide committees for analytical purposes.

There were 47 EMS Board–approved educational programs in Maryland offering initial and continuing education courses in FY 2016. Additionally, several law enforcement programs have switched from instructing EMR courses to offering the Law Enforcement Emergency Medical Care Course (LEEMCC) for required medical training. There were 23 LEEMCC programs registered with Licensure and Certification. Although LEEMCC does not lead to state EMS certification, Licensure and Certification works closely with the Maryland Police and Correctional Training Commissions on the medical content provided in the course.

NREMT Cognitive Examination for Initial BLS Certification

During FY 2016 Licensure and Certification worked closely with the many stakeholders of initial EMT provider level state certification on the use of the NREMT for cognitive testing. Stakeholder representatives took part in an NREMT subcommittee of the EMS Board to address challenges faced by students in process (SIP) enrolled in courses completed between October 1, 2014, and September 30, 2015, the first year requiring the use of NREMT cognitive testing. Licensure and Certification implemented several recommendations originating from the subcommittee’s work.

The Statewide EMS Advisory Council’s subcommittee on best practices continued to develop methods to assist EMS education programs with the transition to NREMT cognitive testing. A meeting of EMS education program directors and staff was called to disseminate the findings of this subcommittee and to review the *EMS Education Program Annual Report* and the requirement of recording NREMT pass rates for all program levels, which are reported to the EMS Board by each EMS education program. Initiatives implemented by many of the EMS education programs have helped raise the NREMT pass rate average for Maryland EMTs up to the national NREMT average.

Information on NREMT testing was posted on MIEMSS’ website to assist students with the NREMT application process and provide other NREMT testing–related resources. Working closely with the Howard County Department of Fire and Rescue Services, the Maryland Fire and Rescue Institute (MFRI), the Cecil County Department of Emergency Services, and the Montgomery County Department of Fire and Rescue, 13 NREMT test preparation programs were offered to SIPs in a guided-study format to assist in preparing for the NREMT cognitive examination.

The extended timeframe from course completion to EMT certification for SIPs impacted the availability of EMS providers to deliver care. In an effort to increase the number of available EMS providers, 654 SIPs who successfully completed an initial EMT course between October 1, 2014, and September 30, 2015, and successfully completed the state certification practical examination, were issued an EMR certification. Additionally, surveys were forwarded to SIPs to determine their interest in pursuing Maryland EMT certification. The results of the survey were tabulated and distributed to the jurisdictions interested in the results of their affiliated students.



EMS Agenda for the Future: A Systems Approach and Current Provider Transition

The *National EMS Education Standards* were implemented for all initial courses on July 1, 2012, and influenced the revision of continuing education and renewal courses. Licensure and Certification adopted the NREMT timeline, which allows multiple licensure and recertification cycles for completion, for transitioning to the national EMS education standards. All current Maryland BLS providers already transitioned by completing refreshers prior to July 1, 2015. However, they continue to meet the objectives of the national EMS education standards by participating in Maryland continuing education and certification renewal courses.

At the advanced life support (ALS) level, the core refresher syllabus was also designed to meet the requirements for transitioning. As ALS providers renewed their NREMT certifications by attending a Maryland-approved full paramedic refresher program, they automatically met the transition requirements. All paramedic level providers have now completed their NREMT transition. CRT level providers have until the 2018-2019 recertification cycle to transition to paramedic with the NREMT, or maintain a Maryland-only CRT license. Further details on the transition timeline are available on the MIEMSS website.

MIEMSS Online Training Center

The Online Training Center, MIEMSS' distance learning management system, reached 43,266 registered users in FY 2016, which includes not only all levels of prehospital care providers, but also other professionals such as nurses, physicians, and administrators who must access the center for required training.

In FY 2016 the Online Training Center hosted 22 active courses. Three new courses were made available this fiscal year: 2016 ALS protocol update, 2016 BLS protocol update, and 2016 Base Station protocol update. Projected course topics for the next fiscal year include the 2017 Protocol Updates, EMD cardiac arrest training, emerging infectious diseases, stroke training, and others as necessary. Licensure and Certification continues to review upgrades to the Online Training Center to keep the system in line with the ever-changing educational technologies available to providers.

Maryland Provider Registry for Licensure and Certification

Licensure and Certification worked closely with MIEMSS' Information Technology Department and EMS Board-approved education programs on the implementation of a new provider registry. ImageTrend, Inc.'s License Management is web-based software that allows providers, students, and EMS education programs increased access to the licensure/certification process. Since ImageTrend also provides eMEDS, the state's electronic patient care reporting system, there will be better integration between the two systems to afford more seamless affiliation updates and current provider certification/licensure status. Additionally in FY 2016, the State Office of Commercial Ambulance Licensing and Regulation (SOCALR) began the process of adopting the Inspections tab within the licensure product. With the convergence of eMEDS and SOCALR, Licensure and Certification will be the system of record for not only provider certification, but also agency affiliation. Licensure and Certification will fully implement the licensure product in FY 2017, retiring the legacy database system.

MARYLAND CRITICAL INCIDENT STRESS MANAGEMENT PROGRAM

Mission: To offer crisis support services to EMS providers, 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 and 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 FY 2016 MIEMSS continued to focus on promoting and enhancing CISM capabilities through collaboration between state and local CISM teams and by sponsoring CISM courses. In January 2016 MIEMSS hosted a symposium that brought together representatives from CISM and crisis response teams from across the state. This was the fourth coordinators' symposium held since 2013; these meetings will continue to be held with a focus on enhancing CISM in Maryland, sharing resources, and building collaboration among the many teams in the state. Efforts made to increase collaboration among teams has proven beneficial, enabling effective resource sharing and mutual aid to support responders following incidents such as the line-of-duty deaths of two sheriff's deputies in Harford County in February 2016 and the shooting of two fire/EMS providers in Prince George's County in April 2016.

MIEMSS has also continued efforts to sponsor CISM training. In November 2015, 25 law enforcement officers from Maryland and National Capital Region (NCR) agencies attended a week-long Peer Support for Public Safety course held in Prince George's County. A second session of this course was held in Montgomery County in May 2016. These courses were held in partnership with the Prince George's and Montgomery County police departments and were funded by the NCR Maryland Emergency Response System program. In May 2016 MIEMSS sponsored a two-day peer support course at the EMS Care conference in Ocean City. Also in May, MIEMSS offered a three-day initial CISM course held in Charles County, a cooperative effort among MIEMSS, Calvert County, Charles County, and St. Mary's County. In June 2016 MIEMSS partnered with Howard County Department of Fire and Rescue Services to hold two courses: Building Skills for Crisis Response Teams and Suicide Awareness. The training sessions offered at EMS Care and in Charles and Howard Counties were funded in part through the Maryland Department of Health and Mental Hygiene

with funds from the Hospital Preparedness Program provided by the Assistant Secretary for Preparedness and Response, US Department of Health and Human Services.

In the coming year, the focus of MIEMSS' CISM program will be enhancing CISM/peer support capabilities in Maryland through training and collaborative efforts with state and local teams.

MARYLAND ORDERS FOR LIFE-SUSTAINING TREATMENT

The Do Not Resuscitate (DNR) program has transitioned to Maryland Orders for Life-Sustaining Treatment (MOLST), which incorporated and replaced the EMS/DNR form.

The MOLST form may be downloaded by the public for use, and MIEMSS continues to provide 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 providers regarding implementation of MOLST.

MEDICAL DIRECTOR'S OFFICE

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

The 21st Annual EMS Medical Directors' Symposium was held at the James N. Robey Public Safety Training Center in Marriottsville on April 13, 2016. It was attended by the regional, jurisdictional, and commercial ambulance service medical directors, Base Station physicians and coordinators, the highest jurisdictional officials, quality assurance officers, and MIEMSS personnel. This year's keynote speaker was Asha Reynolds, Esq., Sexual Assault Legal Institute (SALI), Maryland Coalition Against Sexual Assault (MCASA). In her presentation entitled "Child Sexual Abuse, Human Trafficking, and the Law," Ms. Reynolds discussed what her agency does, the Maryland Code on human trafficking under the Criminal Law section, the definition of sexual abuse of a minor and sexual assault, minors' and victims' rights, the Sexual Assault Forensic Examination (SAFE), and the many civil and legal needs



for sexual abuse survivors. Other symposium presentations included

- “State of the State,” presented by MIEMSS Executive Director Kevin Seaman, MD, FACEP
- “Mission Lifeline for EMS: Performance Benchmarks,” presented by John Dugan III, EMT
- “eMEDS Upgrade to Elite Platform,” presented by Jason Cantera EMT
- “You May Be an EMS Grandfather: Update on Remaining Practice Track for EMS Sub-Specialty Board Certification,” presented by Roger Stone, MD
- “Compassionate Options for Pediatric EMS,” presented by Jennifer F. Anders, MD, FAAP, and Cynthia Wright-Johnson, RN
- “MIEMSS Licensure and Certification Update,” presented by Terrell Buckson, NREMT
- “Electronic Dance Music, Synthetic Drugs, and Teen Death,” presented by Ben Lawner, MD
- “Results of Queen Anne’s Freestanding Pilot and System Performance Benchmark,” presented by Richard Alcorta, MD, FACEP

Washington County Commissioners requested the assistance of State EMS Medical Director Dr. Richard Alcorta to facilitate a strengths, weaknesses, opportunities, and threats (SWOT) analysis for five goals identified by the commissioners, including the development and implementation of consistent training and educational processes for the entire county.

In Garrett County, the Board of Commissioners asked Dr. Alcorta to assist them by facilitating a reassessment of the 2006 SWOT analysis and to develop updates with both short- and long-term EMS recommendations. The Garrett County SWOT “revisited” committee unanimously approved the final report and it was submitted to the county commissioners in January 2016.

The Kent County Commissioners also requested a SWOT analysis of three goals identified in 2014. The Kent County SWOT task force had implemented several of the recommendations before the completion and final unanimous approval of the SWOT report. The final report was presented to the county commissioners in April 2016. Currently, Kent County officials are updating memoranda of understanding with volunteer EMS/fire departments and reviewing funding needs for the improvement of the EMS system.



MIEMSS and the Maryland Regional National Disaster Life Support (NDLS) Coalition continue to provide programs to the health care community. The Maryland Regional NDLS Coalition is comprised of MIEMSS, Johns Hopkins Critical Event Preparedness and Response, the Maryland Fire and Rescue Institute, the R Adams Cowley Shock Trauma Center, and the University of Maryland, Baltimore County’s Center for Emergency Education and Disaster Research. There were 134 participants who successfully completed the one-day Basic Disaster Life Support Course, 132 successfully completed the Advanced Disaster Life Support Course, and 12 successfully completed the Instructors’ Course. Dr. Alcorta serves as the medical director and course director. These courses were provided at no charge to the students. The course textbooks were provided through a Maryland Department of Health and Mental Hygiene grant.

The Maryland Medical Protocols for Emergency Medical Services Providers underwent a complete revision for age classifications. In previous versions of the document, there were 32 age categories for providers to use in determining appropriate care. The arduous task of revising these age categories was a combined effort of the Pediatric Emergency Medical Advisory Committee and the Protocol Review Committee. In the revised document, there are now only nine age groups from which to choose, from the newly born to age 69, eight of which apply to pediatric patients. Another change in the document resulted from the American Heart Association’s revisions to its emergency cardiac care guidelines in October 2015. In order to more closely reflect those guidelines, advanced life support providers transitioned from using lidocaine for ventricular dysrhythmias to amiodarone as of July 1, 2016. Amiodarone has been used nationwide in both the hospital and prehospital settings.

All providers in the state have been provided a new protocol for the detection and treatment of patients who are septic. The frequency of sepsis as the primary cause

of a patient's chief complaint for a 9-1-1 call is higher than that of many other life-threatening emergencies, such as cardiac arrest, ST-elevation myocardial infarction (STEMI), or stroke. Patients presenting with severe sepsis or septic shock also have higher mortality rates than patients suffering from STEMI, stroke, or even serious trauma.

There are 46 Base Stations designated by the EMS Board. All new physician staff at the Base Stations are required to successfully complete the MIEMSS-approved Base Station Program and the *2016 Maryland Medical Protocols Update* training video so that they can consult with EMS providers and provide appropriate on-line medical consultation and direction. The MIEMSS Base Station Communications Course was taught at multiple hospitals in FY 2016, resulting in 612 Base Station certificates issued to emergency department physicians and nurses along with the approval of two new physician Base Station instructors.

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 initiated its quality management implementation through the development of an EMS-specific, Juran-based program. Data analysis and the examination of selected processes form the basis for much of what is done throughout the year. The department supports requests for information, query design, and results interpretation and educates data owners and managers in the specific means for process improvement, which enhances the ability to replicate for improvement in other associated areas.

Managing for Results

For the past 18 years, MIEMSS, like all state agencies, has been required to submit Managing for Results (MFR) updates along with its fiscal year budget requests to the Maryland Department of Budget and Management. This phased-in planning process began with the establishment of the MIEMSS Vision, Mission, and Principles statements through a customer-focused strategic planning process. MIEMSS has again met those requirements, which include reevaluation of key goals, establishment of subsequent objectives and strategies, development of associated action plans, and creation and monitoring of performance indicators.

KEY GOALS AND OBJECTIVES

Goal 1. Provide high quality medical care to individuals receiving emergency medical services.

- Objective 1.1 – Maryland will maintain its trauma patient care performance above the national norm at a 95% or higher statistical level of confidence.
- Objective 1.2 – Increase by 5% annually the number of prehospital acute ischemic stroke patients tissue plasminogen activator (t-PA) medication upon hospital arrival and within three hours of symptom onset.

Goal 2. Maintain a well-functioning emergency medical services system.

- Objective 2.1 – Transport at least 89% of seriously injured patients to a designated Trauma Center throughout 2015.

Team EMS

An innovative approach to quality management education and application in EMS was developed in collaboration with the MIEMSS Region V administration. The strategy was implemented in 1996 and has been updated to reflect present standards. MIEMSS staff and a cadre of instructors from MIEMSS and the EMS community developed ways for company and jurisdictional managers to plan for, measure, maintain, and improve quality services. Techniques taught range from brainstorming causal relationships to data analysis interpretation; topics include quality improvement (QI) team creation and meeting quality assurance (QA) standards established under state law. Jurisdictions and MIEMSS Regional EMS Advisory Councils have utilized this training for planning purposes, and more than 650 providers have attended statewide and special training sessions for EMS Operational Programs (EMSOP) on a variety of subjects, from indicator development to data interpretation.

Beginning in 2002, and in accordance with COMAR Title 30 regulations, all Maryland jurisdictional EMSOPs have implemented their own QA and QI plans. During this evolutionary process, Team EMS has provided the skill sets for effective and continued success in meeting the goals of these plans. Particular interest has focused on the role of jurisdictional and local QA/QI managers and the skills to be effective quality leaders. To help strengthen the role of this important link to quality services, Title 30 was amended in October 2007 to define and mandate the functions of this officer at the EMSOP level. The two-day core curriculum was modified and presented this year at two EMSOP educational seminars.

Completed Implementation of electronic Maryland EMS Data System

From 2009 to 2014 MIEMSS was awarded annual grants from the Maryland Department of Transportation's Highway Safety Office to implement and upgrade the electronic Maryland EMS Data System (eMEDS), its electronic patient care reporting system. The primary goal was to have Maryland's prehospital care data meet the gold compliance standards set forth by the National Emergency Medical Services Information System. All jurisdictional EMSOPs in Maryland are now utilizing eMEDS for direct prehospital patient care data entry and self-report writing for program monitoring, evaluating, and improving. The eMEDS application was modified in 2015 to report and document EMS encounters with sudden cardiac arrest patients. As part of a phased-in program, these cases are now being submitted to the Cardiac Arrest Registry to Enhance Survival to link with hospital outcomes and for system comparison to national case data.

EMS Surveillance Measures

MIEMSS has maintained several EMS system surveillance priorities based on routine data review, customer requests, and research outcomes. Hospital yellow alerts, used to indicate emergency department overload, are monitored at state, regional, jurisdictional, and hospital-specific levels through the County Hospital Alert Tracking System, and form a unit of measurement in Maryland Department of Health and Mental Hygiene's syndromic surveillance programs. Monitoring yellow alert data keeps all entities updated on current system response capabilities as well as historical trends. Specific daily monitoring, conducted during the winter months and flu season, supports hospitals in strategy development to address periods of high demand for emergency department services.

The Helicopter Utilization Database was created after field protocols were revised in 2008 regarding scene requests for helicopter transports. This database accounts for all helicopter requests for transport, independent of actual transport mode outcome, and permits requesting EMS managers or medical directors to conduct case reviews. The primary goal is to use this transportation resource for only the most severe, time-critical scene incident patients.

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 protecting patient and provider confidentiality at all times. Since January 2000 over 1,600 data requests have been tracked and facilitated.

REGIONAL PROGRAMS AND EMERGENCY OPERATIONS

Mission: To provide leadership and support through strong relationships and direct interface with EMS system stakeholders to ensure that, as a system, we are effectively prepared and responding to the emergency medical needs of the citizens of Maryland and surrounding areas.

Vision:

- All Maryland EMS professionals are delivering quality medical care that is safe, timely, effective, and well-coordinated.
- All Maryland EMS professionals are managing emergency incidents to maximize reduction in death, disability, and destruction.

Regional Programs Priorities:

1. To ensure all emergency medical patients receive quality prehospital emergency medical care and are safely transported to the most appropriate facility to treat their illness or injury.
2. To ensure the Maryland EMS professional has the tools, resources, and training required to effectively manage an incident requiring the delivery of emergency medical services.
3. To ensure all Maryland EMS Operational Programs have the tools, resources, and training required to effectively manage their individual EMS systems.

Regional Programs consists of five regional offices throughout the state. Each office is comprised of at least one regional administrator and a supporting staff member. They are responsible for monitoring the operation of the regional EMS system, acting as advocates for the services in their region in the development of state policies, and representing MIEMSS in the implementation and maintenance of these policies. Additionally, Regional Programs staff support the Emergency Operations office by participating in planning processes and responding to significant events around Maryland. In the event of a large-scale incident, regional administrators are expected to be available to local resources to assist in the response. In many cases, they will be the first state representative on the scene.

Regional EMS Advisory Councils

Each region has an EMS advisory council that provides the focal point for the coordination of EMS planning and activities among the jurisdictions. The councils provide a means for neighboring jurisdictions to collaborate on many issues such as conferences, training, quality improvement processes, emergency response exercises, and mutual aid activities. The

regional offices act as staff for the advisory councils to schedule meetings, manage records, research information, facilitate discussions, and represent MIEMSS at meetings.

Grant Programs

Regional offices facilitate the distribution of funds to support local programs from several sources. For an accounting of the funds administered through the regional offices, see below. Enhancements to local programs that were made as a result of those funds are described below.

Department of Health and Human Services – Hospital Preparedness Program

The Hospital Preparedness Program (HPP) provides funding to local EMS agencies to enhance their emergency preparedness. A complete accounting of expenditures, according to the priorities prescribed by HPP, can be found on page 71. This past fiscal year, funds were used to enhance and upgrade EMS systems, increase caches of critical equipment required to provide care to special needs patients, and provide for mass casualty ambulances, buses, and supplies.

MIEMSS Region I is the contact for HPP grant funding for each EMS Operational Program (EMSOP). This office ensures applications are completed, submitted, and funds are expended appropriately during the fiscal year funding period. In FY 2016 regional funds from a statewide grant were used to enhance and expand EMS surge capabilities by funding mass casualty supplies. This included updating expired supplies on mobile emergency supply trailers and ambulance buses that would be mobilized for quick deployment

of regional assets. Current funding has also enabled jurisdictions to support their active assailant response personnel with much needed equipment, including the development and deployment of active assailant training. The equipment will ensure safety measures are in place while first responders train and mitigate incidents within newly developed guidelines from the Governor's Active Assailant Task Force. MIEMSS-managed projects included a CHEMPACK training program and a quick response reference guide for CHEMPACK deployment, first responder mental health, and installing or upgrading communications systems.

MIEMSS Region II continues to work with local jurisdictions to obtain grant funding for jurisdictional projects, equipment, and education.

In MIEMSS Region III, HPP grant funding was utilized to enhance the regional response trailer to serve as a work area for managing patient tracking and system coordination efforts during planned mass gathering events and protracted emergency responses.

MIEMSS Region IV staff assisted several counties with projects, including partial funding for an ambulance bus. HPP funds were necessary for purchasing this much-needed equipment to augment the resources in the event of a mass casualty.

MIEMSS Region V utilized HPP funding in coordination with the State Homeland Security Grant Program to begin regionalizing the use of handheld tablets for EMS providers. These tablets will be used for electronic Maryland EMS Data System (eMEDS) reporting, patient triage and tracking, and overall county situational awareness through the use of jurisdictional computer aided dispatch.

MIEMSS Grant Disbursements (FY 2016) by Region

	SHSGP	50/50 Matching Fund Grant for AEDs, Monitor Defibrillators, and Upgrades	ALS Training Funds	Emergency Dispatch Programs	HPP Bioterrorism Grants BT-XII (FFY 2014-2015)	HPP Bioterrorism Grants BT-XIII (FFY 2015-2016)	Totals By Region
Region I	\$6,416	\$46,000	\$28,000	\$3,410	\$6,448	\$6,060	\$101,300
Region II	\$64,949	\$45,243	\$28,000	\$6,818	\$10,134	\$9,523	\$161,185
Region III	\$65,560	\$117,982	\$103,425	\$12,827	\$62,067	\$58,340	\$434,192
Region IV	\$44,286	\$96,000	\$68,000	\$17,158	\$29,016	\$27,230	\$291,328
Region V	\$68,789	\$101,563	\$78,000	\$9,787	\$25,335	\$23,847	\$316,195
Total	\$250,000	\$406,788	\$305,425	\$50,000	\$133,000	\$125,000	\$1,304,200

State Homeland Security Grant Program – Mass Casualty Incident Grant Application Program

The Maryland Emergency Management Agency (MEMA) and MIEMSS continued their partnership in meeting federal guidance requiring a percentage of the State Homeland Security Grant Program (SHSGP) funding from the US Department of Homeland Security be allocated to EMS agencies. The competitive program was established to address gaps for EMS response to mass casualties. The program was allocated \$250,000 for CY 2016. Approximately 17 applications were received, totaling over \$700,000 in requested funds by county and local departments. MIEMSS staff, along with the Statewide EMS Advisory Council (SEMSAC), are in the process of reviewing these grant requests for an expected award in August 2016. SHSGP funding in 2016 will be focused on developing active assailant preparedness and response programs.

Other MIEMSS-Funded Grants

MIEMSS provides funding from its budget for several programs. Funds for training programs for advanced life support (ALS) and emergency medical dispatch (EMD) providers support initial and continuing education. A matching fund grant (50/50) supports the purchase of automated external defibrillators (AED), monitor defibrillators, and other diagnostic equipment by local EMS agencies and companies.

Inventory and Administration

Each regional office in MIEMSS is responsible for tracking the activity and progress of all grants that it receives. This includes ensuring that periodic reports are completed and inventorying any physical assets gained as a result of the grants, per state and federal requirements. This also includes an annual inventory of assets on loan to local jurisdictions and the inventory of equipment obtained from previous grants.

Medical Direction

STEMI Designation and Planning

All regional offices continue to work toward the rapid treatment and transportation of ST-elevation myocardial infarction (STEMI) patients. Each region is collecting data on STEMI patients, focusing on enhancing EMS-to-balloon times as well as quality assurance (QA) and quality improvement (QI). As more patients are transported directly to a Cardiac Interventional Center (CIC), and transfer times from non-CIC hospitals improve, patient outcomes also improve. MIEMSS has joined the Cardiac Arrest Registry to



Enhance Survival program and is participating in gathering data.

Base Stations

In cooperation with the Medical Director's Office, regional offices throughout the state assist with site visits required to designate Base Stations, hospitals that provide physicians' orders to prehospital providers. They have also taken the lead in coordinating scheduling and supporting the Base Station Course, which is required for physicians and hospitals already designated.

Quality Assurance Committee – MIEMSS

Regional offices continue to provide instruction for QA classes for jurisdictional QA/QI officers. The QA course has been streamlined and the initial training was shortened to a one-and-a-half day program. After review of the course outline, lesson plans were amended to enhance the learning experience for students. Classes were conducted at MIEMSS' headquarters in Baltimore City and in regional offices. In some regions, this is augmented by training coordinated for company- or departmental-level QA officers.



Quality Improvement

Allegany and Garrett Counties, in MIEMSS Region I, have continued work on their QA and QI committees and have been meeting regularly to ensure proper EMS coverage in the region. Both counties continue to implement strengths, weaknesses, opportunities, and threats (SWOT) initiatives. The continued leadership and direction provided by their respective Emergency Services Boards is a testament to the SWOT initiative. The administrator in MIEMSS Region I facilitated one company-level SWOT analysis this past year, and offered to assist other fire/rescue and EMS companies in that region with a similar analysis.

More information about the SWOT efforts this past year in Garrett County and Kent County, in MIEMSS Region IV, is available in the Medical Director's Office report on page 28.

Communications Systems

Regional offices continue monthly testing of the DEMSTEL phones in their respective regions, including those in hospital emergency rooms and hospital command centers. Monthly testing identifies technical failures, which are then able to be repaired, and makes operational personnel more aware of their existence and purpose.

Voluntary Ambulance Inspection Program

The regional offices continue to perform ambulance inspections under the Voluntary Ambulance Inspection Program (VAIP). These inspections ensure that each unit is stocked with specific equipment and meets the newly revised standards, developed by the VAIP Committee, that were effective July 2016. MIEMSS has standardized the process of inspection and interpretation of the standards. Now all regional offices cooperate to inspect units across the state to ensure consistent assessment. The inspections are valid for two years. While not mandated, inspections in all jurisdictions are on the rise.

Conferences and Training

The 14th Annual Miltenberger Emergency Services Seminar, held in March 2016, was another success. Teamwork among MIEMSS, local hospitals, and other local agencies and institutions has developed a supportive learning environment for prehospital providers, fire/rescue personnel, and nurses.

EMS Care 2016 was held April 27 through May 1 in Ocean City. The event offered three days of preconference programs, followed by the two-day full conference. Over 300 participants attended for an extended weekend full of quality educational and networking opportunities.

The Peninsula Regional Medical Center hosted its annual trauma conference in Ocean City in September 2015. The conference once again provided an outstanding opportunity for physicians, nurses, and prehospital providers to network and listen to speakers on current critical issues in the field of trauma care.

With assistance from regional offices, the Talbot County Department of Emergency Services held its annual Winterfest Conference on Tilghman Island in January 2016. Preconference programs included presentations by EMS for Children, a 12-hour emergency medical technician (EMT) skills class, and 12 hours of continuing education needed for BLS recertification.

Regional offices also assisted the Maryland Emergency Response System (ERS) with their first annual Emergency Response Symposium, which took place on June 3, 2015, at the Universities at Shady Grove Conference Center. Speakers for the conference included responders from the 2011 tornado in Joplin, Missouri, the Aurora, Colorado, theater shootings, and the Boston marathon bombings. The second annual Emergency Response Symposium took place on May 26, 2016, and included presentations on the terrorist attacks in Paris in November 2015 and in San Bernardino in December 2015.

Regional offices staff also assisted the Maryland Nurses Association with their regional trauma conference, held at Meritus Medical Center.

Support for Educational Programs

In addition to conferences, the regional offices support many other innovative educational programs intended to address issues specific to a particular region, some of which arise from needs identified through QI processes. Many regional offices also support protocol rollout classes.

Regional offices act as resources for local educational programs and institutions, ensuring there are always adequate resources and basic training programs available, and they often coordinate courses with community colleges, fire academies, and local hospital and association programs. Education committees and

councils staffed by the regional offices bring the program coordinators together and identify priorities for training.

Illness and Injury Prevention

All regional offices continue to support a variety of education and prevention activities through the Regional EMS Advisory Councils.

Health and Medical Emergency Preparedness Response and Activations

The regional offices are the first line of response by MIEMSS to support local jurisdictions during significant emergency incidents and pre-planned mass gatherings. Internal policies and procedures were drafted to improve the notification of the regional offices, the Field Operations Support Team (FOST), MIEMSS leadership, and key support agencies of an incident.

Health and Medical Preparedness Coalitions

MIEMSS Region I staff support local jurisdictions by serving on numerous committees related to the coordination of health and medical activities within the region, ensuring timely and effective communication of relevant EMS health and medical preparedness issues.

MIEMSS Region III Health and Medical Coalition (formerly the Health and Medical Taskforce) is a subcommittee of the Baltimore Urban Area Working Group (BUAWG), and is chaired by Christina Hughes of MedStar Franklin Square Medical Center. The coalition continued their work throughout FY 2016 to enhance emergency preparedness and response capabilities in this region. The group continues to refine operational plans for the Region III medical ambulance buses, the Alternate Care Site and Training Center, and the region's patient tracking system. New initiatives for FY 2016 included coalition evolution, allocation of scarce resources, and hospital evacuation projects.

The Delmarva Regional Healthcare Mutual Aid Group (DRHMAG), chaired by MIEMSS Region IV Associate Administrator Anna Sierra, continues to provide much needed training and resources to health care partners in that region.

MIEMSS Region V participated in a number of programs in 2015, including the National Emergency Department Overcrowding Score (NEDOCS) pilot program and Prince George's County Health Care Coalition. The NEDOCS pilot, which is ongoing, was developed in partnership with the Region V EMS Advisory Council. NEDOCS works by recording

various pieces of data on emergency departments, including longest wait time, longest admitting wait time, number of patients, and number of high-resource patients. That data produces a score that, long-term, could provide a leveling effect to area hospitals in order to prevent the "domino effect" when diverting while also creating an equal field of play when assessing the need for diversion.

MIEMSS Region V worked with the Prince George's County Health Care Coalition to develop a communications plan and a resource sharing plan for county hospitals. These plans include updated capabilities and definitions regarding the Maryland Emergency Medical Resource Alert Database (MEMRAD).

Emergency Response and Exercises

Emergency Operations supports numerous exercises, planned mass gatherings, and emergency response efforts throughout the state. Some of the more notable activities in FY 2016 included

- Moonrise Music Festival
- NDMS full-scale exercise
- Preakness Stakes
- February 2016 record snowfall
- Ebola response
- 2015 papal visit
- Bay Bridge Run
- Towson University active assailant full-scale exercise
- Full-scale hospital surge plan exercise (ERS)
- Hospital evacuation workshop (ERS)
- Joint Andrews Airforce Base annual airshow
- Washington County active shooter drill



Hospital Availability and Alert Utilization

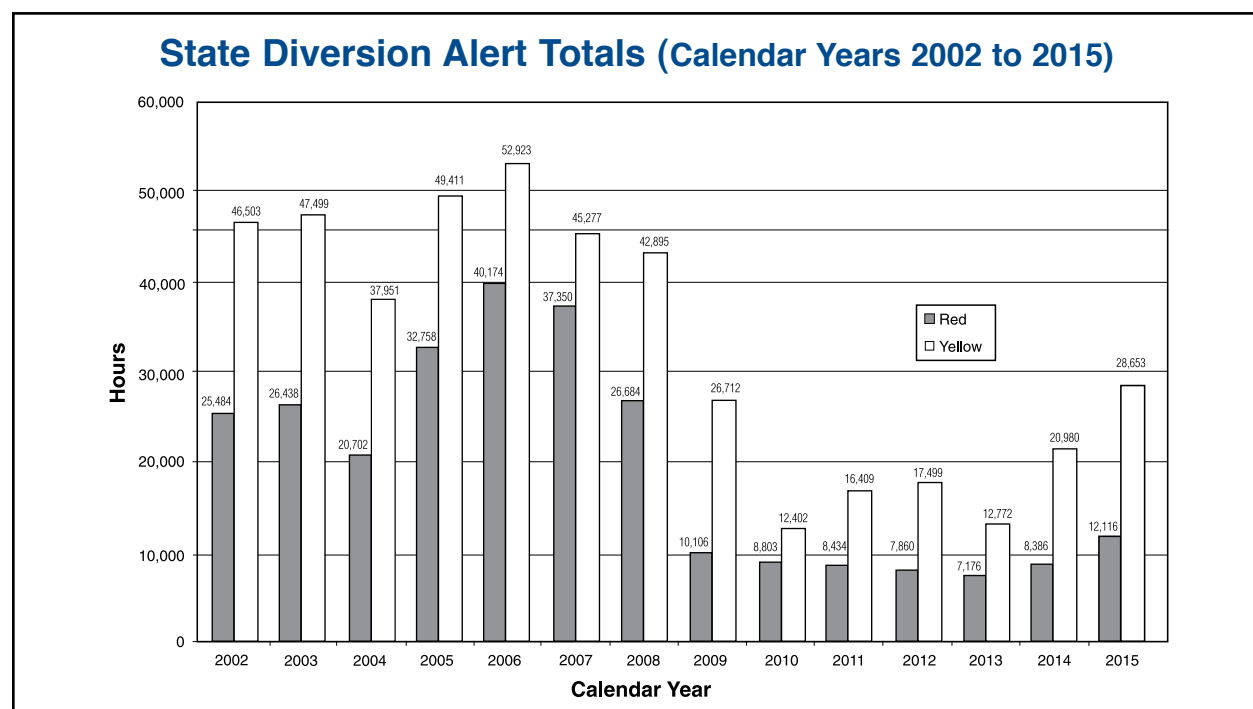
MIEMSS monitors statewide alert activity via the County Hospital Alert Tracking System (CHATS) and generates quarterly reports comparing current alert utilization volumes with the past year's. Real-time CHATS screens showing hospital alert activity in all MIEMSS Regions and online reports containing individual hospital alert activity are available on the MIEMSS website. Additionally, MIEMSS is able to monitor EMS "release-of-patient-care" times (from EMS arrival at the emergency department until the patient is moved to a hospital stretcher) and "return-to-service" times (length provider is at an emergency department with a patient before returning to service) that are recorded in the EMS patient care record. These times are helpful indicators of the impact of emergency department crowding on the EMS system.

CHATS includes several categories of alerts that indicate whether a hospital emergency department is temporarily unable to accept certain ambulance-transported patients. Yellow alert, indicating emergency department overload, is the most frequently utilized alert category and has the most significant impact on EMS providers transporting patients. Hospitals experienced a significant increase in the utilization of yellow alerts in CY 2015, reaching 28,653 hours. Although still well

below the peak of nearly 53,000 hours in CY 2006, increases in utilization of nearly 8,000 hours per year for the last two years have raised some concern.

This year's influenza season also caused higher than normal use of hospital diversion alerts in early 2016. MIEMSS monitors alert activity on a daily basis during the flu season and provides reports to regional offices as necessary to assist them in deciding whether to implement strategies from the *Maryland Hospital and EMS Emergency Department Overload Mitigation Plan*. No portion of this mitigation plan was enacted this year, but hospitals in Baltimore City and Baltimore County were on yellow alert for over 30% of the available time for 34 days in the first quarter of 2016. Hospitals in Southern Maryland also exceeded 30% for nine days in the same time period. Normal daily activity in MIEMSS Regions III and IV is well below 20% of the available time.

Because of these increases, MIEMSS is planning to convene an interdisciplinary workgroup on EMS and hospital availability in 2016. This group will be charged to review current literature, and solicit input from health care providers in order to recommend a means to objectively measure emergency department utilization and propose methods to balance the demand for services across the community through current best practices.



Maryland Emergency Medical Resource Alert Database

Hospitals and 9-1-1 centers use CHATS to change their own statuses and get alerts about other status changes. The patient tracking portion of MEMRAD continued to be used this year to support multiple mass gatherings. The Facility Resource Emergency Database (FRED) function of the system was activated numerous times to alert health and medical response partners of incidents and exercises and was used to assess resource availability for beds, medications, and other supplies needed for the response. Preparations are underway to upgrade to the latest software version, requiring modifications to existing hardware, software, and infrastructure support systems.

Preparedness Planning

MIEMSS and MEMA continue to lead the Interdisciplinary Workgroup on the Response to Active Assailant Incidents. The *Guidance for First Responders for the Active Assailant Incident* report has been published, and presentations were made around the state to increase awareness of the resource. In cooperation with the Maryland Fire and Rescue Institute (MFRI), an active assailant awareness training video was developed and published on the MFRI website and the MIEMSS Online Training Center. As recommended by this workgroup, the “Potentially Volatile Environments — Life Sustaining Interventions Protocol” was approved by the Protocol Review Committee and the EMS Board, and published in *The Maryland Medical Protocols for Emergency Medical Services Providers*, effective July 1, 2015.

STATE OFFICE OF COMMERCIAL AMBULANCE LICENSING AND REGULATION

Mission: To provide leadership and direction regarding the commercial (private) ambulance industry in Maryland to protect the health, safety, and welfare of persons using these services. This includes 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.

By the close of FY 2016, SOCALR had 40 licensed commercial ambulance services with 454 licensed commercial ambulances, including 144 ALS, 284 BLS, and 26 Neonatal designated units.



Even with the ever-changing dynamic of the commercial ambulance industry and its trending growth, the State Office of Commercial Ambulance Licensing and Regulation (SOCALR) remains committed to continue its mission of ensuring patient and provider health, safety, and welfare along with maintaining the mission and vision of MIEMSS.

SOCALR is committed to expanding and enlarging its responsibilities by developing strategies and implementing plans that demonstrate the positive impact of this office on the Maryland EMS system. The office is currently analyzing and assessing fixed-wing aircraft, both domestic and international, for patient transports. SOCALR will ensure compliance with state regulations and medical oversight for quality assurance purposes in order to maintain alignment with its mission.

Beyond licensing, SOCALR continues to play a vital role in the EMS community. Regular duties include compliance with federal, state, and local laws; quality assurance and quality improvement; and ambulance safety.

SOCALR has developed a strong partnership with EMS for Children by promoting ambulance transport safety and committing to providing pediatric educational opportunities, such as the S.T.A.B.L.E. Program (which addresses the six assessment and care modules of sugar, temperature, airway, blood pressure, lab work, and emotional support) and the Neonatal Resuscitation Program. These training opportunities will help fulfill COMAR training requirements for neonatal and specialty care transport teams.

The SOCALR team also remains committed to serving with the Field Operations Support Team (FOST), assisting with emergency operation efforts throughout the state and coordinating commercial resources when disasters strike. SOCALR also supports MIEMSS Regional Programs by assisting with their voluntary ambulance inspections.



This office has been working closely with MIEMSS' Information Technology Department to implement and manage the electronic Maryland EMS Data System (eMEDS) patient care reporting system as it pertains to commercial services. SOCALR has created, and is currently testing, a dynamic run form template that is specific to interfacility and commercial service transports. It is anticipated that this template will increase productivity and make patient care reporting easier for users.

In an upcoming project, SOCALR will replace its current service and vehicle licensing management system database. At this time, SOCALR uses an outdated Microsoft Access database system, developed in-house, for service and vehicle license management. The system currently requires manual processing of all licensing aspects of vehicle and service management, consuming significant amounts of time. SOCALR is on

track to transition to a new electronic format of vehicle and service licensing through License Management, an ImageTrend, Inc. product. This conversion to an electronic format comes at the request of the services licensed by MIEMSS to improve customer service and make the licensing process easier by incorporating automatic features. License Management software is a comprehensive solution that covers all aspects of license processing. It offers the capability to reduce agency costs associated with service management, vehicle management, and the licensing processes, and will streamline workflow. System administrators can track every step of an applicant's process, including payment and delivery. The system will be able to

- Accept applications online and keep applicants updated automatically.
- Process payments online.
- Reduce overhead costs and improve processing efficiency.
- Eliminate transcription errors from handwritten forms.
- Build and customize workflow to better monitor processing.
- Generate email correspondence and produce detailed reports automatically.
- Manage public expectations with a portal for verifying licensed services and vehicles.
- Maintain service and vehicle inspection records.
- Track all investigations, complaints, and compliance issues.

MARYLAND TRAUMA & SPECIALTY REFERRAL CENTERS

Injured patients need treatment at the hospital best staffed and equipped to meet their special needs. Maryland's system of care ensures that patients promptly get to the most appropriate hospital in an effort to decrease morbidity and mortality. (For differences in standards in the levels of Trauma Centers, see the Trauma Center Categorization chart on page 40.) The Trauma and Specialty Referral Centers within the Maryland EMS system are:

TRAUMA CENTERS

Primary Adult Resource Center

- R Adams Cowley Shock Trauma Center/University of Maryland Medical Center, Baltimore City

Level I Trauma Center

- The Johns Hopkins Hospital Adult Trauma Center, Baltimore City

Level II Trauma Centers

- Johns Hopkins Bayview Medical Center, Baltimore City
- Prince George's Hospital Center, Cheverly
- Sinai Hospital, Baltimore City
- Suburban Hospital, Johns Hopkins Medicine (JHM), Bethesda

Level III Trauma Centers

- Meritus Medical Center, Hagerstown
- Peninsula Regional Medical Center, Salisbury
- Western Maryland Regional Medical Center, Cumberland

SPECIALTY REFERRAL CENTERS

Burns

- Baltimore Regional Burn Center/ Johns Hopkins Bayview Medical Center, Baltimore City
- Burn Center/MedStar Washington Hospital Center, Washington, DC
- Pediatric Burn Center at Children's National Health System, Washington, DC
- Pediatric Burn Service at The Johns Hopkins Children's Center

Cardiac Interventional Centers

- Region I
 - Western Maryland Regional Medical Center
- Region II
 - Frederick Memorial Hospital
 - 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 Medical Center
 - University of Maryland (UM) Baltimore Washington Medical Center
 - UM St. Joseph Medical Center
 - UM Upper Chesapeake Medical Center
- Region IV
 - Peninsula Regional Medical Center
- Region V
 - Holy Cross Hospital
 - MedStar Southern Maryland Hospital Center
 - Prince George's Hospital Center
 - Shady Grove Adventist Hospital
 - Suburban Hospital – JHM
 - Washington Adventist Hospital

- 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

Eye Trauma

- The Wilmer Eye Institute/The Johns Hopkins Hospital, Baltimore City

Hand/Upper Extremity Trauma

- The Curtis National Hand Center/ MedStar Union Memorial Hospital, Baltimore City

Hyperbaric Medicine

- Center for Hyperbaric Medicine/ R Adams Cowley Shock Trauma Center/University of Maryland Medical Center, Baltimore City

Neurotrauma

(Head and Spinal Cord Injuries)

- Neurotrauma Center/R Adams Cowley Shock Trauma Center/University of Maryland Medical Center, Baltimore City

Pediatric Trauma

- Pediatric Trauma Center/The Johns Hopkins Children's Center, Baltimore City
- Pediatric Trauma Center/Children's National Health System, Washington, DC

Perinatal Referral Centers

- Anne Arundel Medical Center
- Frederick Memorial Hospital
- 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
- Prince George's Hospital Center
- St. Agnes Hospital
- Shady Grove Adventist Hospital
- Sinai Hospital
- University of Maryland Medical Center
- UM St. Joseph Medical Center

Poison Consultation Center

- Maryland Poison Center/University of Maryland School of Pharmacy, Baltimore City

Designated Primary Stroke Centers

- Anne Arundel Medical Center
- Atlantic General Hospital
- Calvert Memorial Hospital
- Carroll Hospital Center
- Frederick Memorial Hospital
- Greater Baltimore Medical Center
- Holy Cross Hospital
- Howard County General Hospital-JHM
- Johns Hopkins Bayview Medical Center
- Mercy Hospital Center
- Meritus Medical Center
- MedStar Franklin Square 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
- Peninsula Regional Medical Center
- Shady Grove Adventist Hospital
- Sinai Hospital
- St. Agnes Hospital
- Suburban Hospital – JHM
- University of Maryland Medical Center Midtown Campus
- UM Baltimore Washington 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
- Union Hospital of Cecil County
- Washington Adventist Hospital
- Western Maryland Regional Medical Center

Designated Comprehensive Stroke Centers

- The Johns Hopkins Hospital
- University of Maryland Medical Center

Trauma Center Categorization

Differences in Standards Based on Physician Availability and Dedicated Resources	PARC	Level I	Level II	Level III
Attending surgeon who is fellowship-trained and is in the hospital at all times	X			
Dedicated facilities (Resuscitation Unit, Operating Room, and Intensive Care Unit) 24 hours	X			
Facilities (Resuscitation Unit, Operating Room, and Intensive Care Unit) available at all times	X	X	X	X
Trauma Surgeon available in the hospital at all times		X	X	
On-call Trauma Surgeon available within 30 minutes of call				X
Anesthesiologist in the hospital at all times and dedicated to trauma care	X			
Anesthesiologist in the hospital at all times but shared with other services		X	X	
On-call Anesthesiologist with CRNA who is in the hospital				X
Orthopaedic Surgeon in the hospital at all times and dedicated to trauma care	X			
Orthopaedic Surgeon in the hospital at all times but shared with other services		X		
On-call Orthopaedic Surgeon available within 30 minutes of call			X	X
Neurosurgeon in the hospital at all times and dedicated to trauma care	X			
Neurosurgeon in the hospital at all times but shared with other services		X		
On-call Neurosurgeon available within 30 minutes of call			X	X
Fellowship-trained/board-certified surgical director of the Intensive Care Unit	X	X		
Physician with privileges in critical care on duty in the Intensive Care Unit 24 hrs/day	X	X	X	
Comprehensive Trauma Research Program	X	X		
Education – Fellowship Training in Trauma	X			
Surgical Residency Program	X	X		
Outreach Professional Education	X	X	X	

ADULT TRAUMA CENTERS

Primary Adult Resource Center

R Adams Cowley Shock Trauma Center, University of Maryland Medical Center

Located in Baltimore City, the R Adams Cowley Shock Trauma Center, serving as the state's Primary Adult Resource Center (PARC), reported receiving 6,064 primary trauma patients from June 2015 to May 2016, according to the Maryland State Trauma Registry. (See pages 72 to 77 for additional patient data.) During the same time period, the R Adams Cowley Shock Trauma Center had a 96% survival rate of the 9,549 patients received (including those admitted to the Critical Care Resuscitation Unit). Over this 12-month period, 81% of patients admitted to the Shock Trauma Center arrived by ground transportation and 19% arrived by air. Demographic data obtained indicate that the majority of admissions were male (67%) and aged 15-35 years (42%), followed by patients aged 56 or older (31%) and 36-55 (27%).

Staff: Thomas M. Scalea, MD, FACS, MCCM – Physician-in-Chief for the Program in Trauma. Karen E. Doyle, MBA, MS, RN, NEA-BC, FAAN – Senior Vice-President of Nursing and Operations. James V. O'Connor, MD, FACS, FACC, FCCP – Chief of Trauma Critical Care. Deborah Stein, MD, MPH, FACS, FCCM – Chief of Trauma. Kristie Snedeker, DPT – Director of Care Management and Clinical Operations.

As the nation's first and only integrated trauma hospital, the R Adams Cowley Shock Trauma Center (Shock Trauma Center) is dedicated to treating the critically ill and severely injured, and employs groundbreaking research and innovative medical procedures with one goal in mind—saving lives. As one of the highest volume trauma centers in the United States, teams of providers stand by 24/7 to receive, resuscitate, stabilize, and treat those whose lives are threatened by time-sensitive injury and illness, including thoracic, intra-abdominal, and facial trauma; spinal cord and column injuries; brain injury; and acute complex orthopaedic injury. In addition, patients who develop life-threatening respiratory failure, multiple organ dysfunction, soft tissue infection, and sepsis may be transferred to the Shock Trauma Center where expert clinicians and sophisticated technology such as advanced hemodynamic monitoring, continuous renal replacement therapy, molecular adsorbent recirculating system, and extracorporeal membrane oxygenation are readily available.

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.

Shock Trauma Center's physical footprint covers 340,000 square feet. It is designed to ensure immediate diagnostic and therapeutic access for critically-injured and ill patients. Key features include

- Dedicated, highly trained, and experienced multidisciplinary clinical staff
- Dedicated ground entrance for ambulances
- Rooftop helipad capable of handling four helicopters simultaneously
- Trauma Resuscitation Unit (TRU) with 13 resuscitation/stabilization bays
- 10 state-of-the-art operating rooms and 12 post-anesthesia recovery beds
- 24 critical care/intensive care beds, 24 intermediate care beds, and 12 acute care beds with the capacity for additional beds on an as-needed basis in the adjacent University of Maryland Medical Center (UMMC)
- Neurotrauma unit consisting of 14 critical care beds and 20 intermediate care beds
- Critical Care Resuscitation Unit with six dedicated beds
- Lung Rescue Unit with six dedicated beds
- Comprehensive radiology services and the Mirmiran Foundation Diagnostic Imaging Suite with two dedicated high-speed computed tomography (CT) scanners and trauma angiography suite, accessible 24 hours
- State-of-the-art, automated 24-hour STAT lab
- Sophisticated technological monitoring and clinical computer capability at the bedside
- Multi-patient hyperbaric chamber
- Trauma and specialty care ambulatory center with 14 exam rooms and a dedicated street level entrance
- Respiratory, physical, occupational, and speech therapy services; case management; pain management; integrative medicine; nutritional services; social work and pastoral care staff; designated patient advocate; and substance abuse program
- Trauma Survivors Network
- Center for Injury Prevention and Policy

Shock Trauma Center continues to be the nation's premier trauma center, advancing care and developing new life-saving techniques. It serves as a referral center for Maryland in neurotrauma and hyperbaric medicine. The Shock Trauma Center is available to develop individualized disaster or tactical response plans for regional EMS agencies or jurisdictions with specialized medical or rescue needs.

The Critical Care Resuscitation Unit

The six-bed Critical Care Resuscitation Unit (CCRU) is designed for non-trauma critically ill patients transferred to UMMC for time-sensitive specialty care. The multidisciplinary CCRU health care team provides rapid clinical evaluation, diagnostic procedures, and emergent resuscitative interventions in collaboration with specialty consultation services. Diagnoses include acute care surgical or soft tissue infections, severe respiratory failure, cardiothoracic and vascular emergencies, as well as neurological and neurosurgical emergencies.

The Lung Rescue Unit

The six-bed Lung Rescue Unit (LRU), specializing in advanced pulmonary care and research, is designed for patients who need innovative therapies and access to the latest clinical trials to manage their conditions. The LRU team is staffed by a multidisciplinary team of lung failure experts who work to provide care in an organized, integrated way through clinical leadership within the Shock Trauma Center, and the departments of pulmonology, critical care, and cardiac surgery.

The LRU treats adults in need of total critical care for 1) end-stage respiratory failure in need of bridge to transplant and 2) acute lung injury with a need for V-V ECMO.

The GO-TEAM

Shock Trauma Center maintains the GO-TEAM, an advanced resuscitative team led by Medical Director Andrew Pollak, MD, that can respond to the scene where serious injuries and a delay in extrication and transportation have occurred. The team, led by an attending physician accompanied by a certified nurse anesthetist, augments Maryland's EMS system by providing critical care and surgical services beyond the scope of prehospital emergency care providers. In FY 2016 there were 18 requests for the GO-TEAM, with 5 deployments.

Training

Training is central to the mission of the Shock Trauma Center. The Surgical Critical Care (SCC) Fellowship Program is the largest Accreditation Council for Graduate Medical Education (ACGME) training program in the country. The program continues to experience a surge in the number of applicants. Over the past six years, the number of filled positions has more than doubled (from 66 to 139). The program remains at the forefront of approximately 100 SCC programs offered; it has matched the top eight to nine ranked fellow candidates again this year.

Approximately 6% of new SCC physicians released into the national workforce are "Shock Trauma" trained. The fellowship programs are considered among the best

in the world. Currently, the Shock Trauma Center offers fellowships in SCC (8 positions), Anesthesiology (4), Orthopaedic Surgery (5), Emergency Medicine (4), and Acute Care Surgery (3).

The ACGME-accredited University of Maryland Orthopaedic Traumatology Fellowship is considered by many to be the foremost orthopaedic trauma fellowship worldwide. Alumni of the fellowship currently lead trauma care and orthopaedic education at centers around the world. The primary goal of the fellowship is to educate orthopaedic surgeons to become clinically proficient in managing the musculoskeletal injuries of the severely or multiply injured patient in an interdisciplinary environment. Additional goals include educating fellows in the associated research and teaching skills to become leaders in their field.

The American College of Surgeons (ACS) designated the Shock Trauma Center 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. A strong collaboration has been forged with the University of Maryland School of Medicine to offer advanced training in critical care and trauma care to medical students.

Advanced Trauma Life Support, developed by the ACS, and Advanced Trauma Care in Nursing, developed by the Society of Trauma Nurses, along with the Society of Critical Care Medicine's Fundamental Critical Care Support, continue to be the cornerstone courses of the curriculum.

Surgical skills courses are offered throughout the calendar year, including Advanced Trauma Operative Management and Advanced Surgical Skills for Exposure in Trauma. Disaster Management and Emergency Preparedness courses are offered on a regular basis to all partners in patient care from first responders to advanced clinicians. Basic Endovascular Skills for Trauma was added to the line of surgical skills training courses in 2014 and will be conducted bimonthly.

In 2014 the Center for Critical Care and Trauma Education opened a 10,000 square foot medical simulation area. The center houses four reconfigurable labs and three adjacent classrooms with debriefing areas where basic individual skills training, as well as multiple team-based courses focused on interprofessional education throughout the hospital system, can be accommodated. It supports the development, implementation, and continuous evaluation of many courses related to trauma and critical care management.

In FY 2016 over 400 classes were provided to various groups of health care workers, including medical students, EMS providers, attending physicians, and nurses.

Center for the Sustainment of Trauma and Readiness Skills

Since 2001, US Air Force Medical Service personnel, including surgeons, nurses, and medical technicians, have traveled to Baltimore for training at the US Air Force Center for the Sustainment of Trauma and Readiness Skills (C-STARS), embedded within the Shock Trauma Center. This location is one of three C-STARS sites in the country, each specifically chosen for trauma patient volume, mechanisms of injury, and clinical expertise. These civilian-military partnerships are crucial in keeping military medics constantly ready for wartime casualty care. The C-STARS program provides military personnel with a real-world platform for intense, state-of-the-art training in trauma skills for the care of the critically-injured soldier. This relationship is mutually beneficial as the Shock Trauma team learns skills and maintenance techniques and identifies patient throughput strategies that improve the delivery of definitive care. This relationship is further conducive to collaborative research supported by the US Department of Defense that benefits both military and civilian trauma patients.

Membership in Regional and National Organizations and Leadership Roles

Many of the faculty and staff at the Shock Trauma Center are members of and/or hold leadership positions in national, regional, and state organizations.

Dr. Thomas M. Scalea recently completed his term as president of the American Association for the Surgery of Trauma (AAST). Dr. Scalea is currently a member of the AAST Board of Managers and holds positions on its membership, program, scholarship and awards, international relations, and nominating committees. He also continues his term as president of the Western Trauma Association. Dr. Deborah Stein, Associate Professor of Surgery and Chief of Trauma, was invested as the inaugural R Adams Cowley Professor in Shock and Trauma. Dr. Stein has a role on the Ad Hoc Acute Care Surgery Committee for the Eastern Association for the Surgery of Trauma (EAST) and the Ad Hoc Geriatric Trauma Committee for AAST. Dr. Rosemary Kozar is the president of the Shock Society. Dr. William Chiu is a member of the EAST Board of Directors as well as chairman for the Careers in Trauma Committee and ex officio for the Program Committee. He was also elected treasurer of the Surgical Critical Care Program Directors Society. Dr. Jose Diaz is on the Ad Hoc Acute Care Surgery Committee for EAST. Dr. Raymond Fang is the vice-chair of the Military Liaison Committee for EAST. Dr. Andrew Pollak, who has received the Boy Scout Health Services Leadership Award, is chair of the Department of Orthopaedics, Dr. Robert O'Toole is the co-chair

of the Program Committee for the Orthopaedic Trauma Association. Dr. Sam Tisherman has been appointed to the Trauma, Burns, and Critical Care Board of Surgery, and he is also president-elect of the Surgical Critical Care Program Directors Society.

Karen Doyle, MBA, MS, RN, NEA-BC, FAAN, was selected as a fellow in the American Academy of Nursing. She is a member of the Statewide EMS Advisory Council (SEMSAC) and has been elected into the Maryland State Firemen's Association (MSFA) Hall of Fame. Karen McQuillan, MS, RN, CSN-BC, CCRN, CNRN, FAAN, serves on the American Association of Critical-Care Nurses (AACN) Board of Directors and completed her year as president of the organization. She also serves on the AACN Certification Corporation. Tara Reed Carlson, MS, RN, is chair of the Maryland Trauma Center Network (TraumaNet) and holds a board position on the Partnership for a Safer Maryland. She received Nurse.com's 2015 Giving Excellence Meaning Award in Home, Community and Ambulatory Care for the DC/Maryland/Virginia region, and was also elected into the MSFA's Hall of Fame. Karen Memphis, RN, is a board member of the Brain Injury Association of Maryland.

Global Outreach

Because of the large number of trauma patients with a variety of injuries treated each year, a wealth of clinical and research experience has been accumulated at the Shock Trauma Center. Staff expertise is shared with other health care providers through presentations at regional, national, and international professional meetings and publications in peer-reviewed journals and books. Shock Trauma Center staff are frequently called upon as consultants to develop or improve trauma centers and systems in the United States and around the world. The Shock Trauma Center was highlighted in the six-episode series *Shock Trauma: Edge of Life*, which aired on the Discovery Life channel throughout 2016.

EMS Outreach

The Shock Trauma Center has an active prehospital outreach program, which includes both in-hospital and out-of-hospital training for prehospital providers. The EMS Office offers Maryland prehospital providers the opportunity to accompany a trauma nurse for eight hours in two different clinical settings: the TRU and a critical care unit. The primary objective of this program, available throughout the year, is to give prehospital providers a better understanding of the relationship between prehospital procedures and definitive treatment in the hospital. In FY 2016 the program hosted 80 EMS providers in the TRU and 15 EMS providers on a critical care unit. In FY 2016 the Shock Trauma Center initiated a new electronic medical record system and temporarily

suspended observation programs during this implementation process.

The EMS Office also offers ongoing educational opportunities for prehospital providers. In FY 2016, five evening educational programs open to prehospital and hospital providers were held and could be linked via live broadcasts to 24 remote sites across the state. Tours were given to two groups of EMS providers, for a total of 30 participants. The office is in the process of developing a virtual tour to enhance access to the organization's operations. In addition to the local and regional EMS conferences and planning teams, the Shock Trauma Center continued its collaboration with the *Journal of EMS* to provide speakers, courses, observations, and tours for the EMS Today conference. The EMS Office maintains a relationship with the conference and is an integral part of the planning committee.

Center for Injury Prevention and Policy

As a designated Adult Trauma Center, the Shock Trauma Center primarily focuses on trauma prevention for individuals aged 15 years and older. The University of Maryland Children's Hospital is the lead agency for Safe Kids Baltimore, a coalition dedicated to the prevention of unintentional childhood injuries and deaths for children younger than 15 years.

In a proactive effort to combat preventable injury, the Center for Injury Prevention and Policy (CIPP), led by Tara Reed Carlson, was established in 2011 to research, evaluate, and implement trauma prevention programs on a community, regional, and national level. The established mission of the CIPP is to reduce preventable injuries and violence and to reduce the consequences while establishing a culture of injury prevention in Maryland.

The Violence Prevention Program consists of three elements.

1. **The Violence Intervention Project (VIP)** identifies patients who are victims of violent injury in an effort to intervene and disrupt the cycle of violence, retaliation, and continued exposure to trauma. The program utilizes a multidisciplinary approach including social workers, caseworkers, nurses, physicians, and pastoral care to provide resources and intense, post-discharge case management services to these patients. In FY 2016 the VIP had 878 patient encounters.
2. **The Bridge Project** is a domestic/intimate partner violence initiative aimed at breaking the cycle of intimate partner abuse by intervening with patients who screen positive for or exhibit other signs and symptoms of intimate partner violence. The Bridge Project provides direct care for victims

of domestic violence using a multidisciplinary team and community resources. Other case management services include legal advocacy, court accompaniment, and assistance with social services. In FY 2016 the Bridge Program assisted 129 patients.

3. **Promoting Healthy Alternatives for Teens (PHAT)** operates as a single session workshop designed to expose youth to the consequences associated with poor decision-making by providing testimonials from victims and perpetrators of violence, as well as creative self-expression through spoken word poetry, theater, and role-playing exercises. PHAT programs are interactive in nature as the youth are introduced to a variety of hospital careers and are encouraged to ask about the professions. In FY 2016, six programs were conducted that reached 266 students.

The Trauma Prevention Program holds assemblies that focus on impaired and/or distracted driving at high schools throughout Maryland. In FY 2016 the CIPP presented 32 programs reaching 9,409 high school students and community members with important prevention messages.

The Saving Maryland At Risk Teens (SMART) Program began in 1979 and targets high school students with dangerous behaviors related to drug and/or alcohol use. The program consists of a partnership with seven counties and Baltimore City, and works in coordination with the Department of Juvenile Services, Family Court, the State's Attorney's Office, and the Office of Substance Abuse. In FY 2016 more than 193 teens attended the weekly two-hour program.

Adult Court-Ordered Drinking and Driving Monitoring Program focuses on adults charged with a DUI/DWI who are referred to the Shock Trauma Center for an educational experience as part of the Drinking and Driving Monitoring Program. Participants discuss poor decisions and the consequences they face, and review skills to make better decisions. In FY 2016, 572 adults were served by the two-hour program, which is offered once a month.

The Minds of the Future Program at the Shock Trauma Center is a three-hour educational session designed to meet the needs of junior and senior high school students interested in a health care career. The program introduces students to various careers in the hospital setting with both didactic and hands-on approaches, including presentations from a physician, nurse, and rehabilitation therapist; a tour of the hospital; and hands-on experiences in the simulation laboratory. In addition, students participate in breakout sessions with Rehabilitation Services and Trauma Prevention

Programs. In FY 2016 the program presented six courses serving 123 high school students.

Trauma Survivors Network (TSN) is a unique program created in collaboration with the American Trauma Society. The TSN is a compilation of programs, support groups, resources, and services with an underlying goal of helping patients and family members connect and rebuild their lives following a serious injury.

The TSN and the Shock Trauma Center recognize that the patient is at the center of the recovery process, and are committed to providing trauma patients and their families with tools to better manage their recovery and improve their lives. In FY 2016 the TSN coordinated or presented 410 events that served 2,380 individuals.

Level I Adult Trauma Center **The Johns Hopkins Hospital**

Located in Baltimore City, The Johns Hopkins Hospital Adult Trauma Center received 2,051 trauma patients from June 2015 to May 2016, according to the Maryland State Trauma Registry. (See pages 72 to 77 for additional patient data.)

Staff: David T. Efron, MD, FACS – Director of Adult Trauma and Chief of Acute Care Surgery. Kathy Noll, MSN – Trauma Program Manager. Ingrid Reynolds, MSN – Trauma PI Coordinator. Elliott R. Haut, MD, PhD; Kent A. Stevens, MD, MPH; Christian Jones, MD; Joseph Sakran, MD; Mariuxi Manukyan, MD – Trauma/Acute Care Surgery Attendings. Linda Dultz, MD, MPH; Alistair Kent, MD, MPH; Franz Yanagawa, MD – Trauma/Acute Care Surgery Clinical Fellows. Patricia Freeman, CRNP; Suzanne Heptinstall, CRNP – Nurse Practitioners.

The Johns Hopkins Hospital has been ranked number one in the nation 22 times by *U.S. News & World Report*. The hospital's Level I Adult Trauma Center in the Sheikh Zayed Adult Patient Care Tower, which opened in 2012, includes 6 state-of-the-art trauma rooms, 96 intensive care beds, 33 new operating rooms, and a radiology suite with CT, MRI, and ultrasound.

The Adult Trauma Center continues to provide 24/7, in-house trauma-attending surgeon coverage. A core group of six trauma/surgical intensivists maintain responsibility for clinical pathways and processes of care. Improved survival, triage time, and length of stay among critically-injured patients have been documented with this approach.

True to the mission of Johns Hopkins School of Medicine, the Trauma Division is dedicated to research that will improve access to care and outcomes for trauma patients. The Trauma Division maintains a unique relationship with Johns Hopkins Bloomberg School

of Public Health (JHSPH), encompassing all facets of ongoing research. In addition to its standing interest in violence and injury prevention, the Trauma Division has broadened its academic focus to identify ethnic and gender disparities in outcomes among critically-injured patients. Specific faculty interests include deep vein thrombosis prevention; benchmarking of population-based outcomes related to trauma care; quality of care studies; violence and injury prevention, both domestically and internationally; and evaluation, improvement, and implementation of trauma care systems in the developing world.

Dr. Elliott R. Haut completed his PhD in Clinical Investigation at JHSPH and is currently the principal investigator on Individualized Performance Feedback on Venous Thromboembolism Prevention Practice, a project funded by a grant from the Agency for Healthcare Research and Quality. His group is studying methods to engage physicians, nurses, and patients in efforts to improve prevention of venous thromboembolism (VTE) after trauma, after surgery, and during medical admissions. Dr. Haut leads the multidisciplinary VTE collaborative within the Armstrong Institute for Patient Safety and Quality at Johns Hopkins School of Medicine. He has published numerous articles related to his work on public reporting and prevention of deep vein thrombosis in trauma and other patient populations, and has influenced national policy in the field.

Dr. Haut was lead author on a paper commissioned by the National Academies of Sciences, Engineering, and Medicine titled “Military Trauma Care’s Learning Health System: The Importance of Data Driven Decision Making.” This paper was used to support the group’s main report, *A National Trauma Care System: Integrating Military and Civilian Trauma Systems to Achieve Zero Preventable Deaths After Injury*, which will be a new roadmap to improve trauma care nationwide.

The latest faculty member to join the Division of Acute Care Surgery is Dr. Christian Jones, an assistant professor of surgery, who comes to The Johns Hopkins Hospital after serving on the faculty of The Ohio State University College of Medicine in Columbus. Dr. Jones attended the Keck School of Medicine of the University of Southern California before completing his general surgery residency at University of Kansas Medical Center. He pursued a fellowship in surgical critical care at Ohio State before joining the faculty there and leading efforts to improve surgical education for medical students and residents. He joins The Johns Hopkins Hospital as the associate director of the Acute Care Surgery Fellowship and assistant program director for the Surgery Residency. His research focuses on database-driven outcomes and he is recognized as a national leader in developing surgeon engagement with



social media. He is a member of the Eastern Association for the Surgery of Trauma’s (EAST) Publications Committee and leads its Twitter-based journal club. In addition, he serves on the Committee on Technology and Communication for the Association of Academic Surgery. Dr. Jones is a vocal proponent of Free and Open Access Medical Education and is a founder and member of the Executive Committee of the International General Surgery Journal Club.

The Johns Hopkins Medicine Simulation Center is a state-of-the-art training facility that allows trauma professionals to refine advanced techniques utilizing practice scenarios and debriefings. Through a partnership between the emergency medicine and trauma departments, Dr. Jones will lead this effort as he challenges staff to hone assessment skills, improve patient safety, and increase interdisciplinary teamwork. In 2016 he led the Johns Hopkins Surgery “Boot Camp,” preparing graduating medical students for surgical internship in an intensive week-long course in combination with the department’s Minimally Invasive Surgery Training and Innovation Center.

Trauma faculty and staff at The Johns Hopkins Hospital are also involved in continuing education courses in EMS for prehospital providers. Faculty and staff teach the Critical Care Paramedic Program at

University of Maryland, Baltimore County, focusing on topics such as EMS protocols, tourniquets, trauma systems response, head injury, balloon pumps, and ventricular assist devices, and also provide instruction in EMS at the Baltimore City Fire Academy.

The Johns Hopkins Hospital has a vast and far-reaching role in the community, both in the Baltimore area and statewide. Members of the Trauma Center faculty aspire to advance the science of trauma care education throughout the country. Dr. Haut is the secretary and a member of the EAST Board of Directors, and recently served as chair of its Guidelines Committee. Dr. Efron sits on the board of the American Trauma Society, is the immediate past chair of the Maryland Trauma Center Network (TraumaNet), and is the incoming chair of the Maryland Committee on Trauma of the American College of Surgeons (ACS). Dr. Efron is also a course director for Advanced Trauma Life Support, Advanced Trauma Operative Management, Advanced Surgical Skills for Exposure in Trauma, and the Rural Trauma Team Development Course, all of which are ACS Committee on Trauma curricula. These courses are taught in conjunction with the faculty at the University of Maryland. Kathy Noll serves as treasurer of TraumaNet, and is also the Maryland chair for the Society of Trauma Nurses.

Community outreach and prevention efforts at The Johns Hopkins Hospital have supported the development of an Alcohol Screening and Brief Intervention (ASBI) program. The relevance of ASBI in trauma centers was originally identified in "Alcohol Interventions in a Trauma Center as a Means of Reducing the Risk of Injury Recurrence," published in the *Annals of Surgery* in 1999. The study determined that 50% of trauma patients screen positive for alcohol use and ASBI is an effective means to decrease trauma recidivism. In 2005 the ACS mandated inclusion of ASBI in trauma centers. The ASBI program for the Adult Trauma Service, although not currently mandated by the State of Maryland, provides a professional staff member who interviews and educates patients using personalized information to identify the need for ongoing resources and/or additional counseling. Ingrid Reynolds, in combination with the Adult Trauma Service social worker, provides leadership for the ASBI program. The program has been highlighted as a part of the curriculum of the JHSPH's Summer Institute on Injury Prevention. Additionally, a hospital-wide, multidisciplinary group that includes the Adult Trauma Service developed an alcohol withdrawal syndrome protocol that is currently used in the intermediate and intensive care units.

Collaboration on several statewide injury prevention initiatives began with a distracted driving fair held in April 2016. The event, held in conjunction with The Johns Hopkins Hospital's Pediatric Trauma Center, was

highlighted by a personal story as told by the mother of a victim of distracted driving. Other activities included speakers from the National Study Center and the JHSPH, a distracted driving simulator, educational pamphlets, and pledge signings. Plans are also underway for a fall prevention campaign in September focusing on tai chi as a means to create better balance and flexibility.

The Johns Hopkins Falls Prevention Clinic has developed a condensed screening questionnaire for providers to use as part of a falls prevention initiative. This tool promotes provider awareness in hospital and outpatient settings, and serves as a referral pathway for additional services through the clinic. Dr. Levan Atanelov directs the center's comprehensive multidisciplinary program designed for patients at risk of falls or who experience recurrent falls. Plans are underway to incorporate tai chi into community centers through a partnership between The Johns Hopkins Hospital's Trauma Division and the Falls Prevention Clinic.

The Johns Hopkins Hospital Adult Trauma Center works collaboratively with the Johns Hopkins Center for Gun Policy and Research, which provides expertise on the complex issues related to gun violence prevention. The Cure Violence initiative, a partnership among faculty from The Johns Hopkins Hospital's Division of Adult Trauma, Johns Hopkins Department of Emergency Medicine, the JHSPH, and the Baltimore City Health Department, will focus on enhancing violence prevention through proven violence interruption strategies and identification and treatment of the highest risk individuals. Daniel Webster, ScD, MPH, the center's director and an advocate for legislative and community-based prevention strategies, will be involved in the evaluation of the Cure Violence program.

Level II Adult Trauma Center **Johns Hopkins Bayview Medical Center**

The Trauma Program at Johns Hopkins Bayview Medical Center serves the citizens of eastern Baltimore City, northern and eastern Baltimore County, southern Cecil County, and Harford County. The Trauma Program entered 2,448 trauma patients into the Maryland State Trauma Registry from June 2015 to May 2016, a 6% increase from the previous year. (See pages 72 to 77 for additional patient data.)

Staff: Nathaniel McQuay Jr, MD, FACS – Clinical Medical Director for the Trauma Program and Co-Director of Surgical Critical Care. Marie Dieter, MSN, MBA, RN, CEN, TCRN – Trauma Program Manager. Acute Care Surgery Division: A. Reema Kar, MD – Trauma Attending Faculty; Michael Cooley, CRNP – Lead Surgical NP.

The Johns Hopkins Bayview Medical Center (JHBMC) Trauma Program is committed to providing access to emergency surgical care for acutely-injured patients with time-sensitive injuries. The Trauma Program provides patient-centered comprehensive care to all trauma patients using a team-oriented approach. Under the collaborative leadership of specialized physicians, nurses, and members of the health care team, the Trauma Program continues to advance with implementation of protocols to address patient, community, and institutional needs.

The ultimate goal of the JHBMC Trauma Program is to optimize care of the acutely-injured patient through collaborative research and the application of evidence-based practices. To achieve this goal, the Trauma Program uses a multidisciplinary approach to the management of the adult trauma patient and the community with dedicated support from emergency medicine, anesthesia, orthopaedics, neurosurgery, plastic surgery, rehabilitation, nursing, and support staff.

The JHBMC Trauma Program submits records annually to the American College of Surgeons' National Trauma Data Bank (NTDB), the largest aggregation of US trauma registry data ever assembled. JHBMC's participation in the NTDB is required by MIEMSS, and allows the Trauma Program to benchmark against national norms and to participate in trauma-related research. This type of self-assessment facilitates performance improvement opportunities and also contributed to JHBMC's annual trauma patient survival rate of 97% or greater for the past five years.

The JHBMC Trauma Program realizes the importance of community outreach and injury prevention, as well as clinical education for acute care professionals and prehospital providers throughout the region. Many existing programs continue to serve these health care colleagues and the community at large. Examples of these programs include

- Topics in Emergency Medicine (course offered twice a year for prehospital providers to obtain continuing education credits)
- Trauma education seminars for nurses
- Trauma education for resident physicians

Johns Hopkins Bayview Medical Center chose community-based fall prevention as a strategic initiative for FY 2016. The leadership, geriatrics, and trauma program departments have developed strategies and tactics to implement a fall prevention plan in the community. This strategic initiative has three arms that focus on fall prevention: community, inpatient population, and health care provider.

The Trauma Program held its First Annual Fall Prevention Awareness Fair on September 17, 2015,

during which Jade Leung, chief of the Division of Injury Prevention in the Maryland Department of Health and Mental Hygiene, presented JHBMC's trauma leadership with a Governor's Fall Prevention Proclamation. This program was well-attended by visitors and staff. The Trauma Program represents JHBMC on the statewide Maryland Fall Prevention Coalition and Baltimore City's Fall Prevention committee, and has also partnered with the Baltimore Falls Reduction Initiative and Engaging Neighborhoods and Data (B'FRIEND) program.

On April 6, 2016, JHBMC Trauma Program participated in a statewide distracted driving initiative spearheaded by the Maryland Trauma Quality Improvement Committee, of which JHBMC is a member. The initiative touched the lives of thousands of Maryland residents through brochures, driving simulators, and media exposure.

The JHBMC Trauma Program continues to expand its injury prevention partnerships through various state committees, including distracted driving and pedestrian and bicyclist safety.

Level II Adult Trauma Center Prince George's Hospital Center

Located in Cheverly, the Prince George's Hospital Center's Trauma Center continues to provide a high level of quality trauma care to the ever-increasing volume of trauma patients it receives. It serves as the primary Adult Trauma Center for Prince George's, Calvert, Charles, St. Mary's, and Southern Anne Arundel Counties, as well as several areas within Montgomery and Howard Counties, and the eastern parts of Washington, DC. The Trauma Center is supported by several board-certified general surgeons who are all certified in Advanced Trauma Life Support. The trauma team also includes orthopaedic traumatologists, neurosurgeons, PGY-4 residents, physician assistants, and medical students. According to the Maryland State Trauma Registry, Prince George's Hospital Center received 3,385 trauma patients from June 2015 through May 2016. (See pages 72 to 77 for additional patient data.)

Staff: R. Sean Benoit, MD, MBA, FACS—Trauma Medical Director. Gabriel Ryb, MD, MPH, FACS—Assistant Medical Director. (Drs. Benoit and Ryb both hold clinical appointments at the University of Maryland School of Medicine.) Dawn Moreland, BSN, RN, TCRN—Trauma Program Manager. Anna Cleveland, LCSW-C—Trauma Social Worker. Jody Shirley, RN—Trauma Registry Coordinator. Lisa Kriner, Betty Fields, Angelle Simms—Trauma Registrars.

As the only designated Adult Trauma Center in Prince George's County, and the second busiest Trauma Center in Maryland, Prince George's Hospital Center (PGHC) continues to see a rise in the number of citizens sustaining injuries and requiring treatment. While most of these are motor vehicle crashes, a large percentage of these injuries increasingly result from violent acts, including gunshot wounds and stabbings. As a result, and to reduce recidivism and readmissions, new injury prevention efforts are being made to reach surrounding jurisdictions, area schools, and national organizations, including incorporating the hospital-based National Capital Area Violence Intervention Program (VIP). PGHC's partners in the VIP include professors from the University of Maryland and government officials from Washington, DC. Other injury prevention efforts include continuing to partner with local police on gun buyback programs.

Additionally, PGHC is excited to introduce the John "Jack" Godfrey Brain Injury Support Group, named in honor of a former patient. This group, housed on the campus of PGHC, is dedicated to providing support to survivors and their caretakers. It is part of the Brain Injury Association of Maryland, and is the only brain injury support group in Prince George's County. The survivors of traumatic brain injury and their caretakers will learn much from each other in this support group. The classes will be facilitated by a trauma social worker and a speech language pathologist.

Moving forward, the PGHC Trauma Center remains enthusiastic about the continued growth in its relationship with the University of Maryland Medical System to bring comprehensive and responsive health care to Prince George's County and surrounding area residents.

Level II Adult Trauma Center Sinai Hospital

Located in the northwest corridor of Baltimore City, Sinai Hospital Trauma Center serves the Greater Baltimore Metropolitan area. The trauma volumes at Sinai Hospital continue to increase, with leading mechanisms of injuries that include motor vehicle collisions and falls. This is followed by penetrating trauma, which has shown an upward trend over the past year. The Trauma Program resides within the Department of Surgery, and is staffed by a team of in-house fellowship-trained trauma critical care surgeons 24/7, a successful and growing surgical residency program, and an experienced advanced

practice provider staff. Sinai Hospital reported receiving 2,037 trauma patients from June 2015 through May 2016, according to the Maryland State Trauma Registry. (See pages 72 to 77 for additional patient data.)

Staff: Mark Katlic, MD – Chairman, Department of Surgery and Surgeon-in-Chief. Hashim Hesham, MD – Trauma Medical Director and Division Head of Acute Care Surgery. Lauren Smith, MSN, ACNP – Trauma Program Manager. Karen Sweeney, BSN – Clinical Systems Coordinator. John David Morris, Carolyn Reeves, Blanca Sanders – Trauma Registry Staff.

The mission at Sinai Hospital is to maintain and improve health, and continue its dedication to delivering quality, evidence-based care resulting in the best possible outcomes for trauma patients. Trauma surgery, emergency medicine, neurosurgery, orthopaedics, anesthesia, respiratory, radiology, and nursing departments are all committed to a multidisciplinary approach to patient care and performance improvement efforts. Through a new initiative, the Department of Surgery's Trauma Program led efforts focused on improving communication and documentation. Initial results of this project have shown a decrease in the length-of-stay of trauma patients. These efforts earned a first place award in this year's systemwide resident quality competition. Other quality projects related to anticoagulation reversal, blood utilization, identification and treatment of delirium, and pain management are ongoing.

With current shifts toward population health delivery models, Sinai Hospital recognizes that comprehensive care is more important than ever. The hospital has optimized the communication between inpatient and outpatient care units with the goal of improving follow-up compliance. To date there has been a 20% reduction in no-show appointments. An additional outpatient trauma clinic has opened to go beyond addressing routine trauma/post-op follow-up. This clinic also connects patients with the resources they require to manage any medical, social, or primary care needs that were identified during admission. These patients may also be referred to the necessary specialty services to address any incidental findings that may have been diagnosed as part of their trauma evaluation.

Injury prevention efforts have also expanded, including using data from the Maryland State Trauma Registry to focus efforts where the communities served

by Sinai Hospital need them most. Much of the focus on prevention is on raising awareness to the dangers of distracted driving through internal hospital programs as well as collaboratively with the Maryland Trauma Quality Improvement Committee (TQIC), Maryland State Police, and AT&T's It Can Wait campaign. The partnership continues with the Maryland Department of Health and Mental Hygiene by offering Stepping On, a well-researched fall prevention program, in the communities served by Sinai Hospital. The hospital is also committed to violence prevention, which has been a rising concern as evidenced by an increase in the treatment of penetrating injuries. The Trauma Program is collaborating with leadership in the population health/community initiatives, community development, and emergency departments. Sinai Hospital's Community Initiatives Department has developed the Kujichagulia Center, a youth mentoring and intervention program. This program offers resources proven to have a life-changing impact on young men in the community, breaking the cycle of violence that may otherwise occur. Sinai Hospital has also been working with the Baltimore City Health Department and Safe Streets programs, as well as other trauma centers and emergency departments, to improve communication and expand resources for patients who experience violence.

Sinai Hospital continues its active participation in regional and national organizations to advance all aspects of patient care, including the American College of Surgeons, Eastern Association for Surgery in Trauma, Maryland Committee on Trauma, Maryland TQIC, and the Maryland Trauma Center Network (TraumaNet). Sinai Hospital places a high value on education of its staff at all provider levels. Trauma surgeons at the hospital are Advanced Trauma Life Support (ATLS) instructors, and are active in multiple trauma organizations. All surgical residents and advanced practice providers maintain current ATLS certification in Advanced Cardiovascular Life Support. All residents receive additional training in Advanced Trauma Operative Management, Focused Abdominal Sonography in Trauma, Advanced Surgical Skills for Exposure in Trauma, and an eight-week rotation at the R Adams Cowley Shock Trauma Center during their post-graduate III-V years. The simulation lab continues to grow and provide multidisciplinary education and team building opportunities. Sinai Hospital and its Trauma Center strive to maintain an excellent working relationship and open communication with EMS and its providers in the

Greater Baltimore Metropolitan area by participating in local, regional, and state meetings, and training EMS students across central Maryland.

Sinai Hospital is continually trying to improve by offering the newest technology and best experience to its patients. The Emergency Department is currently being expanded, including adding a second state-of-the-art CT scanner to provide better imaging and improve patient flow, and a new pediatric care center and observation area was recently completed. The Trauma Center now uses Lifelink, a new technology system intended to optimize communication with internal and external physicians, as well as EMS, and to improve interfacility transfers. Under the leadership of CEO of LifeBridge Health Neal Meltzer and President of Sinai Hospital and Executive Vice President of LifeBridge Health Amy Perry, the institution continues to add resources at all levels of care to prevent injuries and improve the outcomes of those who experience trauma.

Level II Adult Trauma Center Suburban Hospital – Johns Hopkins Medicine

Located in Bethesda, Suburban Hospital is the only designated Adult Trauma Center in Montgomery County, serving the residents of Bethesda, Potomac, Kensington, Rockville, Silver Spring, Germantown, and Gaithersburg. It also provides backup support to Frederick, Washington, and Prince George's Counties. According to the Maryland State Trauma Registry, 1,208 trauma patients were treated at Suburban Hospital from June 2015 through May 2016. (See pages 72 to 77 for additional patient data.)

Staff: Dany Westerband, MD, FACS – Medical Director of Trauma Services. Melissa Meyers, RN, BSN, MBA – Trauma Program Director. Gimra Harrison, BS – Trauma Clinical Data Abstractor. Voula McDonough, RN, BSN, CHEP – Lead Trauma Performance Improvement RN. Taryn Giza, RN, BSN, CEN – Trauma Performance Improvement RN.

The Trauma Center at Suburban Hospital, a member of Johns Hopkins Medicine, continues to aim to deliver the highest level of quality trauma care. A driving force in the Quality Management program at Suburban Hospital is the daily concurrent and retrospective review of trauma care. Through a careful process that involves a thorough review of all records, clinical and system issues are rapidly identified, addressed timely, and further

discussed at monthly intradepartmental and multidisciplinary meetings, which often lead to the development of new policies and treatment guidelines. Furthermore, significant complications and management challenges are also brought up for discussion at monthly morbidity and mortality conferences, which serve as educational forums for the trauma surgeons, emergency department physicians, intensivists, surgical residents, nurse practitioners, physician assistants, registered nurses, and many other clinicians involved in the provision of daily trauma care.

More recently, a trauma team training program led by Dany Westerband, MD, FACS, the medical director of Trauma Services and surgical residency liaison director for Suburban Hospital, has been added to the Trauma Center's quality improvement initiatives. Trauma Services hopes use this program to maximize the benefits of effective communication and teamwork during resuscitation of critically-injured patients.

As a leader in emergency preparedness, Suburban Hospital continues to partner with a number of regional emergency preparedness groups such as the Montgomery County Collaborative on Emergency Preparedness, the MIEMSS Region V Emergency Preparedness Coalition, the Johns Hopkins Center for Preparedness and Emergency Response, and the Bethesda Hospitals' Emergency Preparedness Partnership. Each of these partnerships was established out of an identified need for coordinated community collaboration in response to man-made or natural disasters. Through these solid alliances and expanded participation in local, state, and national disaster drills, Suburban Hospital remains one of the most highly-prepared trauma centers in the nation, proudly representing MIEMSS Region V in Emergency Support Function #8 activities for the National Capital Region (NCR).

In addition to participation in MIEMSS Region V and NCR emergency preparedness exercises, Suburban Hospital sponsors a two-day first receiver operator training annually, which is open to other Region V partners. Participants extend beyond the emergency department with representation of multiple disciplines including doctors, nurses, patient care technicians, security personnel, municipal police officers, and respiratory therapists.

In response to the increase in domestic mass casualty/active shooter incidents, Dr. Westerband presented an inaugural Bleeding Control Course (B-Con) at Suburban Hospital during the MIEMSS Region V mass casualty exercise this past spring. This new course, developed for training lay personnel in

external hemorrhage control, was first given at Suburban Hospital to establish a core group of hospital-based instructors who are able to assist with its dissemination to the population of Montgomery County and other surrounding communities.

To ensure that trauma and other vital health care services are available to the community at all times, the Suburban Hospital administration has remained fully committed to maintaining hospital diversion hours to a minimum. Suburban Hospital's implementation of the 24/7 nursing supervisor position, which focused on optimizing patient throughput last year, has been successful in achieving this goal.

In April 2016 Suburban Hospital participated in the first statewide Trauma Center initiative to prevent distracted driving. Other activities related to injury prevention include yearly presentations to high school seniors enrolled in Suburban Hospital's Medical Venture's program, tours of the trauma bays to teenagers, lectures to the Girl Scouts of the USA, and the hospital's fall prevention and balance programs organized by the Physical Medicine Department and presented at Montgomery County senior centers. These programs include trained physical therapists from Suburban Hospital who initiate fall-risk screenings and ensure community education on same-level falls by offering diverse lectures and classes on balance exercises and safety strategies to seniors.

Dr. Westerband remains heavily committed to trauma education. As the current chair of the Maryland Committee on Trauma of the American College of Surgeons (ACS), he is closely involved in the dissemination and teaching of all ACS-sponsored trauma courses, including Advanced Trauma Life Support, Advanced Trauma Operative Management, Advanced Surgical Skills for Exposure in Trauma, Disaster Management and Emergency Preparedness, as well as the Trauma Outcomes and Performance Improvement Course developed by the Society of Trauma Nurses. In addition, Dr. Westerband continues to serve on the Maryland EMS Board and is an active member of the American Association for the Surgery of Trauma and the Eastern Association for the Surgery of Trauma. Melissa Meyers, RN, BSN, MBA, the trauma program director, serves on the Statewide EMS Advisory Council and other state-level trauma committees, is a board member of the Maryland Division of the American Trauma Society, and is an active member of the Society of Trauma Nurses. She is also an Advanced Trauma Nursing instructor.

Suburban Hospital's Emergency Department is also a training site for prehospital care providers through an agreement with Montgomery County Community College and the Montgomery County Training Academy. The hospital sponsors an emergency medical technician to certified nursing assistant bridge program, free of charge, for prehospital care providers interested in working as emergency department technicians.

In June 2016 a four-hour seminar, "Critical Issues in Trauma," was sponsored by Suburban Hospital's Trauma Center at the Johns Hopkins University Montgomery County Campus. This program, which included speakers from other academic medical centers, was offered free of charge to the region's trauma community. The conference was attended by approximately 200 trauma care providers, including physicians, registered nurses, physician assistants, and EMS providers.

Level III Adult Trauma Center Meritus Medical Center

Located in Hagerstown, Trauma Services at Meritus Medical Center serves the residents of Washington and Frederick counties, southern Pennsylvania, and the eastern panhandle of West Virginia. From June 2015 to May 2016, Trauma Services received 1,232 trauma patients, according to the Maryland State Trauma Registry. (See pages 72 to 77 for additional patient data.) Vehicle crashes and injuries among the elderly account for the majority of trauma in the tristate area; however, the incidence of penetrating injuries is increasing. More than 95% of the trauma patients treated at Meritus Medical Center arrived via ground EMS.

Staff: Frank Collins, MD, FACS – Director. Marc E. Kross, MD, PhD, FACS – Surgeon-in-Chief. Susie Burtleson, MSN, MBA, RN – Trauma/EMS Manager. Bobbi Kimple, LPN – Trauma Registrar.

EMS Partners

Meritus Medical Center's Trauma Services values its working relationship with EMS providers throughout the region. It serves as a clinical site for paramedic programs in Maryland by providing opportunities for prehospital education through case presentations and other educational opportunities. In addition, the staff regularly attends EMS jurisdictional and MIEMSS Region II EMS Advisory Council meetings.

Community Impact

The dedicated staff of Trauma Services continues to advocate for injury prevention throughout the community. In coordination with the Safe Kids Washington County Coalition, safety events focusing on child passenger safety, bicycle safety, and injury prevention were held in targeted neighborhoods in Washington County. Trauma Services has taken on the leadership role for Safe Kids Washington County, including conducting monthly car seat safety and installation checks and operating a child safety seat loaner program. Trauma Services has also partnered with the Washington County Health Department to provide Stepping On, a class designed to help prevent falls in the elderly. Each partner has made an investment to ensure that the county is a safe place to live, work, and visit.

Following the state and national trend, Washington County saw an increase in injuries related to distracted driving. Meritus Medical Center's award-winning Stay Alive! Don't Text and Drive campaign was targeted at teens and their families to increase awareness of the devastating effects of distracted driving, especially texting and driving. The program continues to be supported by EMS partners, regional businesses, public school systems, law enforcement, and community leaders. On April 6, 2016, Trauma Services partnered with other Maryland Trauma Centers for a public education initiative on the risks of distracted driving.

Education and Outreach

Trauma Services hosted two multidisciplinary trauma conferences for direct-care providers in fall 2015 and spring 2016. Plans are in place to continue this semiannual event in upcoming years. Members of the staff, such as Surgeon-in-Chief Dr. Marc E. Kross, have spoken on trauma-related topics to local health care and community groups. The Trauma Nursing Core Course and Emergency Nursing Pediatric Course are taught at Meritus Medical Center, and Trauma Services provides quarterly case studies and educational opportunities to EMS throughout the year.

The William L. Riggle Memorial Trauma Nurse Education Fund continues to provide scholarship money for trauma nurses who are continuing their education.

Trauma Services staff celebrated Trauma Awareness Month (May) with an art contest for Washington County elementary school students on injury prevention. To further celebrate the contributions and dedication of the staff, the hospital held an annual Trauma Team Recognition Day and recognized a trauma nurse for providing exceptional care.

Level III Adult Trauma Center

Peninsula Regional Medical Center

Located in Salisbury, 30 miles west of Ocean City, Peninsula Regional Medical Center (PRMC) is the only designated Trauma Center located on the Eastern Shore of Maryland. PRMC received 1,219 trauma patients from June 2015 to May 2016, according to the Maryland State Trauma Registry. (See pages 72 to 77 for additional patient data.) PRMC is a Joint Commission on Accreditation of Healthcare Organizations (JCAHO)-certified Acute Myocardial Infarction (AMI) and Stroke Center.

Staff: Brion McCutcheon, MD – Trauma Medical Director. Kari Cheezum, RN, BSN, CEN – Trauma Program Manager. Tonya Paige, EMT – Trauma Registrar. Doug Walters, RN, EMT-I – EMS Nurse Liaison and AHA Faculty Coordinator.

The Peninsula Regional Medical Center (PRMC) Trauma Center continues to coordinate and participate in community-based injury prevention initiatives. During the prom season of spring 2016, Trauma Department nurses and staff assisted the Wicomico Highway Safety Task Force, Wicomico Sheriff's Department, Salisbury Fire Department, Salisbury Police Department, and the Maryland State Police Aviation Command with a mock-crash scenario for local high schools. In April 2016 Trauma Department staff participated in the first statewide injury prevention initiative, focusing on distracted driving awareness. In addition, the staff continue to work with the Maryland Division of the American Trauma Society and local communities for various wellness events. For the past four years, the Trauma Department staff, along with TraumaRoo, the American Trauma Society's children's safety program, provided injury prevention education to children at the Maryland State Firemen's Association's Annual Convention and Conference in Ocean City, and have also attended the Critical Care Symposium and American Association of Critical-Care Nurses conference to help increase awareness of local hospitals and EMS companies located in MIEMSS Region IV. Trauma Department staff joined the Ocean City Pedestrian Safety Task Force in 2012, which aims to improve pedestrian safety in Worcester County.

Peninsula Regional Medical Center continues to assist in planning, coordinating, and sponsoring regular educational events. A multidisciplinary group coordinates and sponsors the annual Topics in Trauma

Conference, which is in its 26th year. Conference topics are applicable to the daily practice of prehospital care as well as to advanced inpatient trauma care. This annual regional conference continues to attract nurses and EMS providers from Maryland, Delaware, Pennsylvania, and Virginia. In 2015 Trauma Program Manager Kari Cheezum, RN, BSN, CEN, and EMS Nurse Liaison Doug Walters, RN, EMT-I, became certified Trauma Nurse Core Course instructors.

Educational classes for EMS providers from Worcester, Wicomico, and Somerset Counties continued to be provided by PRMC in FY 2016. Pediatric Education for Prehospital Providers, Prehospital Basic Trauma Life Support, advanced life support paramedic recertifications/refreshers, 12-lead EKG interpretation classes for prehospital providers, and ALS skills are just a few of the classes offered. PRMC continues to support Wor-Wic Community College EMS programs as a clinical site for students.

Peninsula Regional Medical Center promotes open communication with the surrounding EMS community. The EMS nurse liaison attends EMS jurisdiction, MIEMSS Region IV EMS Advisory Council, and quality assurance meetings on a regular basis to offer feedback to the EMS populations served by the Trauma Center. The liaison also serves on the Wor-Wic Community College EMS Council, Wicomico County Highway Safety Advisory Council, Worcester County Pedestrian Safety Council, and several EMS advisory councils local to the area served by PRMC.

Level III Adult Trauma Center

Western Maryland Regional Medical Center

Located in Cumberland, the Trauma Center at Western Maryland Regional Medical Center, part of Western Maryland Health System (WMHS), is the only designated Trauma Center in Allegany and Garrett Counties. WMHS received 597 patients from June 2015 to May 2016, according to the Maryland State Trauma Registry. (See pages 72 to 77 for additional patient data.) WMHS is certified by the Joint Commission on Accreditation of Healthcare Organizations.

Staff: Juan Arrisueno, MD – Trauma Director. Elizabeth Wooster, PhD, RN, MS, MsEM – Trauma Services Program Manager. Kathy Witt – Trauma Services Registrar. William Hardy – Prehospital Care Coordinator. Debi Wolford, Fawn Gerhard, Samantha Judy – Forensic Nurse Examiners.

In FY 2016 the Emergency Department at Western Maryland Health System (WMHS) Regional Medical Center welcomed 50,543 patients through its doors; of these patients, 597 met criteria to be placed in the Maryland State Trauma Registry. WMHS is committed to providing the most comprehensive care possible to the citizens of MIEMSS Region I, which includes Allegany and Garrett Counties, and also serving the bordering states of West Virginia and Pennsylvania.

As the Base Station coordinator, Trauma Services Program Manager Elizabeth Wooster, PhD, RN, MS, MsEM, facilitates communication between hospital and prehospital personnel. She also serves as the specialty care transport coordinator and holds positions on the Miltenberger Emergency Services Seminar planning committee, on MIEMSS Region I EMS Advisory Council, and is the vice-chair of the Maryland Trauma Center Network (TraumaNet). Dr. Wooster and Trauma Director Dr. Juan Arrisueno both serve as committee members on MIEMSS' Adult Trauma Standards Workgroup.

Western Maryland Health System employs full-time and part-time forensic nurse examiners who work closely with local law enforcement and the domestic violence advocate at the local District Attorney's office. They also act as a resource for all employees and patients of WMHS on domestic violence issues. Forensic nurse examiners provide not only system employee education on domestic violence and forensics, but are active in presenting to a wide range of community organizations.

The system actively participates in providing community health education and injury prevention, a high priority in MIEMSS Region I. Trauma Services presents at health fairs and school programs (primary, secondary, tertiary) and delivers individual lectures. Data from the Maryland State Trauma Registry is used to focus prevention activities on the injuries most seen and the issues specific to the communities served by WMHS, such as all-terrain vehicle safety, motor vehicle safety, child passenger safety, hunter safety, fall prevention for the elderly, exposure prevention, and boating and camping safety. A recent example of this community awareness on trauma is a coordinated initiative for a distracted driving event that took place on April 6, 2016, with repeated events later that month. Participating in this event along with WMHS were Allegany County EMS Chief John Herath and Garrett County EMS Chief Wayne Tiemersma, the Maryland State Highway Administration, and multiple law-enforcement agencies, among others. Information regarding distracted driving, with an emphasis on texting while driving, was presented in a hands-on event that was well-attended and had positive reviews.



Dr. Wooster, along with TraumaRoo, the American Trauma Society's mascot for childhood injury prevention programs, has made many appearances at local health fairs, parades, schools, and other venues. She also delivers the lecture "Trauma Nurses Talk Tough" to high school students in Western Maryland, West Virginia, Pennsylvania, and Virginia. In addition to helping younger students, Dr. Wooster has lectured at many colleges and universities on topics such as injury prevention and injury-specific physiology, treatment, and outcomes.

"Watch Your Step" is an injury prevention lecture focused on the senior citizen population. The lecture was presented to 4,238 seniors in Western Maryland, West Virginia, and Pennsylvania during FY 2016.

In partnership with law enforcement, fire, and EMS, WMHS provides educational lectures for citizens and other stakeholders in the community on the growing problems of "bath salts," synthetic "marijuana," and heroin use, as well as the increase in gang violence and active assailant assaults. WMHS is actively teaching the Bleeding Control Course (B-Con) as part of the national initiative to enhance the survivability of intentional mass casualty and active assailant events proposed in the American College of Surgeons' *Hartford Consensus III*.

The Emergency Department staff coordinates activities for the observance of EMS Week. In addition to recognizing prehospital care providers for the critical role they play in the chain of survival, the staff uses this dedicated week as a forum to educate the public on the appropriate use of the 9-1-1 and emergency care systems.

Moving forward into 2017, with the selfless commitment of its staff, Western Maryland Health System will continue to provide expert trauma care.

Adult Burn Center

The Burn Center at Johns Hopkins Bayview Medical Center

The Burn Center at Johns Hopkins Bayview Medical Center is verified by the American Burn Association and the only designated Adult Burn Center in Maryland. The Burn Center not only serves the citizens of Maryland, but also receives patients from surrounding states. The Burn Center submits data to the National Burn Repository (NBR) annually. The NBR is a comprehensive overview of cumulative burn-related data from 2004 through 2015 from both national and international burn centers. (See pages 78 to 80 for additional patient data.) The Burn Center provides critical, acute, and subacute care to burn and wound patients aged 15 years and older. It is comprised of two units, the Burn Intensive Care Unit (BICU) and the Burn Wound Unit (BWU), totaling 20 beds. Higher acuity patients are treated in the BICU, while patients needing rehabilitative and subacute care are treated in the BWU.

Staff: Stephen Milner, MD, DDS – Burn Center Director, Professor of Plastic Surgery, and Director of the Michael D. Hendrix Burn Research Center. Julie Caffrey, DO, MS – Assistant Professor of Plastic and Reconstructive Surgery. Kelly Krout, DNP, MS, RN – Patient Care Manager for the Burn Center and Surgical Intensive Care Unit. Carrie Cox, MS, RN – Community Outreach and Clinical Education Coordinator.

The Burn Center at Johns Hopkins Bayview Medical Center realizes the importance of community outreach and burn prevention, as well as clinical education for health care professionals who may come into contact with burn patients throughout the region. Many programs currently exist to serve burn survivors, the community, and fellow health care colleagues:

- Fire safety and burn program for adults and senior citizens
- Kiwanis community burn prevention program for school-aged children
- Safe babies program for newborns and their parents
- Juvenile fire-setter program for at-risk youth
- New Life Burn Society survivor support group
- School re-entry program for burn survivor children
- Image enhancement program for burn survivors

- Survivors Offering Assistance in Recovery (SOAR) program
- Annual participation in numerous statewide health and safety fairs
- Providing lectures for nursing schools, EMS programs, trauma conferences, and continuing education seminars throughout the region

Clinical education programs currently provided by the Burn Center include

- Advanced Burn Life Support (ABLS) provider certification courses
- Emergency Department burn poster program
- Military burn education program
- EMS/firefighter burn course
- On-site clinical training for medical, nursing, rehabilitation, psychology, and dietitian students, as well as EMS providers and firefighters

In keeping with the mission and vision of Johns Hopkins Medicine, laboratory, clinical, and translational research is a key focus for the Burn Center, which is currently collaborating on research with many disciplines, including burn nutrition, burn rehabilitation, psychology, critical care service, nursing, and with the physician and fellow staff. The Michael D. Hendrix Research Laboratory actively studies the non-healing wound environment and is looking at ways to improve or speed burn wound healing. The purpose of Burn Center research is to study methods and techniques that may improve patient care, promote patient safety, and reduce morbidity and mortality in the burn patient population.

Adult Burn Center

MedStar Washington Hospital Center

The Burn Center at MedStar Washington Hospital Center is the regional Adult Burn Center for Southern Maryland, Northern Virginia, eastern West Virginia, and Washington, DC. The Burn Center is verified by the American Burn Association and the Committee on Trauma of the American College of Surgeons.

The Burn 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 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.

This 20-bed facility features an intensive care unit with its own operating room and an intermediate care/rehabilitation unit, both of which provide wound care and progressive rehabilitation. With more than 600 admissions annually, the Burn Center provides care for an array of thermal, electrical, and chemical injuries as well as soft tissue lesions. The outpatient burn clinic provides care for more than 850 patients annually.

Pediatric Burn Center **The Johns Hopkins Children's Center**

From June 2015 to May 2016, the Pediatric Burn Center at The Johns Hopkins Children's Center treated 394 children with severe burn injuries, with 138 patients admitted. (See pages 85 to 88 for additional pediatric burn data.)

The Pediatric Burn Center, located in The Charlotte R. Bloomberg Children's Center building, experienced another year of unprecedented growth. Inpatient admissions, complex surgical procedures, and outpatient visits have all expanded significantly. Some of this growth comes from the Baltimore region, but much of the increased volume may come from the Pediatric Burn Center's outreach to regional pediatric centers and the growing realization that it is a major regional burn resource for children.

The Pediatric Burn Center is part of the Johns Hopkins Regional Burn Center. Dylan Stewart, FACS, serves as the director and Dr. Richard Redett is the co-director of the Pediatric Burn Unit. Dr. Stewart, a pediatric surgeon, oversees the clinical care, teaching, research activities, and administrative duties related to the Pediatric Burn Program at The Johns Hopkins Children's Center (JHCC). Together they provide all aspects of acute and reconstructive pediatric burn surgery.

Dr. David Hackam continues to serve as the pediatric surgeon-in-chief, having shared authority in the overall management of JHCC. He oversees all divisions of children's surgery and is co-functional unit director. Dr. Hackam sits on the JHCC Board of Directors representing both Pediatric Surgery and the entire children's center; as such, the commitment to providing the best possible care for injured children is assured by those most invested in the program. Dr. Hackam is developing five centers of excellence, with the Pediatric Burn Program being at the top of his list.

Susan Ziegfeld is a master's-prepared nurse practitioner who serves full-time as the burn program manager. Lisa Puett, BSN, is the pediatric burn quality improvement coordinator.

Injury prevention services have expanded this year with the addition of a second coordinator and many volunteers. Led by Lauren Davis, MSW, the burn injury prevention and outreach program offers injury prevention education for patients and families in JHCC and the community.

As well as the expansion of injury prevention programs, several IRB-approved studies, such as pediatric pain management research and a study titled Parent and Child Adjustment to Pediatric Burn Injuries, are underway at the Pediatric Burn Center, and will also be presented at national meetings.

Pediatric burn care at JHCC is truly a multidisciplinary effort, having multiple subspecialists with specific expertise in children contributing to provide the best care for the most severely burned child. This acute care team includes pediatric burn surgeons, pediatric intensivists, pediatric plastic and reconstructive surgeons, pediatric infectious disease specialists, dedicated pediatric pain service, nutritionists, pharmacists, social workers, therapists, psychologists, and nurses.

Critically-ill burned children are cared for in designated burn beds in the Pediatric Intensive Care Unit, whereas less acute children are managed on the 20-bed unit specifically designated as the Burn Unit, with highly trained nurse specialists, therapists, and child life specialists.

Pediatric Burn Center **Children's National Health System**

From June 2015 to May 2016, Children's National Health System's pediatric burn specialty referral center treated 797 patients requiring initial burn care, for a total of 1,836 burn visits. Children injured or residing in Maryland accounted for 320 unique burn clinic visits, 200 patients discharged from the Emergency Department, and 44 patients admitted. (See pages 85 to 88 for additional pediatric burn data.)

Staff: Randall Burd, MD, PhD, Burn Center Director and Chief of Trauma and Burn Surgery. Jennifer Fritzeen, MSN, RN, PCNS-BC – Trauma and Burn Program Manager. Cindy Colson, MSN, RN, Process Improvement Team Leader; Omar Ahmed, MD, Research Staff Leader; Yu Yan, MSN, RN, Burn Prevention/Burn Registry Staff Leader; Janice Lambrose, BSN, RN, Outreach Staff Leader, in partnership with Safe Kids District of Columbia, managed by Chenille Holloman; and five Pediatric Acute Care Nurse Practitioners (forming the Burn Clinical Staff).

The Children's National Health System (Children's National) has served as a Pediatric Burn Center in Maryland for over three decades. Children's National serves the pediatric communities of MIEMSS Region V, which includes Montgomery, Prince George's, Calvert, Charles, and St. Mary's Counties, as well as those in the western regions of the state.

An interdisciplinary team of pediatric specialists provides comprehensive emergency, critical, acute, and follow-up care for children who are burned by flames, scalded, or suffering from electrical burns. During the past year, 44 children from Maryland were admitted to the Burn Center. In addition, 200 Maryland children were treated for minor burn injuries and discharged from the Emergency Department at Children's National. A child's burn wound can be treated under non-operating room anesthesia (NORA), significantly reducing pain during the treatment of a burn injury. In FY 2016 there were six Maryland children who received burn wound care using NORA.

In FY 2015 a fractionated CO₂ laser was purchased to establish a pediatric laser surgery program for children with traumatic scars. This innovative treatment technology has been used to provide therapy to improve limb functionality in two patients from Maryland. There are currently six to eight additional patients who are expected to begin laser therapy. In FY 2017 the burn service will be expanding the laser program to provide aesthetic care in addition to functionality, in hopes of improving the quality of life and self-esteem for children with severe burn scars.

Working jointly with the Safe Kids District of Columbia, Safe Kids USA, the DC RISK WATCH Champion Management Team, and the Injury Free Coalition for Kids of the District of Columbia, the Pediatric Trauma and Burn Center provides fire and burn safety education to communities in Maryland, Northern

Virginia, and Washington, DC. In the past year, burn outreach and education has interacted with over 7,000 families. In FY 2016 community outreach included the distribution of 5,000 "safe baby bags," which include non-spill coffee cups, outlet plugs, tub testers, and age-appropriate scald safety literature, to new parents. Additionally, the Pediatric Burn Center staff provides burn-specific EMS and emergency department education at surrounding hospitals and at EMS conferences.

Pediatric Trauma Center **The Johns Hopkins Children's Center**

From June 2015, to May 2016, the Pediatric Trauma Center at The Johns Hopkins Children's Center treated 1,124 severely injured children under the age of 15 years. (See pages 81 to 84 for additional pediatric trauma data.)

The Pediatric Trauma Center at The Johns Hopkins Children's Center (JHCC) continues to provide exceptionally high-quality care to the injured children of Maryland. The Charlotte R. Bloomberg Children's Center, opened in 2012, is a highly-advanced facility that allows the trauma program to flourish and expand. The building was designed for state-of-the-art care to be delivered to patients in a timely fashion. Close collaboration among the multitude of clinical services that dedicate their time and resources help deliver optimal, evidence-based care for patients.

The ultimate goal for the Pediatric Trauma Center is to provide the best possible care for critically-ill pediatric patients, so it continually strives to improve performance. A team-based, collaborative approach to care, in which participation from all the different departments, is encouraged. This teamwork and communication efforts among trauma team members makes a significant impact. To reinforce this collaborative approach in patient care, the center has revitalized the *in situ* trauma simulations program. In addition, a quality improvement effort incorporating trauma bay video recording is expected to enhance the delivery of care to pediatric trauma patients.

Dr. Dylan Stewart is in his seventh year as the director of the Pediatric Trauma Program and is now joined by Dr. Isam Nasr, who serves as the associate director. Dr. Nasr completed his training in pediatric surgery as well as trauma and critical care surgery. Both



Drs. Stewart and Nasr are members of the Maryland Committee on Trauma and the American Pediatric Surgical Association's Committee on Trauma. They remain very active in the Advanced Trauma Life Support classes offered in Maryland.

Susan Ziegfeld is a master's-prepared nurse practitioner who serves as the full-time program manager. In addition to her administrative duties, she functions as a pediatric nurse practitioner within JHCC, assuming responsibility for the care of both inpatients and outpatients. At the state level, she serves on the Maryland Trauma Improvement Committee and the Executive Committee for the Maryland Trauma Center Network (TraumaNet). Additionally, she is an active course director for the Maryland Advanced Trauma Care for Nurses course, helping train military nurses before they are deployed for active duty.

Dr. David Hackam continues to serve as the pediatric surgeon-in-chief. The Pediatric Trauma Center is pleased to announce that under his leadership, two members have been added to the trauma team, and two more are expected by the start of next year. Also under the direction of Dr. Hackam, the research program is flourishing with extensive clinical research and a very active science laboratory.

Lisa Puett, BSN, who serves as the trauma coordinator, assumes day-to-day responsibility for process and performance improvement activities. At the state level, she serves on the MIEMSS Trauma Quality Improvement Committee and MIEMSS Region III EMS Advisory Council.

Lauren Davis, MSW, the injury prevention coordinator, is responsible for planning, evaluating, and maintaining all injury prevention programs. Under her leadership, injury prevention initiatives have expanded to include several community outreach opportunities, such as child passenger safety car seat checks.

Pediatric Trauma Center **Children's National Health System**

From June 2015 to May 2016, the Children's National Health System (Children's National), as a Pediatric Trauma Center, treated 698 Maryland children for trauma injuries. Of these, 232 children had multiple trauma injuries, with 264 of the injured children brought directly to Children's National through the Maryland EMS system. A total of 232 trauma patients were transfers to Children's National after stabilization in another Maryland emergency department. Thirteen Maryland children required inpatient rehabilitation following injury. (See pages 81 to 84 for additional pediatric trauma data.)



Staff: Randall Burd, MD, PhD, Chief of Trauma and Director of Pediatric Trauma Service. Jennifer Fritzeen, MSN, RN, PCNS-BC – Trauma Program Manager. Cindy Colson MSN, RN, Trauma Coordinator, along with five Pediatric Acute Care Nurse Practitioners (forming the Trauma Clinical Staff). Janice Lambrose, BSN, RN – Injury Prevention, Education, and Outreach, in partnership with Safe Kids District of Columbia, managed by Chenille Holloman. Omar Ahmed, MD, and Yu Yan, MSN, RN – Trauma Registry and Research Initiatives.

Children's National Health System (Children's National), a Level I Pediatric Trauma Center, serves the pediatric communities of MIEMSS Region V, which includes Montgomery, Prince George's, Calvert, Charles, and St. Mary's Counties, as well as those in the western regions of the state, by caring for children with multiple trauma and burns.

Children's National provides pediatric emergency and trauma education to physicians, nurses, and prehospital providers. Multidiscipline trauma simulation is offered to advance clinical skills and communication among trauma teams. Multiple Pediatric Advanced Life Support courses are offered throughout the year. Advances in Pediatric Emergency Medicine is offered annually to community physicians. Numerous pediatric trauma outreach educational programs, including Pediatric Education for Prehospital Professionals, are offered by nurses and specialty physicians to all levels of providers throughout the Maryland EMS system.

Trauma Services at Children's National has a robust trauma research program focusing on the care of children and trauma team performance. The trauma research team has a four-year grant project, funded by the National Institutes of Health, to investigate the use of various technological devices to monitor team

performance and improve patient care in the trauma bay. The *Trauma Checklist Tool Kit*, the product of a three-year grant funded by MIEMSS' Emergency Medical Services for Children and the US Health Resources and Services Administration, continues to be available on the Emergency Medical Services for Children National Resource Center website.

Pediatric Trauma Services at Children's National was one of the first pediatric trauma centers in the country to participate in the Pediatric Trauma Quality Improvement Program (TQIP), providing risk-adjusted benchmarking for pediatric trauma centers to track outcomes and improve patient care. Dr. Randall Burd is a member of the Pediatric TQIP leadership and has been a leading physician in the development of current pediatric benchmarks. TQIP data has been utilized to improve quality outcomes.

Community education and outreach has continued to expand at Children's National. Through its outreach program, Children's National has provided education to thousands of families in Maryland, covering topics such as burn prevention, pedestrian safety, abuse prevention, and car seat safety. Car seat inspections are available at the main campus and satellite locations daily, and have expanded days and hours of operation. Children's National's focus this year has been on child abuse prevention. The initial preventative program, the Period of Purple Crying, which addresses shaken baby syndrome, is being launched on all inpatient units and will expand to outpatient clinics within the year. Further initiatives will use multi-year demographic data to guide program development.

Since its inception in 1987, Safe Kids Worldwide, the injury prevention mission of Children's National, has contributed to a 45% decrease in child fatalities from unintentional injuries to children aged 14 years and under by promoting changes in attitudes, behaviors, laws, and the environment. In the United States, this reduction has saved an estimated 38,000 children's lives. Working through 350 Safe Kids coalitions in the United States and 18 other countries, Safe Kids Worldwide delivers proven programs at the grassroots level to prevent unintentional injury. By mobilizing communities at the local level, Safe Kids Worldwide provides public education programs, facilitates engineering and environmental modifications, encourages the enforcement of laws and regulations, and conducts research that drive programs and determines the efficacy of those efforts. Safe Kids activities for Maryland are available on www.safekidsmd.org.

Eye Trauma Center

The Wilmer Eye Institute at The Johns Hopkins Hospital

Located in East Baltimore, the Wilmer Eye Institute (WEI) at The Johns Hopkins Hospital is the first statewide Eye Trauma Center in the nation. The Trauma Center is committed to providing the resources needed to remain a leading center for ocular trauma in the country. The objectives of WEI are to maintain optimal clinical management of severe ocular injuries, conduct research into the natural history of eye trauma, develop new treatments for ocular trauma, and initiate and support eye trauma prevention activities.

Staff: Michael Grant, MD, PhD, FACS – Director of Eye Trauma. Ian Han, MD – Associate Trauma Director for FY 2016. Shailaja Chopde, MSN, RN – Eye Trauma Coordinator.

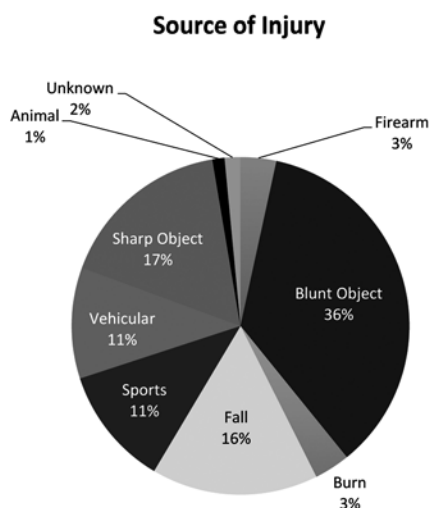
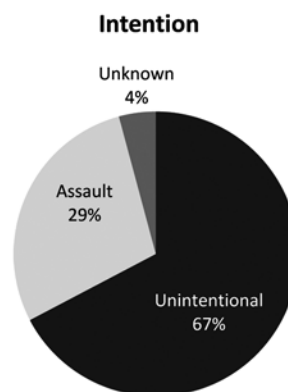
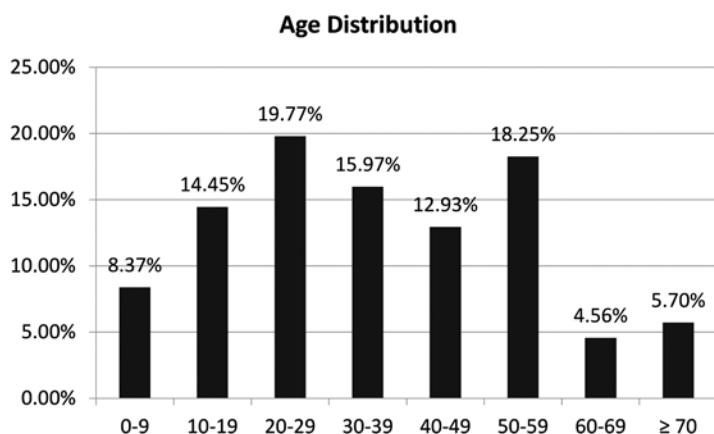
Since its founding in the 1920s, Wilmer Eye Institute (WEI) at The Johns Hopkins Hospital (JHH) has maintained its status as a premier eye care and research center. In the past academic year, WEI received over 250,000 visits from patients within Maryland, all other US states, and over 80 countries.

The Wilmer Eye Institute's designated Eye Trauma Center is complemented on JHH's East Baltimore campus by adult and pediatric emergency rooms (each equipped with eye rooms), inpatient facilities, assurance of coverage from all other JHH clinical departments, seven dedicated operating rooms for outpatient eye surgery, and robust programs in all subspecialty areas within ophthalmology: comprehensive eye care, glaucoma, retina, cornea, ocular immunology, ophthalmic plastic and reconstructive surgery, ocular oncology, pathology, neuro-ophthalmology, and pediatric ophthalmology. Although most patients sustaining eye injuries are treated on the East Baltimore campus, there are eight additional satellite locations positioned across the state, which assures ease of access for preventive, acute, and follow-up care.

For the reporting period of October 2015 through June 2016, the mean age of patients sustaining serious ocular and orbital injuries was 36, with an age range of 0 to 96 years. Based on overall eye injuries, males were overrepresented as compared to females by a ratio of 2.46:1. The predominant source of injury was blunt force (35.74% of total), with just over 24% of that category comprised of assaults. Other notable findings by source include high frequency of BB/pellet gun injuries within the firearm category, and high

Wilmer Eye Institute at The Johns Hopkins Hospital Demographics

(October 2015 - June 2016)



Other Statistics

Age Range: 0 – 96 years
 Mean Age: 36
 Median Age: 34
 % Below Age 30: 42.59%

Age Group	Eye Injury Ratio, Male to Female
0-9	0.7:1
10-19	3.8:1
20-29	1.9:1
30-39	3.2:1
40-49	10.3:1
50-59	2.6:1
60-69	1.4:1
≥ 70	1.5:1
Overall	2.46:1

representation of baseball and softball injuries within the sporting category. (See above for additional patient data.)

Consistent with prior periods, the vast majority of patients referred for primary evaluation were residents of Maryland (92.78%), although the WEI also provided care to patients from Pennsylvania, Virginia, Delaware, West Virginia, New Jersey, and Texas.

Wilmer Eye Institute leaders continue to be committed to the education of providers responsible for the evaluation and treatment of eye/orbital trauma patients. In the past year, they have organized programs and courses at the state, national, and international levels. As in prior years, WEI nursing staff is responsible for organizing an eight-hour ocular trauma workshop, offered bi-annually to nurses

within The Johns Hopkins Health System, for which participants can earn six hours of continuing education units. The core curriculum for this workshop was approved by MIEMSS.

Institute nurses organized the Wilmer Nursing Conference, held on June 10, 2016, which was well-attended by nurses, technicians, and allied health professionals. As an ongoing effort to increase awareness of the importance of vision screening and eye protection to maintain vision health, Ann Roberts, local chapter president of the American Society of Ophthalmic Registered Nurses, and Shailaja Chopde, Wilmer Eye Institute trauma coordinator, volunteer their time and expertise at a community church health fair each year. Faculty members, trainees, and students make regular and substantial contributions

to professional literature and prevailing knowledge in ophthalmology, including trauma-related publications in peer-reviewed journals.

Wilmer Eye Institute, which is in the midst of a comprehensive website redesign, is actively planning monthly eye health observance briefings to the public using media available through the American Academy of Ophthalmology. A recent web campaign was launched ahead of the Fourth of July on firework eye safety; other summer programs will focus on the summer sun and UV protection. On May 18, 2016, WEI hosted an interactive educational session with fourth-grade students from Henderson Hopkins School as part of the JHH Adopt-A-Class Career Day.

In a partnership with MIEMSS, along with Digital Innovation, Inc., a new, web-based Eye Trauma Registry was developed for data entry and exchanges. WEI is also focused on quality/performance measurement and continuous improvement. By leveraging new data and tools with a longstanding tradition of excellence, WEI hopes to expand its reach in the field, identify novel pathways to prevention and mitigation of ocular injuries, and, most importantly, reduce the incidence and impact of trauma in/on vulnerable populations.

The faculty, nursing staff, and support staff of WEI look forward to continuing to educate providers engaged in the treatment of ocular trauma, provide outstanding patient care, and perform cutting edge research.

Hand/Upper Extremity Trauma Center **The Curtis National Hand Center** **at MedStar Union Memorial** **Hospital**

Located in Baltimore City, The Curtis National Hand Center at MedStar Union Memorial Hospital serves as the state's referral center for the specialized care of injuries to the hand, wrist, and elbow. In FY 2016, 1,668 patients with traumatic hand injuries were cared for at the center. The unique nature of the services provided also draws patients from a broad geographic region, including Pennsylvania, Delaware, Virginia, West Virginia, and Washington, DC.

The Curtis National Hand Center is known as one of the country's most advanced resources for the care of patients with elbow, forearm, wrist, and hand trauma. Having received Congressional designation as the National Hand Center in 1994, it remains one of the world's premier facilities for the clinical care and study of the hand and upper extremities in addition to being an advanced training center for orthopaedic, plastic, and general surgeons in the field.

The Curtis National Hand Center and MedStar Union Memorial Hospital remain 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 a well-developed trauma system in Maryland 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.

The repair of amputated and seriously injured upper extremities requires a coordinated effort of rapid transport, proper handling of injured limbs, precise surgical repair, physical and occupational therapy, and most of all, a motivated patient. Over 30% of traumatic hand cases are transported through the Maryland EMS system (public safety ambulance or medevac helicopter) (Chart 1). An onsite heliport at the hospital reduces travel time and improves the speed of intervention for the most critically wounded.

The center's expertise in challenging bone and soft tissue trauma is supplemented by advanced microsurgery skills. The handling of fractures, complex soft tissue coverage problems, and amputations requiring replantation attempts continues to be the major focus of the Hand Surgery Service at MedStar Union Memorial Hospital.

The Acute Trauma Unit is staffed by specialists in orthopaedic and plastic surgery with subspecialty training in hand and upper extremity surgery. The team is available around-the-clock to respond to a variety of injuries ranging from severing or crush injuries to infections and animal bites. Most hand injuries treated at the center are caused by power saws, lawn mowers, snow blowers, or other machines that can cut, crush, or break hands (Chart 2), and most injuries occur outside of the work place (Chart 3). Demographic information about the center's patients is shown in Chart 4.

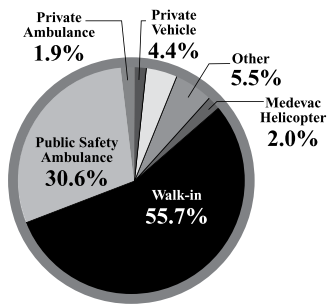
The surgeons of the Curtis National Hand Center have contributed some of the most important publications concerning the care of the injured hand and upper extremity and continue to lecture worldwide about the topic of hand trauma.

Research projects, funded by both internal and external sources, look at a wide range of pertinent questions, including those in microsurgery, surgery of the peripheral nerve, bone and soft tissue problems, and reconstruction after significant trauma. Collaborations with the region's scientists and other investigators promote current thinking and new developments in this vital area.

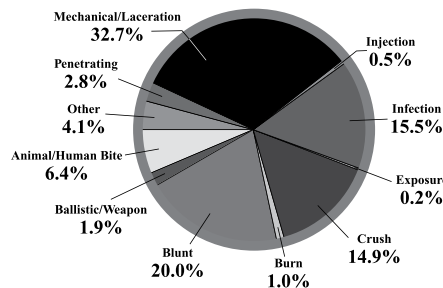
Maryland maintains the nation's premier network of institutions and physicians for trauma care in part because of the unique capabilities and availability of all trauma providers, including the Specialty Referral Centers designated by MIEMSS. The Curtis National Hand Center is proud to be part of this network and supports the efforts to provide advanced care for Maryland's citizens.

The Curtis National Hand Center at MedStar Union Memorial Hospital

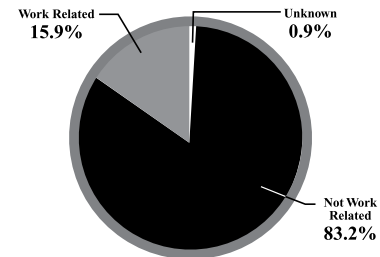
**Chart 1.
Transport Mode**



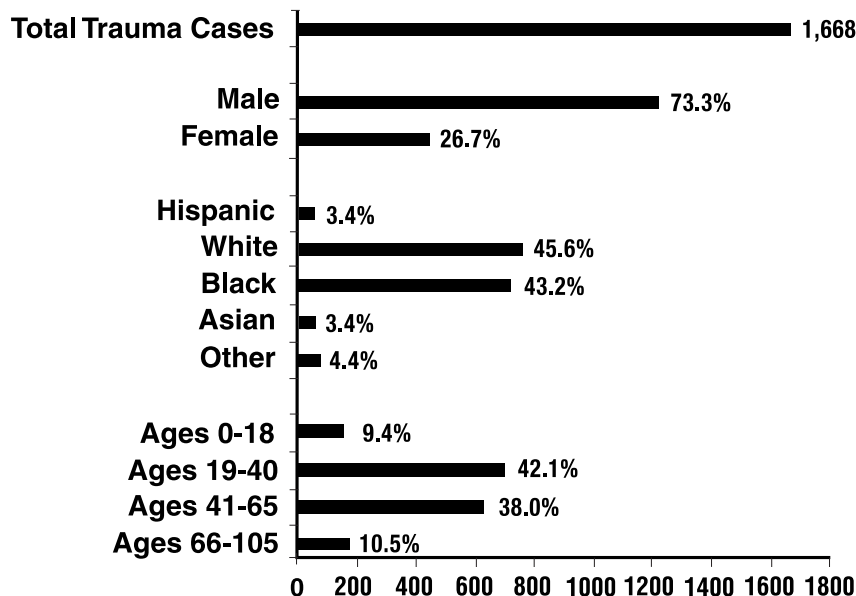
**Chart 2.
Injury Type**



**Chart 3.
Injury Location**



**Chart 4.
Demographics**



Hyperbaric Medicine Center at R Adams Cowley Shock Trauma Center

The Center for Hyperbaric Medicine at the R Adams Cowley Shock Trauma Center, University of Maryland Medical Center, is the statewide referral center for individuals who experience diving incidents, carbon monoxide poisoning, smoke inhalation, and/or gas gangrene. In FY 2016 therapeutic hyperbaric oxygen treatment was provided during 2,306 patient encounters. Established in 1965, the center is able to provide treatment around-the-clock, 365 days a year.

Staff: Robert Rosenthal, MD – Director of the Center for Hyperbaric Medicine.

Located within one of the highest volume trauma centers in the United States, the Center for Hyperbaric Medicine at the R Adams Cowley Shock Trauma Center (Shock Trauma Center) is the only multi-place chamber in Maryland. Internationally recognized for its leadership and expertise in the clinical application of hyperbaric therapy, the center is capable of simultaneously accommodating 10 stretcher patients or 23 seated patients. Hyperbaric oxygen 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 in a special chamber. The center treats a wide spectrum of patients, from the most critically-ill inpatients to ambulatory outpatients. The large interior space of the chamber is



an attractive alternative for claustrophobic patients who cannot tolerate small monoplace (individual) chambers.

The chamber is equipped to provide around-the-clock critical care under the direct supervision of specially trained critical care nurses. Conditions treated at the Center for Hyperbaric Medicine include

- Problem/non-healing wounds
- Delayed effects of radiation
- Central retinal artery occlusion
- Carbon monoxide poisoning and smoke inhalation
- Acute gas embolism
- Decompression illness
- Necrotizing soft tissue infections
- Clostridial and non-clostridial gangrene
- Compromised skin grafts and flaps
- Crush injuries
- Chronic refractory osteomyelitis
- Arterial insufficiencies
- Severe anemia
- Intracranial abscess
- Idiopathic sudden sensorineural hearing loss

At the Shock Trauma Center, physicians, nurses, respiratory therapists, and hyperbaric technologists work closely with referring physicians to ensure patients are evaluated and receive a comprehensive treatment plan, including nutrition and appropriate wound care. Many of the conditions responsive to hyperbaric oxygen therapy can be successfully treated on an outpatient basis, including

- Enhancement of healing in selected wounds, such as non-healing foot ulcers in patients with diabetes or peripheral vascular disease
- Damage to tissues following radiation therapy (radionecrosis)
- Chronic refractory (unresponsive to standard antibiotics) osteomyelitis

All hyperbaric treatments are supervised by board-certified emergency medicine physicians with special expertise in hyperbaric medicine. The clinical staff includes certified hyperbaric registered nurses with critical care experience, certified hyperbaric technologists, and certified respiratory therapists. Nursing care is provided by the critical care nurses who undergo atmospheric compression within the chamber at the patient's bedside. Because of the chamber's unique design and staffing, critically-ill patients can receive hyperbaric treatment without any interruption in care.

In 2015 Dr. Douglas Sward and Dr. Robert Rosenthal of the Center for Hyperbaric Medicine began offering fitness to dive medical evaluations. Both physicians have completed the Dive Medical Advisory Committee's Medical Examiner of Divers course. This international certification allows Drs. Sward and Rosenthal to perform comprehensive dive physicals for recreational, scientific, public safety, and commercial divers. In addition, return to diving after decompression illness services are provided. The fitness to dive services complement the Center for Hyperbaric Medicine's long standing history of providing hyperbaric treatment for acute decompression illness.

Physicians, nurses, and technical members of the Center for Hyperbaric Medicine regularly lecture on hyperbaric medicine to a variety of health care professionals, both regionally and nationally.

Neurotrauma Center at R Adams Cowley Shock Trauma Center

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.

Staff: Bizhan Aarabi, MD, FACS, FACSC – Co-Medical Director and Chief of Trauma Neurosurgery. Deborah Stein, MD, MPH, FACS, FCCM – Co-Medical Director and Chief of Trauma, and Medical Director of the Neurotrauma Critical Care Unit.

As Maryland's designated Specialty Referral Center for head and spinal cord/column injuries, the Neurotrauma Center, located within the Primary Adult Resource Center (PARC) of the R Adams Cowley Shock Trauma Center (Shock Trauma Center), employs a multidisciplinary team of clinical experts. The team 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 health care providers.

The Neurotrauma Center provides the following:

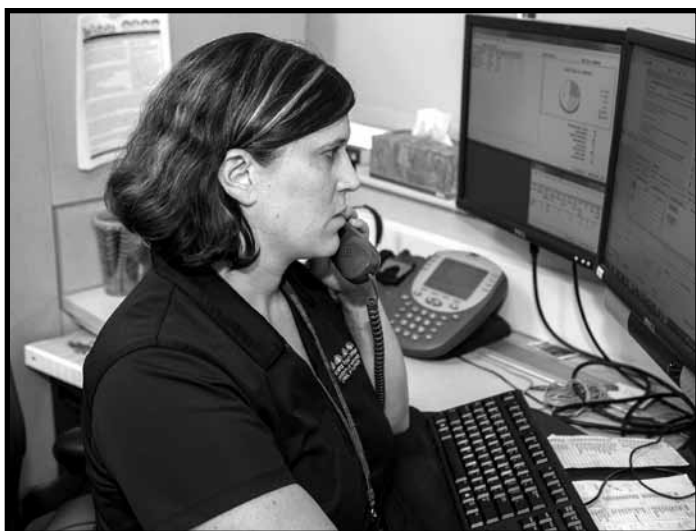
- A dedicated, highly-trained, and experienced multidisciplinary clinical staff including physicians; nurses; respiratory, physical, occupational, and speech therapy services; case management; pain management; nutritional services; integrative medicine; social work and pastoral care staff; a designated patient advocate; and a substance abuse program
- Comprehensive radiology services and the Mirmiran Foundation Diagnostic Imaging Suite with a dedicated high-speed 64-slice computed tomography (CT) scanner, a dedicated 40-slice CT scanner, and a dedicated trauma angiography suite accessible on a 24-hour basis
- 14 critical care/intensive care beds
- 20 intermediate care beds with the capacity for additional beds as needed in the adjacent University of Maryland Medical Center
- A trauma and specialty care ambulatory center with 14 exam rooms

The Neurotrauma Critical Care and Intermediate Care Units provide multidisciplinary care to patients who have sustained primarily central nervous system injury and may have other associated injuries or organ dysfunction. From June 2015 to May 2016, the Neurotrauma Center provided care to 2,258 patients with traumatic brain injury, 147 patients with spinal column or spinal cord injuries, and 524 patients who suffered from both traumatic brain and spinal column or spinal cord injuries.

Those with severe brain injury receive a multisystem assessment with intracranial pressure and cerebral oxygenation 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 and, when appropriate, implantation of a diaphragmatic pacer that enables successful weaning from mechanical ventilation for most patients.

Studies conducted in the Neurotrauma Critical Care Unit led to the development of evidence-based interventions routinely used by the multidisciplinary team to prevent multisystem complications prevalent in many spinal cord injured patients. Dr. Bizhan Aarabi, co-medical director and chief of trauma neurosurgery, and Dr. Daniel Gelb, an orthopaedic spine surgeon, served as two of the authors on the evidence-based "Guidelines for





Management of Acute Cervical Spine and Spinal Cord Injuries,” published in the March 2013 issue of Neurosurgery. Ongoing multisite studies continue at the Shock Trauma Center focusing on pharmacologic interventions that may improve outcomes of patients with head or spinal cord injury.

The Neurotrauma Center’s emphasis on early patient mobilization as the beginning of the rehabilitative process helps to decrease the morbidity associated with neurologic injury. Post-acute inpatient and outpatient services are primarily provided by the University of Maryland Rehabilitation and Orthopaedic Institute and the University of Maryland Medical Center Midtown Campus. In collaboration with other medical centers, the Neurotrauma Center has an important role in advancing the medical community’s understanding of severe head and spinal trauma.

Educational programs are offered for medical students, residents, fellows, and nurses who seek to improve the care and outcome of patients in the aftermath of neurotrauma.

Poison Consultation Center **Maryland Poison Center**

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 and Mental Hygiene as a Regional Poison Center for Maryland. The MPC provides 24/7 emergency poison information to the public and health professionals across the state. The MPC is accessed by calling the nationwide poison help telephone number: 800-222-1222.

Staff: Bruce D. Anderson, PharmD, DABAT – Executive Director.

The poison specialists who work at the Maryland Poison Center (MPC) are pharmacists and nurses who are certified as Specialists in Poison Information by the American Association of Poison Control Centers. The 15 specialists at the MPC have over 250 years of combined poison center experience, ensuring that callers have access to experienced, qualified, and well-trained staff.

In CY 2015 the MPC received 44,155 calls. While 31,340 of these calls involved a human exposure, the remaining 12,815 were animal exposures and requests for information where no exposure occurred. Forty-one percent of poison exposures involved children under the age of six. The top five causes of poisoning were analgesics, sedatives/antipsychotics/hypnotics, household cleaners, cosmetics/personal care products, and antidepressants. Sixty-two percent of the cases reported to the MPC were managed at a site not providing health care, such as the home, school, or workplace. Patients referred by the MPC or already en route to a physician, clinic, emergency department, or other health care facility numbered 10,460 (33%). Maryland EMS providers consulted with the MPC on 1,740 cases in 2015. In 16% of those cases, transportation by EMS to a health care 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 health care resources.

The 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. The MPC's data collection system allows data to be submitted in real time to a nationwide poison center surveillance system. An automated symptom and substance outlier detection strategy is used to identify evolving patterns or emerging clusters of exposures. MPC and national poison center data was used to identify and address outbreaks from new drugs of abuse in 2015. Compared to 2014, the MPC saw more than a two-fold increase in synthetic cannabinoid calls in 2015. A notice was sent to Maryland EMS agencies, health departments, and other organizations alerting them to this increase. Data was also used in 2015 to increase awareness of the dangers of household products such as liquid nicotine and laundry detergent packets when children are exposed to them.

In 2015 the MPC continued to work with the Maryland Department of Health and Mental Hygiene's (DHMH) Behavioral Health Administration and the Maryland Office of the Chief Medical Examiner to focus on the important issues of heroin and opioid overdose deaths. Of note, the MPC is a vital component of the state's Overdose Response Program by monitoring the use of naloxone by the lay public and law enforcement officers in an effort to decrease opioid overdose deaths. Collecting data on these cases assists the DHMH in assessing the success of the naloxone program.

Research is conducted by MPC staff to advance the prevention, diagnosis, and treatment of poisonings. Areas of research that resulted in presentations at scientific meetings or publications in 2015 included:

- Analysis of acute acetaminophen overdose data
- Toxicity and clinical outcomes of rivaroxaban and apixaban ingestions reported to poison centers
- Characterizing the toxicity and dose effect profile of tramadol ingestions in children
- Asenapine, iloperidone, and lurasidone exposures in young children reported to US poison centers
- Comparison of lisdexamfetamine and dextro-amphetamine exposures reported to US poison centers
- Toxalbumin exposures reported to US poison centers
- Abuse and intentional misuse of promethazine reported to US poison centers
- Treatment of sulfonylurea and insulin overdose
- Comparison of hyperbaric oxygen treatment reported to poison centers in the United States and Israel

The 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 the MPC's public education coordinator. In 2015 the MPC provided speakers and/or materials for 104 programs in 17 Maryland counties and Baltimore City, reaching approximately 5,200 people. Several organizations partnered with the MPC to provide education to their patients, customers, clients, and students. These organizations included fire departments, police departments, hospitals, health departments, pharmacies, hospital perinatal education programs, CPR instructors, parish nurses, the American Red Cross, and Head Start and Healthy Start programs. Approximately 50,000 pieces of educational material (brochures, magnets, telephone stickers, Mr. Yuk stickers, teacher's kits, and more) were distributed at these programs and by these organizations. Seventeen county school systems and daycare centers used educational materials from the MPC in their classrooms. More than 30,000 pieces of educational material were distributed in schools throughout Maryland and approximately 76,000 additional materials were mailed upon request.



National Poison Prevention Week (March 15–21, 2015) activities included mailings to emergency departments throughout the state. The MPC also partnered with Safe Kids Baltimore, Safe Kids Carroll County, Safe Kids Washington County, and Cecil County Department of Emergency Services to offer Poison Prevention Week kits to elementary schools in their areas, reaching more than 19,800 students.

The MPC publishes *Poison Prevention Press*, a bimonthly e-newsletter for the public that highlights poison safety topics for all ages. Articles published in 2015 included “Lice Products,” “Laundry Packets,” “Top Summertime Poison Hazards,” “Bystander Naloxone,” “Hidden Sources of Alcohol,” and “OTC Medicine Safety.” The MPC also used Facebook to keep the public up-to-date on poison-related issues with tips and notices.

Health professional education is coordinated by Lisa Booze, PharmD, CSPI. Programs and materials are designed to help health professionals better manage poisoning and overdose cases. In 2015, 73 programs were presented by MPC staff at hospitals, EMS/fire departments, colleges, professional conferences (state, regional, and national), and through online webinars. These programs and webinars were attended by more than 15,000 physicians, nurses, EMS providers, pharmacists, physician assistants, and others. Toxicology segments were recorded for MedicCast.com and NursingShow.com podcasts for health care providers. The MPC also provided on-site training throughout 2015 for physicians, pharmacists, and EMS providers.

ToxTidbits is a monthly e-newsletter containing important toxicology information, updates, and news for health professionals. Among the topics addressed in 2015 were guanfacine extended release, methylene blue, pediatric marijuana ingestions, synthetic cannabinoids, insect repellents, drug-induced QT prolongation, marijuana concentrates, loperamide, and holiday hazard myths. *ToxTidbits* is emailed to subscribers and faxed to every emergency department in the MPC’s service area. Current and past issues of *ToxTidbits* and information on how to subscribe to receive all of the MPC’s e-newsletters can be found on its website. The MPC uses Twitter as another tool to keep health professionals up-to-date with toxicology news and information.

Reason for Poisoning (CY 2015)

Circumstance	Number of Patients	Percentage
Unintentional	22,625	72.2
Intentional	6,988	22.3
Adverse Reaction	1,185	3.8
Other and Unknown	542	1.7
TOTAL	31,340	100.0

Medical Outcome of Poisoning (CY 2015)

Medical Outcome	Number of Patients	Percentage
No Effect/Minor Effect	26,835	85.6
Moderate Effect	2,433	7.8
Major Effect	325	1.0
Death	35	0.1
Other and Unknown	1,712	5.5
TOTAL	31,340	100.0

NOTE: The medical outcome is assessed based on the inherent toxicity of the agent and the severity of the clinical manifestations.

Location of Poisoning Exposure by MIEMSS Region (CY 2015)

Region	Number of Exposures	Percentage
Region I	741	2.4
Region II	2,727	8.7
Region III	18,695	59.7
Region IV	3,340	10.7
Region V*	3,034	9.7
Unknown County/		
Other state	2,803	8.9
TOTAL	31,340	100.0

**NOTE: 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, DC. This report reflects calls to the Maryland Poison Center only. An additional 13,404 human exposures in Maryland were reported to the National Capital Poison Center in 2015.*

Rehabilitation

The continuum of trauma care in Maryland begins with treatment by prehospital providers, followed by handover of the patient to a Trauma Center for acute care and treatment, and then transfer to any of the various rehabilitation services needed by the patient. The Maryland Trauma Centers have relationships with many rehabilitation centers for patients who require continued care and treatment so they may optimize their recovery from traumatic injury to their best potential. Patients are assessed early in the acute phase of trauma care to align their needs with the appropriate components of therapy.

Rehabilitation to support a patient's recovery from traumatic injuries includes a variety of services.

- **Physical Therapy:** Physical therapists visit the patient in critical care and acute care settings while in the hospital. Their training includes assisting the patient following traumatic injury to increase mobility, strength, balance, and flexibility using stretches, exercise, and massage therapies. The goal is to limit pain, limit permanent disability, and ensure that the patient has the best possible chance to return to daily activities.
- **Occupational Therapy:** Occupational therapists focus on restoring a patient's ability to perform everyday tasks such as getting dressed, eating, driving, and taking a shower. Long-term occupational therapy may be required of traumatic brain or spinal cord-injured patients.
- **Speech Therapy:** Speech therapists help patients regain the ability to communicate to others and are often used following traumatic brain injury. Speech therapy supports the patient to relearn swallowing, eating, and comprehending language following injury.

During FY 2016 Maryland Trauma Centers referred 1,975 adult trauma patients (aged 15 years and older) to inpatient rehabilitation services and 41 pediatric trauma patients (aged 14 years and younger) to inpatient rehabilitation services. The 10 rehabilitation facilities receiving the majority of adult patients and those who received pediatric patients are listed to the right.

Top Ten Destinations of Patients Who Went to Inpatient Rehabilitation Facilities (Aged 15 & Over) (June 2015 to May 2016)

Source: Maryland State Trauma Registry

Rehabilitation Center	Number
Adventist Health Care	52
Future Care	36
Genesis Health Care	131
Johns Hopkins Bayview Specialty Hospital Inpatient Rehabilitation	21
HCR Manor Care	14
Health South Chesapeake Rehabilitation Center	45
Lorien Health Systems	25
MedStar Good Samaritan Hospital	52
Sinai Rehabilitation Center	81
University of Maryland Rehabilitation & Orthopaedic Institute	430

Note: Total patients age 15 and over that went to rehabilitation centers = 1,975.

Destinations of Patients Who Went to Inpatient Rehabilitation Facilities (Aged 14 & Under) (June 2015 to May 2016)

Source: Maryland State Trauma Registry

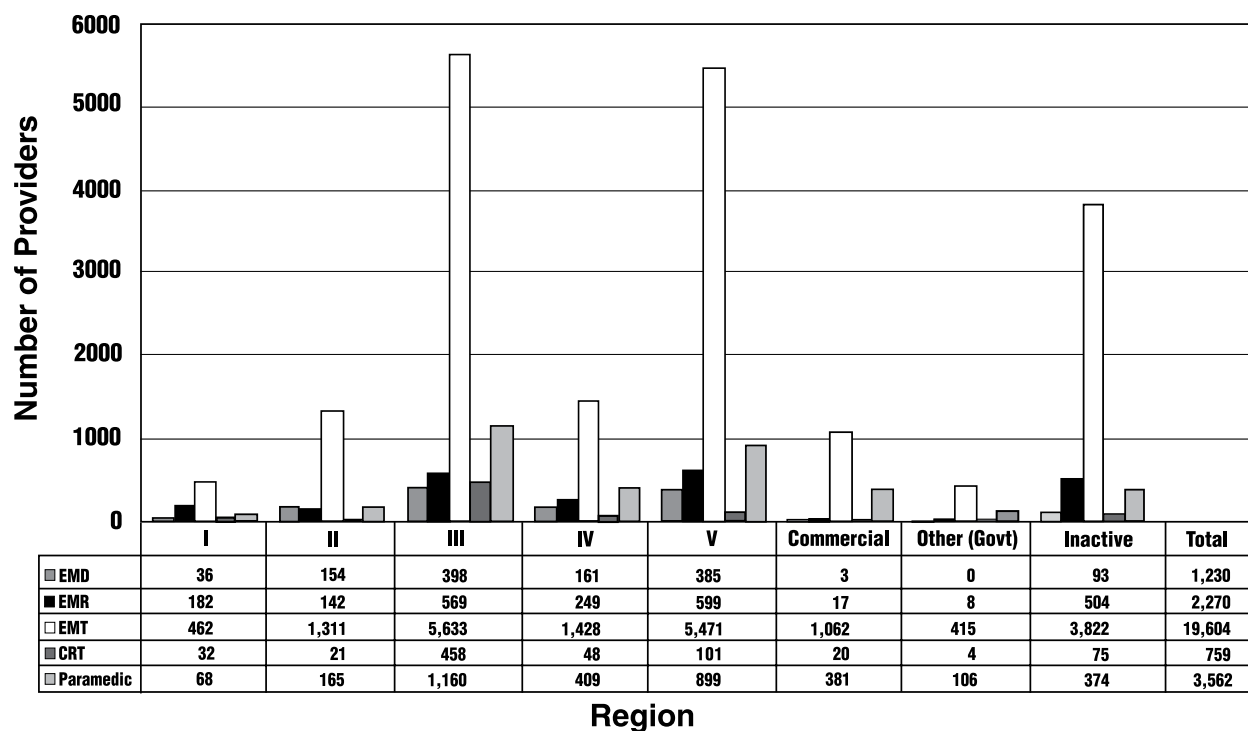
Rehabilitation Center	Number
Hospital for Sick Children	2
Kennedy Krieger Institute	18
Mt. Washington Pediatric Hospital	13
MedStar National Rehabilitation Network	5
National Hospital for Orthopedics and Rehabilitation	1
Health South Chesapeake Rehabilitation Center	1
Penn State Hershey Rehabilitation Hospital	1

Note: Total patients age 14 and under that went to rehabilitation centers = 41.

MARYLAND EMS STATISTICS

Number of EMS Providers (Primary Affiliation) by Region

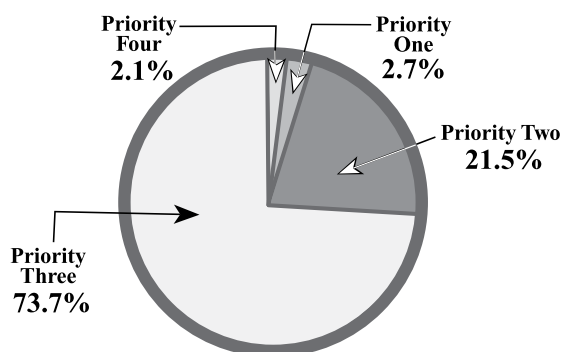
(As of June 30, 2016)



Types of EMS Calls

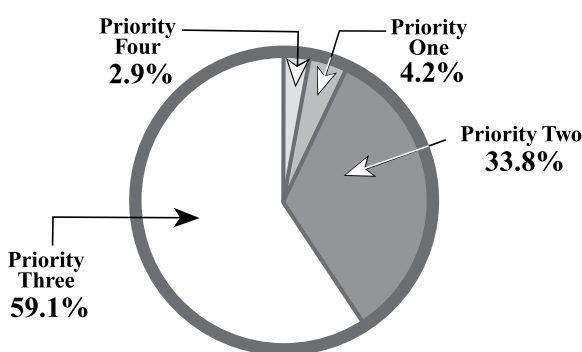
Patient Priority For Injury Transports

Fiscal Year 2016



Patient Priority For Medical Transports

Fiscal Year 2016



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

electronic Patient Care Reporting Records Submitted to MIEMSS by Maryland Jurisdictions

The electronic Maryland EMS Data System (eMEDS) is a 3rd 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.

eMEDS was launched in the winter of 2011 with implementation of a pilot program in three jurisdictions (Cecil, Harford, and Queen Anne's Counties). As of June 2015, all 24 jurisdictional EMSOPs in Maryland used 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 demonstrates jurisdictional participation by date of implementation and quarterly record volume for FY 2016.

ePCR Records Submitted to MIEMSS per Fiscal Year 2016 Quarter						
Reporting Between: 7/1/2015 - 06/30/2016						
Jurisdiction	eMEDS Implementation	1st Qtr. FY 2016	2nd Qtr. FY 2016	3rd Qtr. FY 2016	4th Qtr. FY 2016	Total
Allegany County	1-Oct-11	3,760	3,500	3,489	3,345	14,094
Anne Arundel County*	21-Feb-12	23,177	22,186	20,537	20,875	86,775
Baltimore City	1-Nov-11	57,206	55,205	54,526	59,744	226,681
Baltimore County*	22-Feb-12	30,814	31,805	32,348	32,968	127,935
Calvert County	1-Jan-13	4,918	4,533	4,715	4,285	18,451
Caroline County	1-Jun-13	1,631	1,567	1,614	1,502	6,314
Carroll County	1-May-12	5,149	5,364	5,079	5,044	20,636
Cecil County	4-Feb-11	6,165	5,999	6,157	6,244	24,565
Charles County	1-Dec-13	7,026	7,051	7,188	7,013	28,278
Dorchester County	1-Jan-13	1,654	1,548	1,516	1,673	6,391
Frederick County	4-Mar-13	10,658	10,320	10,637	10,901	42,516
Garrett County	1-Oct-11	1,147	886	926	870	3,829
Harford County*	4-Feb-11	8,192	8,062	8,562	8,497	33,313
Howard County	14-May-13	7,408	7,383	7,198	7,227	29,216
Kent County	1-Mar-12	1,404	1,251	1,348	1,377	5,380
Montgomery County	15-Apr-15	20,809	21,023	21,171	20,712	83,715
Prince George's County	27-Mar-14	54,496	56,798	59,874	60,775	231,943
Queen Anne's County	4-Feb-11	1,906	1,959	1,885	1,836	7,586
Somerset County	1-Dec-12	831	841	881	868	3,421
St. Mary's County	1-Oct-12	5,264	5,071	5,200	5,336	20,871
Talbot County	16-Jan-12	1,693	1,689	1,555	1,767	6,704
Washington County	19-Dec-11	8,070	7,442	7,882	7,985	31,379
Wicomico County	15-Nov-12	3,595	3,830	3,940	3,803	15,168
Worcester County*	1-Jan-13	4,220	2,154	2,310	3,067	11,751
Jurisdictional Total		271,193	267,467	270,538	277,714	1,086,912
*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.						

Public Safety EMS Units

Patient Transportation Vehicles

Region	Ambulances				Ambu Buses		
	BLS		ALS		Type I	Type II	Type III
	Inservice	Reserve Prestocked	Inservice	Reserve Prestocked	20 + Pts	10 - 19 Pts	< 10 Pts
Region I	0	0	36	0	0	0	0
Region II	36	2	24	0	0	0	0
Region III	32	0	168	11	0	2	0
Region IV	17	3	115	20	0	1	0
Region V	129	9	36	11	3	0	0
STATEWIDE TOTAL	214	14	379	42	3	3	0

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

- **Inservice:** Fully stocked and staffed unit ready to be dispatched
- **Reserve Prestocked:** Fully stocked, but not staffed, unit. Could replace an Inservice unit or be added to Inservice fleet by calling in additional personnel.

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

Public Safety/Non-Transportation Vehicles

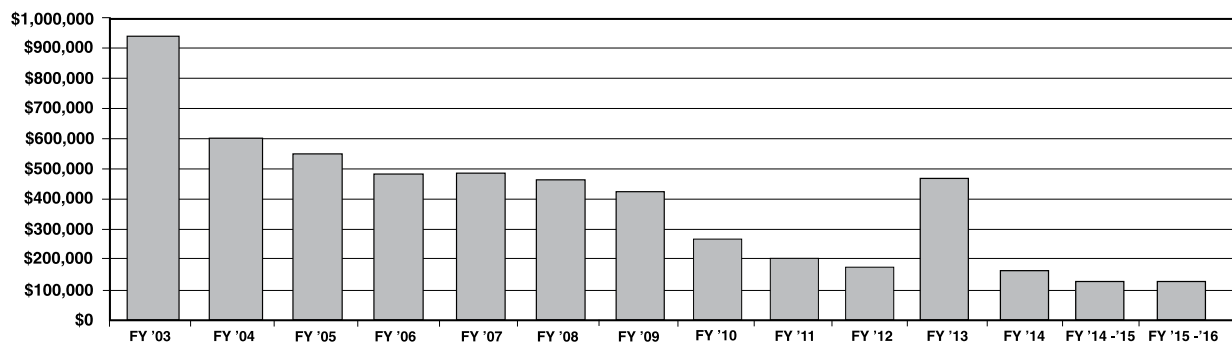
Region	Non-Transport Support					Disaster Supplies*		
	BLS First Response	Suppression BLS First Response	ALS Chase			MCSU Type I (100+ Pts)	MCSU Type II (50 Pts)	MCSU Type III (25 Pts)
			Non-Supervisory	Supervisory	ALS Engines			
Region I	0	17	8	1	3	0	4	0
Region II	22	35	13	6	0	0	2	1
Region III	14	287	16	25	74	8	0	2
Region IV	28	68	25	25	2	1	3	5
Region V	33	160	19	7	35	1	3	4
STATEWIDE TOTAL	97	567	81	64	114	10	12	12

Source: Vehicle data reported by the EMS Operational Programs

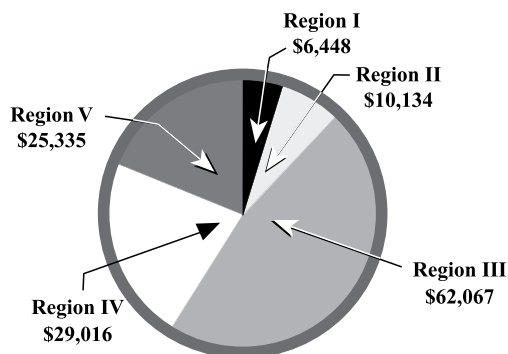
* MCSU = Mass Casualty Support Unit

Health Preparedness Program (HPP) Bioterrorism Funding for Maryland EMS

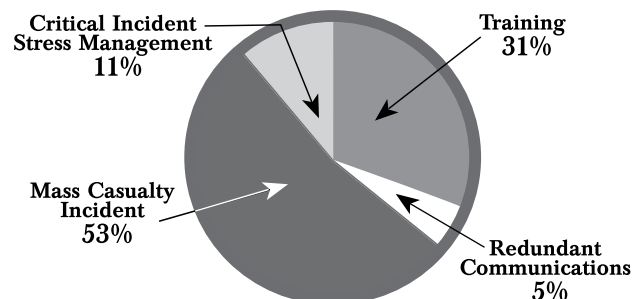
HPP Bioterrorism Funding Totals (Federal FY 2003 – FY 2016)



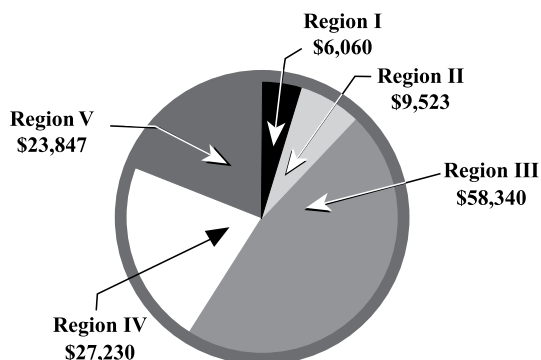
HPP Bioterrorism Funding Allocation By Maryland EMS Region (Federal FY 2014-2015, BT-XII)



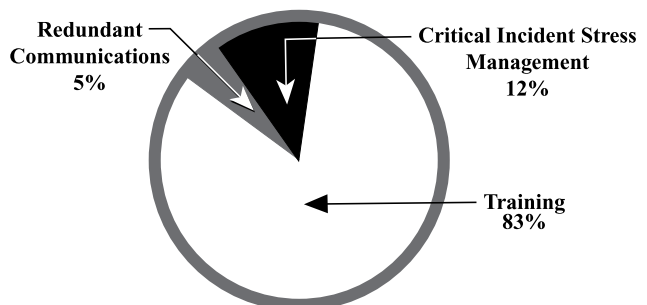
HPP Bioterrorism Funding Categories (Federal FY 2014-2015, BT-XII)



HPP Bioterrorism Funding Allocation By Maryland EMS Region (Federal FY 2015-2016, BT-XIII)



HPP Bioterrorism Funding Categories (Federal FY 2015-2016, BT-XIII)



MARYLAND TRAUMA STATISTICS*

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

Source: Maryland State Trauma Registry

Age Range	June 2013 to May 2014	June 2014 to May 2015	June 2015 to May 2016
Under 1 year	211	200	277
1 to 4 years	520	497	518
5 to 9 years	566	617	643
10 to 14 years	578	652	619
15 to 24 years	4,100	3,967	3,986
25 to 44 years	6,205	6,247	6,769
45 to 64 years	5,012	5,052	5,123
65+ years	3,511	4,025	4,120
Unknown	5	1	8
TOTAL	20,708	21,258	22,063

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

MARYLAND ADULT TRAUMA STATISTICS

Legend Code

Johns Hopkins Bayview Medical Center	BVMC	R Adams Cowley Shock Trauma Center	STC
Johns Hopkins Medical System	JHH	Sinai Hospital of Baltimore	SH
Meritus Medical Center	MMC	Suburban Hospital – Johns Hopkins Medicine	SUB
Peninsula Regional Medical Center	PEN	Western Maryland Regional	WMRMC
Prince George's Hospital Center	PGH	Medical Center	

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

Source: Maryland State Trauma Registry

Trauma Center	June 2013 to May 2014	June 2014 to May 2015	June 2015 to May 2016
Johns Hopkins Bayview Medical Center	1,581	2,283	2,448
Johns Hopkins Medical System	1,820	1,674	2,051
Meritus Medical Center	1,109	1,060	1,232
Peninsula Regional Medical Center	1,214	1,280	1,219
Prince George's Hospital Center	3,436	3,340	3,385
R Adams Cowley Shock Trauma Center	6,203	6,028	6,064
Sinai Hospital of Baltimore	1,574	1,805	2,037
Suburban Hospital – Johns Hopkins Medicine	1,505	1,474	1,208
Western Maryland Regional Medical Center	641	592	597
TOTAL	19,083	19,536	20,241

* Maryland Trauma Statistics are based on patient discharge data from June 2015 to May 2016.

Occurrence of Injury by County: Scene Origin Cases Only

(June 2015 to May 2016)

Source: Maryland State Trauma Registry

County of Injury	Number
Allegany County	346
Anne Arundel County	685
Baltimore County	2,760
Calvert County	137
Caroline County	53
Carroll County	262
Cecil County	73
Charles County	225
Dorchester County	78
Frederick County	341
Garrett County	41
Harford County	621
Howard County	274
Kent County	29
Montgomery County	1,081
Prince George's County	2,264
Queen Anne's County	77
St. Mary's County	218
Somerset County	102
Talbot County	39
Washington County	864
Wicomico County	398
Worcester County	222
Baltimore City	4,555
Virginia	55
West Virginia	145
Pennsylvania	171
Washington, DC	230
Delaware	96
Other	8
Not Indicated	708
TOTAL	17,158

Note: Scene origin cases represent 84.8 % of the total trauma cases treated statewide.

Residence of Patients by County: Scene Origin Cases Only

(June 2015 to May 2016)

Source: Maryland State Trauma Registry

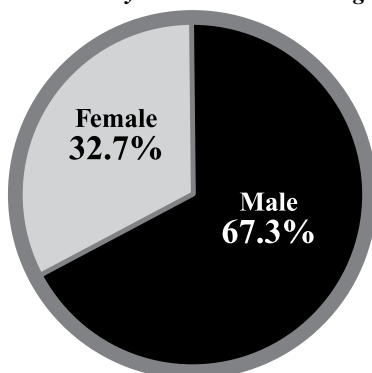
County of Residence	Number
Allegany County	325
Anne Arundel County	696
Baltimore County	2,793
Calvert County	156
Caroline County	51
Carroll County	282
Cecil County	71
Charles County	292
Dorchester County	62
Frederick County	311
Garrett County	27
Harford County	651
Howard County	318
Kent County	25
Montgomery County	1,036
Prince George's County	2,130
Queen Anne's County	59
St. Mary's County	157
Somerset County	102
Talbot County	45
Washington County	720
Wicomico County	372
Worcester County	147
Baltimore City	4,356
Virginia	304
West Virginia	198
Pennsylvania	418
Washington, DC	485
Delaware	171
Other	333
Not Indicated	65
TOTAL	17,158

Note: Scene origin cases represent 84.8 % of the total trauma cases treated statewide.

Gender Profile: Primary Admissions Only

(June 2015 to May 2016)

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 2013 to May 2014	June 2014 to May 2015	June 2015 to May 2016
None	17.9%	19.9%	20.6%
Seatbelt	25.4%	25.5%	22.5%
Airbag & Seatbelt	26.6%	28.0%	32.5%
Airbag Only	5.5%	6.1%	6.9%
Infant/Child Seat	0.1%	0.2%	0.2%
Protective Helmet	15.4%	15.2%	15.1%
Padding/Protective Clothing	0.2%	0.2%	0.1%
Other Protective Device	0.2%	0.0%	0.6%
Unknown	8.7%	4.9%	1.5%
TOTAL	100.0%	100.0%	100.0%

Note: Table reflects patients 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 2015 to May 2016)

Source: Maryland State Trauma Registry

Modality Type	BVMC	JHH	MMC	PEN	PGH	SH	STC	SUB	WMRMC	TOTAL
Ground Ambulance	93.1%	81.2%	78.7%	88.7%	81.4%	85.8%	72.2%	96.1%	70.6%	82.1%
Helicopter	0.1%	1.0%	1.1%	5.2%	14.1%	0.1%	21.6%	0.6%	7.0%	8.6%
Other	6.8%	17.8%	20.2%	6.1%	4.5%	14.1%	6.2%	3.3%	22.4%	9.3%
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 2015 to May 2016)

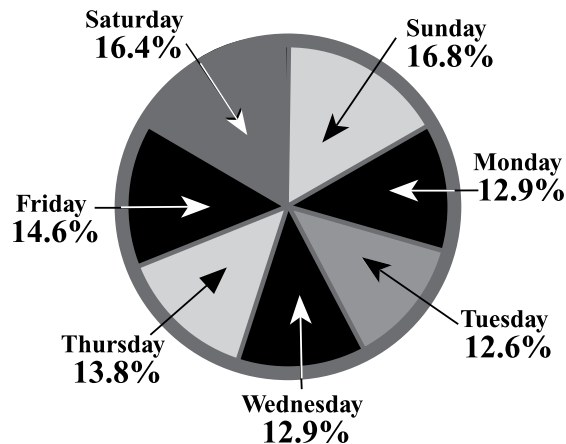
Source: Maryland State Trauma Registry

Origin Type	BVMC	JHH	MMC	PEN	PGH	SH	STC	SUB	WMRMC	TOTAL
Scene of Injury	96.5%	81.5%	98.2%	76.1%	95.0%	96.1%	69.7%	94.6%	95.3%	85.5%
Hospital Transfer	0.2%	9.7%	1.2%	3.1%	2.6%	3.4%	30.2%	3.5%	0.8%	11.2%
Other	3.3%	8.8%	0.6%	20.8%	2.4%	0.5%	0.1%	1.9%	3.9%	3.3%
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 2015 to May 2016)

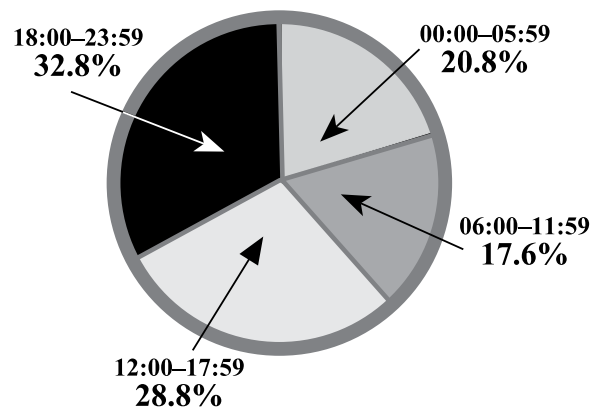
Source: Maryland State Trauma Registry



Emergency Department Arrivals by Time of Day: Primary Admissions Only

(June 2015 to May 2016)

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 2013 to May 2014	June 2014 to May 2015	June 2015 to May 2016
Under 1 year	0	0	3
1 to 4 years	1	6	1
5 to 14 years	2	3	2
15 to 24 years	126	108	160
25 to 44 years	205	189	243
45 to 64 years	149	135	157
65+ years	228	220	193
Unknown	4	0	3
TOTAL	715	661	762

Deaths Overall as a
Percentage of the Total
Injuries Treated

3.7% 3.4% 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 2013 to May 2014	June 2014 to May 2015	June 2015 to May 2016
Under 1 year	37	34	64
1 to 4 years	88	77	91
5 to 14 years	215	239	190
15 to 24 years	4,010	3,861	3,876
25 to 44 years	6,205	6,247	6,769
45 to 64 years	5,012	5,052	5,123
65+ years	3,511	4,025	4,120
Unknown	5	1	8
TOTAL	19,083	19,536	20,241

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 2015 to May 2016)

Source: Maryland State Trauma Registry

Age	Number of Injured Patients		Number of Deaths	
	Total	Maryland Residents	Total	Maryland Residents
Under 1 year	64	55	3	3
1 to 4 years	91	78	1	1
5 to 14 years	190	134	2	2
15 to 24 years	3,876	3,455	160	144
25 to 44 years	6,769	5,973	243	216
45 to 64 years	5,123	4,529	157	140
65+ years	4,120	3,728	193	173
Unknown	8	6	3	3
TOTAL	20,241	17,958	762	682

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 2013 to May 2014	June 2014 to May 2015	June 2015 to May 2016
Motor Vehicle Crash	26.5%	27.5%	26.2%
Motorcycle Crash	5.5%	5.4%	5.2%
Pedestrian Incident	4.8%	5.2%	5.3%
Fall	33.1%	33.2%	33.5%
Gunshot Wound	6.1%	5.9%	7.6%
Stab Wound	6.6%	6.2%	6.5%
Other	17.4%	16.6%	15.7%
TOTAL	100.0%	100.0%	100.0%

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

Blood Alcohol Concentration of Patients by Injury Type: Primary Admissions Only

(June 2015 to May 2016)

Source: Maryland State Trauma Registry

Blood Alcohol Concentration	Motor Vehicle Crash	Assault	Fall	Other	Total
Negative	27.2%	19.4%	15.7%	19.6%	21.1%
Positive	17.0%	23.5%	13.5%	12.0%	16.7%
Undetermined	55.8%	57.1%	70.8%	68.4%	62.2%
TOTAL	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.

Etiology of Injuries by Age: Primary Admissions Only

(June 2015 to May 2016)

Source: Maryland State Trauma Registry

Age	Motor Vehicle Crash	Motorcycle	Pedestrian	Fall	Gunshot Wound	Stab Wound	Other	Total
Under 1 year	0.1%	0.0%	0.1%	0.4%	0.0%	0.1%	0.3%	0.2%
1 to 4 years	0.2%	0.0%	0.2%	0.3%	0.1%	0.0%	0.4%	0.2%
5 to 14 years	0.5%	0.4%	1.0%	0.7%	0.1%	0.2%	1.1%	0.6%
15 to 24 years	22.0%	20.6%	19.2%	5.2%	39.0%	25.1%	18.9%	17.1%
25 to 44 years	37.0%	41.0%	34.6%	15.2%	48.8%	54.2%	40.0%	32.3%
45 to 64 years	25.8%	32.1%	32.4%	28.0%	10.1%	18.2%	30.5%	26.3%
65+ years	14.4%	5.9%	12.5%	50.2%	1.9%	2.2%	8.8%	23.3%
TOTAL	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 Maryland Pediatric Trauma Statistics.

Etiology Distribution for Patients with Blunt Injuries: Primary Admissions Only

(June 2015 to May 2016)

Source: Maryland State Trauma Registry

Etiology	Percentage
Motor Vehicle Crash	30.8%
Motorcycle Crash	6.1%
Pedestrian Incident	6.3%
Stabbing	0.2%
Fall	39.3%
Other	16.0%
Unknown	1.3%
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 2015 to May 2016)

Source: Maryland State Trauma Registry

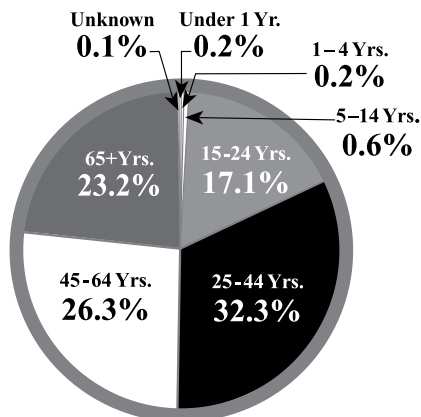
Etiology	Percentage
Motor Vehicle Crash	0.1%
Gunshot Wound	50.7%
Stabbing	42.5%
Fall	0.6%
Other	4.4%
Unknown	1.7%
TOTAL	100.0%

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 2015 to May 2016)

Source: Maryland State Trauma Registry

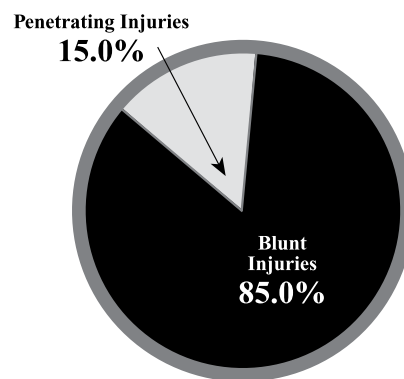


Note: "Primary Admissions" refers to all patients except those treated and released from the emergency department within 6 hours of emergency department arrival. Only pediatric patients who were treated at Adult Trauma Centers are included in this table. For patients treated at Pediatric Trauma Centers, see Maryland Pediatric Trauma Statistics.

Injury Type Distribution of Patients: Primary Admissions Only

(June 2015 to May 2016)

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.

Final Disposition of Patients: Primary Admissions Only

(3-Year Comparison)

Source: Maryland State Trauma Registry

Final Disposition	June 2013 to May 2014	June 2014 to May 2015	June 2015 to May 2016
Inpatient Rehab Facility	14.4%	13.9%	13.0%
Skilled Nursing Facility	3.6%	4.5%	4.7%
Residential Facility	1.1%	1.0%	0.9%
Specialty Referral Center	3.7%	3.2%	4.0%
Home with Services	2.4%	3.8%	3.5%
Home	62.4%	61.5%	61.2%
Acute Care Hospital	2.6%	2.9%	2.1%
Against Medical Advice	1.7%	1.6%	2.0%
Morgue/Died	5.3%	4.5%	5.0%
Left without Treatment	0.4%	0.4%	0.3%
Hospice Care	0.3%	0.4%	0.2%
Jail	1.5%	1.2%	1.7%
Psychiatric Hospital	0.3%	0.9%	1.0%
Other	0.3%	0.2%	0.4%
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 (ISS) by Injury Type: Primary Admissions Only

(June 2015 to May 2016)

Source: Maryland State Trauma Registry

ISS	Blunt	Penetrating	Total
1 to 12	80.0%	76.8%	79.5%
13 to 19	12.6%	10.3%	12.2%
20 to 35	6.4%	8.2%	6.7%
36 to 75	1.0%	4.7%	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.

Injury Severity Scores of Patients with Penetrating Injuries: Primary Admissions Only

(3-Year Comparison)

Source: Maryland State Trauma Registry

ISS	June 2013 to May 2014	June 2014 to May 2015	June 2015 to May 2016
1 to 12	75.6%	78.6%	76.8%
13 to 19	11.0%	10.2%	10.3%
20 to 35	10.7%	8.5%	8.2%
36 to 75	2.7%	2.7%	4.7%
TOTAL	100.0%	100.0%	100.0%

Note: "Primary Admissions" refers to all patients except those treated and released from the emergency department within 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 2013 to May 2014	June 2014 to May 2015	June 2015 to May 2016
1 to 12	74.7%	80.2%	80.0%
13 to 19	14.4%	11.7%	12.6%
20 to 35	9.1%	7.0%	6.4%
36 to 75	1.8%	1.1%	1.0%
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 2013 to May 2014	June 2014 to May 2015	June 2015 to May 2016
1 to 12	74.9%	80.0%	79.5%
13 to 19	13.9%	11.5%	12.2%
20 to 35	9.3%	7.2%	6.7%
36 to 75	1.9%	1.3%	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.

MARYLAND ADULT BURN STATISTICS

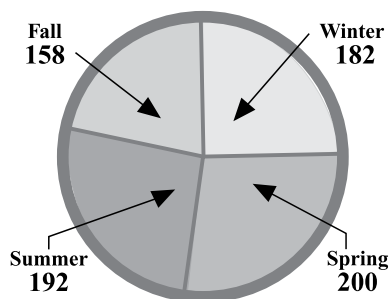
Total Number of Adult Burn Cases

*Patients Age 15 and Older Treated at
Johns Hopkins Burn Center at Bayview
Source: Maryland State Trauma Registry*

Institution	June 2013 to May 2014	June 2014 to May 2015	June 2015 to May 2016
Johns Hopkins Burn Center at Bayview	713	826	732

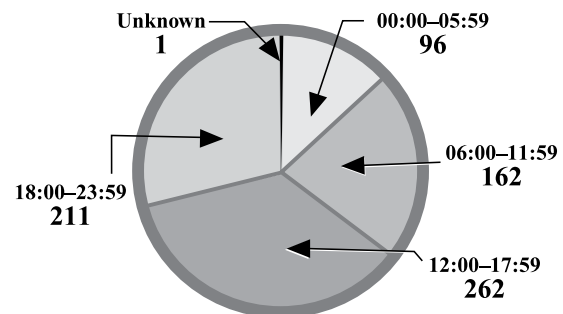
Season of Year Distribution

*Patients Age 15 and Older Treated at
Johns Hopkins Burn Center at Bayview
(June 2015 to May 2016)
Source: Maryland State Trauma Registry*



Time of Arrival Distribution

*Patients Age 15 and Older Treated at
Johns Hopkins Burn Center at Bayview
(June 2015 to May 2016)
Source: Maryland State Trauma Registry*



Place of Injury

*Patients Age 15 and Older Treated at
Johns Hopkins Burn Center at Bayview
(June 2015 to May 2016)
Source: Maryland State Trauma Registry*

Place of Injury	Number
Home	428
Farm	1
Industrial Place	71
Place for Recreation or Sport	24
Street/Highway	24
Public Building	7
Residential Institution	9
Other Specified Place	63
Unspecified Place	105
TOTAL	732

Occurrence of Injury by County

*Patients Age 15 and Older Treated at
Johns Hopkins Burn Center at Bayview
(June 2015 to May 2016)*

Source: Maryland State Trauma Registry

County of Injury	Number
Allegany County	4
Anne Arundel County	61
Baltimore County	203
Calvert County	3
Caroline County	4
Carroll County	14
Cecil County	11
Charles County	1
Dorchester County	2
Frederick County	10
Harford County	40
Howard County	22
Kent County	1
Montgomery County	3
Prince George's County	1
Queen Anne's County	3
St. Mary's County	2
Somerset County	2
Talbot County	1
Washington County	9
Wicomico County	7
Worcester County	4
Baltimore City	204
Virginia	7
West Virginia	10
Pennsylvania	21
Other	6
Not Valued	76
TOTAL	732

Residence of Patients by County

*Patients Age 15 and Older Treated at
Johns Hopkins Burn Center at Bayview
(June 2015 to May 2016)*

Source: Maryland State Trauma Registry

County of Residence	Number
Allegany County	5
Anne Arundel County	65
Baltimore County	219
Calvert County	4
Caroline County	6
Carroll County	15
Cecil County	12
Charles County	1
Dorchester County	3
Frederick County	12
Harford County	51
Howard County	23
Kent County	2
Montgomery County	5
Prince George's County	1
Queen Anne's County	4
St. Mary's County	2
Somerset County	2
Talbot County	1
Washington County	13
Wicomico County	7
Worcester County	3
Baltimore City	208
Virginia	8
West Virginia	14
Pennsylvania	30
Delaware	1
Other	13
Not Valued	2
TOTAL	732

Mode of Patient Transport

*Patients Age 15 and Older Treated at
Johns Hopkins Burn Center at Bayview
(June 2015 to May 2016)*

Source: Maryland State Trauma Registry

Modality Type	Number
Ground Ambulance	369
Helicopter	31
Other*	315
Not Valued	17
TOTAL	732

**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 Age 15 and Older Treated at Johns Hopkins Burn Center at Bayview
(June 2015 to May 2016)*

Source: Maryland State Trauma Registry

Age Range	Electrical	Chemical	Thermal			Inhalation	Other Non-Burn	Total
			Flame	Contact	Scald			
15 to 24 years	2	3	31	12	48	2	1	99
25 to 44 years	14	23	105	23	126	2	2	295
45 to 64 years	7	17	103	28	78	3	5	241
65 years and over	2	1	36	8	44	4	2	97
Total	25	44	275	71	296	11	10	732

Final Disposition of Patients

*Patients Age 15 and Older Treated at
Johns Hopkins Burn Center at Bayview
(3-Year Comparison)*

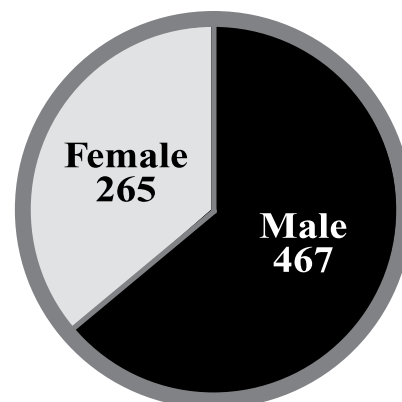
Source: Maryland State Trauma Registry

Final Disposition	June 2013 to May 2014	June 2014 to May 2015	June 2015 to May 2016
Home	597	726	640
Home with Services	41	39	26
Transfer to Another Acute Care Facility	3	2	2
Transfer to Another Service	2	1	1
Discharge to Extended Care Facility	4	0	1
Discharge to Foster Care	1	0	0
Discharge to Alternate Caregiver	2	0	1
Rehabilitation Facility	6	8	11
Skilled Nursing Facility	27	26	16
Psychiatric Hospital	5	2	6
Morgue/Died	13	13	14
Unable to Complete Treatment	6	3	4
Jail	4	5	7
Not Valued	2	1	3
TOTAL	713	826	732

Gender Profile

*Patients Age 15 and Older Treated at
Johns Hopkins Burn Center at Bayview
(June 2015 to May 2016)*

Source: Maryland State Trauma Registry



Number of Injuries by Age

*Patients Age 15 and Older Treated at
Johns Hopkins Burn Center at Bayview
(3-Year Comparison)*

Source: Maryland State Trauma Registry

Age Range	June 2013 to May 2014	June 2014 to May 2015	June 2015 to May 2016
15 to 24 years	111	147	99
25 to 44 years	269	312	295
45 to 64 years	237	284	241
65 years and over	96	83	97
TOTAL	713	826	732

MARYLAND PEDIATRIC TRAUMA STATISTICS

Legend Code

Children's National Health System
Johns Hopkins Pediatric Trauma Center

CNHS
JHP

Total Cases Treated at Pediatric Trauma Centers

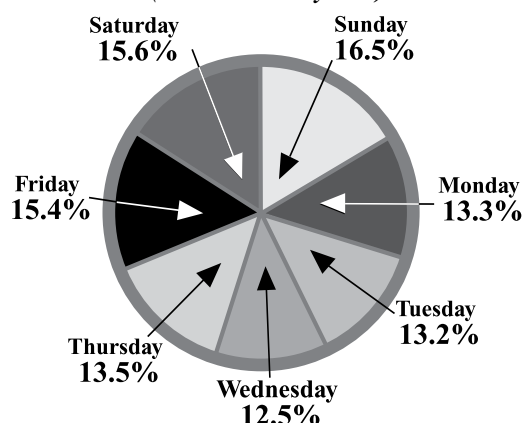
(3-Year Comparison)

Trauma Center	June 2013 to May 2014	June 2014 to May 2015	June 2015 to May 2016
CNHS	772	665	698
JHP	853	1,057	1,124
TOTAL	1,625	1,722	1,822

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 Statistics.

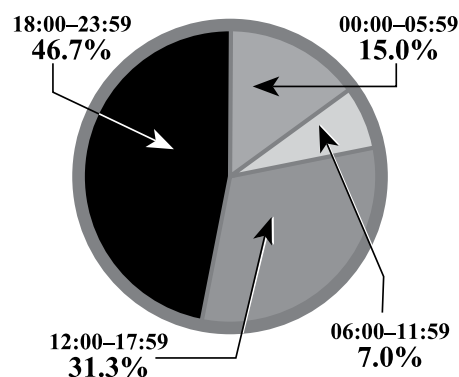
Emergency Department Arrivals by Day of Week: Children Treated at Pediatric Trauma Centers

(June 2015 to May 2016)



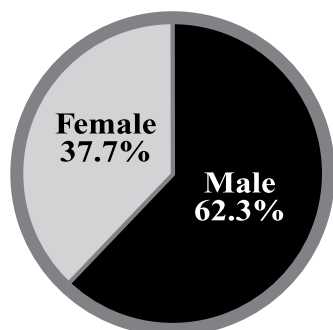
Emergency Department Arrivals by Time of Day: Children Treated at Pediatric Trauma Centers

(June 2015 to May 2016)



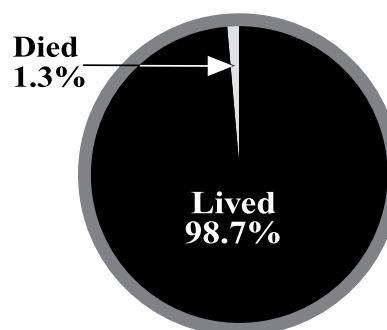
Gender Profile: Children Treated at Pediatric Trauma Centers

(June 2015 to May 2016)



Outcome Profile: Children Treated at Pediatric Trauma Centers

(June 2015 to May 2016)



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 Statistics.

Mode of Patient Transport by Center: Scene Origin Cases Only

*Children Treated at Pediatric Trauma Centers
(June 2015 to May 2016)*

Modality Type	CNHS	JHP	Total
Ground Ambulance	62.5%	75.0%	71.1%
Helicopter	22.7%	13.1%	16.1%
Other	14.8%	11.9%	12.8%
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 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 Statistics.

Origin of Patient Transport by Center

*Children Treated at Pediatric Trauma Centers
(June 2015 to May 2016)*

Origin	CNHS	JHP	Total
Scene of Injury	39.7%	53.1%	48.0%
Hospital Transfer	46.3%	39.6%	42.1%
Other	14.0%	7.3%	9.9%
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 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 Statistics.

Injury Type

*Children Treated at Pediatric Trauma Centers
(3-Year Comparison)*

Injury Type	June 2013 to May 2014	June 2014 to May 2015	June 2015 to May 2016
Blunt	94.1%	92.5%	91.6%
Penetrating	2.6%	4.1%	5.2%
Near Drowning	0.4%	0.9%	0.9%
Hanging	0.2%	0.1%	0.1%
Inhalation	0.1%	0.1%	0.0%
Ingestion	0.1%	0.1%	0.1%
Crush	0.4%	0.1%	0.1%
Snake Bite/Spider Bite	0.0%	0.1%	0.0%
Animal Bite/Human Bite	2.0%	1.6%	1.4%
Other	0.1%	0.4%	0.6%
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 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 Statistics.

Etiology of Injuries

*Children Treated at Pediatric Trauma Centers
(3-Year Comparison)*

Etiology	June 2013 to May 2014	June 2014 to May 2015	June 2015 to May 2016
Motor Vehicle Crash	16.9%	15.9%	15.7%
Motorcycle Crash	1.3%	0.8%	1.2%
Pedestrian Incident	9.8%	8.1%	7.5%
Gunshot Wound	0.6%	1.5%	1.7%
Stabbing*	2.5%	1.5%	1.9%
Fall	39.2%	44.8%	46.1%
Other	29.7%	27.4%	25.9%
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 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 Statistics.

**Stab wounds include both intentional and unintentional piercings and punctures.*

Etiology of Injuries by Age

Children Treated at Pediatric Trauma Centers (June 2015 to May 2016)

Age	Motor Vehicle Crash	Motorcycle	Pedestrian	Fall	Gunshot Wound	Stab Wound*	Other	Total
Under 1 year	5.4%	0.0%	0.0%	13.4%	0.0%	3.0%	15.2%	11.0%
1 to 4 years	21.1%	4.5%	18.7%	27.8%	6.7%	12.1%	20.2%	23.1%
5 to 9 years	33.2%	18.2%	37.3%	35.7%	26.6%	36.4%	20.9%	31.3%
10 to 14 years	35.7%	68.2%	38.8%	19.8%	60.0%	42.4%	31.3%	28.4%
15+ years	4.6%	9.1%	5.2%	3.3%	6.7%	6.1%	12.4%	6.2%
TOTAL	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 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 Statistics.

**Stab wounds include both intentional and unintentional piercings and punctures.*

Number of Injuries and Deaths by Age

Children Treated at Pediatric Trauma Centers
(June 2015 to May 2016)

Age	Number of Injured Patients		Number of Deaths	
	Total	Maryland Residents	Total	Maryland Residents
Under 1 year	213	204	6	6
1 to 4 years	427	408	8	8
5 to 9 years	562	528	7	6
10 to 14 years	510	487	2	2
15+ years	110	105	0	0
TOTAL	1,822	1,732	23	22

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 Statistics.

Number of Injuries by Age

Children Treated at Pediatric Trauma Centers
(3-Year Comparison)

Age	June 2013 to May 2014	June 2014 to May 2015	June 2015 to May 2016
Under 1 year	174	166	213
1 to 4 years	432	420	427
5 to 9 years	478	532	562
10 to 14 years	451	498	510
15+ years	90	106	110
TOTAL	1,625	1,722	1,822

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 Statistics.

Number of Deaths by Age

Children Treated at Pediatric Trauma Centers
(3-Year Comparison)

Age	June 2013 to May 2014	June 2014 to May 2015	June 2015 to May 2016
Under 1 year	2	4	6
1 to 4 years	7	7	8
5 to 9 years	2	2	7
10 to 14 years	1	1	2
TOTAL	12	14	23

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 Statistics.

Final Disposition of Patients

Children Treated at Pediatric Trauma Centers
(3-Year Comparison)

Final Disposition	June 2013 to May 2014	June 2014 to May 2015	June 2015 to May 2016
Inpatient Rehab Facility	2.4%	1.7%	2.1%
Skilled Nursing Facility	0.1%	0.1%	0.0%
Residential Facility	0.2%	0.2%	0.0%
Specialty Referral Center	0.0%	0.0%	0.2%
Home with Services	1.7%	0.9%	0.6%
Home	93.1%	94.7%	94.4%
Acute Care Hospital	0.1%	0.3%	0.2%
Morgue/Died	0.7%	0.8%	1.3%
Foster Care	1.7%	1.2%	1.0%
Jail	0.0%	0.0%	0.1%
Psychiatric Hospital	0.0%	0.0%	0.1%
Other	0.0%	0.1%	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 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 Statistics.

Etiology of Injuries by Age

Children Treated at Pediatric Trauma Centers or Adult Trauma Centers (June 2015 to May 2016)

Age	Motor Vehicle Crash	Motorcycle	Pedestrian	Fall	Gunshot Wound	Stab Wound*	Other	Total
Under 1 year	6.0%	0.0%	0.7%	16.5%	0.0%	5.3%	17.0%	12.8%
1 to 4 years	21.2%	7.4%	20.3%	30.0%	9.1%	10.5%	22.8%	25.0%
5 to 9 years	34.6%	18.5%	39.2%	33.6%	24.2%	39.5%	23.8%	31.7%
10 to 14 years	38.2%	74.1%	39.8%	19.9%	66.7%	44.7%	36.4%	30.5%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Note: 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 Statistics.

**Stab wounds include both intentional and unintentional piercings and punctures.*

Occurrence of Injury by County: Scene Origin Cases Only

*Children Treated at Pediatric Trauma Centers
(June 2015 to May 2016)*

County of Injury	Number
Anne Arundel County	44
Baltimore County	105
Calvert County	12
Caroline County	2
Carroll County	17
Cecil County	21
Charles County	28
Dorchester County	5
Frederick County	15
Harford County	46
Howard County	18
Kent County	4
Montgomery County	54
Prince George's County	149
Queen Anne's County	8
St. Mary's County	20
Talbot County	4
Washington County	2
Wicomico County	1
Worcester County	1
Baltimore City	234
Washington, DC	5
Other	1
Not Indicated	78
TOTAL	874

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. Scene origin cases represent 48.0% of the total cases treated at Pediatric Trauma Centers. For children who were burn patients at each hospital, see Maryland Pediatric Burn Statistics.

Residence of Patients by County: Scene Origin Cases Only

*Children Treated at Pediatric Trauma Centers
(June 2015 to May 2016)*

County of Residence	Number
Allegany County	1
Anne Arundel County	43
Baltimore County	121
Calvert County	12
Caroline County	1
Carroll County	21
Cecil County	17
Charles County	22
Dorchester County	5
Frederick County	15
Harford County	44
Howard County	27
Kent County	1
Montgomery County	57
Prince George's County	134
Queen Anne's County	5
St. Mary's County	23
Talbot County	3
Washington County	4
Wicomico County	3
Baltimore City	264
Virginia	2
Pennsylvania	9
Washington, DC	21
Delaware	4
Other	15
TOTAL	874

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. Scene origin cases represent 48.0% of the total cases treated at Pediatric Trauma Centers. For children who were burn patients at each hospital, see Maryland Pediatric Burn Statistics.

Children with Protective Devices at Time of Trauma Incident

*Children Treated at Pediatric Trauma Centers
(3-Year Comparison)*

Protective Device	June 2013 to May 2014	June 2014 to May 2015	June 2015 to May 2016
None	31.0%	49.7%	48.2%
Seatbelt	14.7%	11.2%	11.4%
Airbag & Seatbelt	7.3%	8.2%	10.6%
Airbag Only	2.4%	2.1%	5.0%
Infant/Child Seat	15.7%	13.8%	14.0%
Protective Helmet	14.7%	12.3%	9.7%
Other Protective Device	0.4%	0.2%	0.0%
Padding/Protective Clothing	0.2%	0.4%	0.9%
Unknown	13.6%	2.1%	0.2%
TOTAL	100.0%	100.0%	100.0%

Note: Table reflects children 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 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 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 2013 to May 2014	June 2014 to May 2015	June 2015 to May 2016
Children's National Health System Pediatric Burn Center	CNHSPBC	266	211	244
Johns Hopkins Pediatric Burn Center	JHPBC	393	412	394
Johns Hopkins Burn Center at Bayview	JHBC	19	28	16
TOTAL		678	651	654

Place of Injury

*Patients Treated at Pediatric Burn Centers and Patients Less Than Age 15 Treated at Johns Hopkins Burn Center at Bayview
(June 2015 to May 2016)*

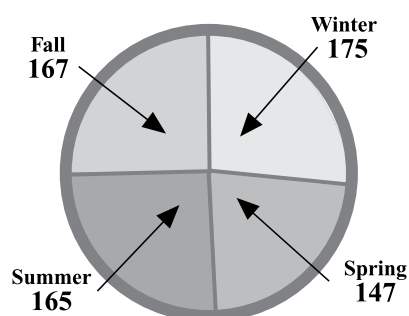
Source: Maryland State Trauma Registry

Place of Injury	Number
Home	556
Farm	2
Place for Recreation or Sport	18
Street/Highway	3
Public Building	22
Residential Institution	2
Other Specified Place	13
Unspecified Place	38
TOTAL	654

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 2015 to May 2016)*

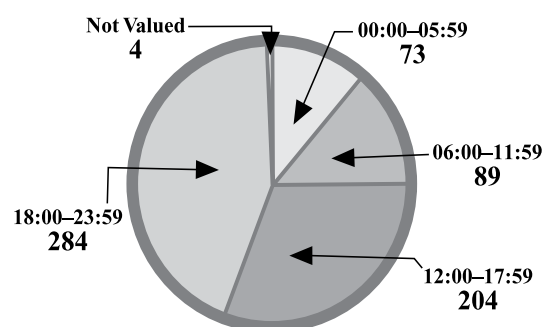
Source: Maryland State Trauma Registry



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 2015 to May 2016)*

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 2015 to May 2016)*

Source: Maryland State Trauma Registry

County of Injury	Number
Allegany County	2
Anne Arundel County	44
Baltimore County	79
Calvert County	10
Caroline County	1
Carroll County	4
Cecil County	5
Charles County	15
Frederick County	6
Harford County	17
Howard County	12
Montgomery County	76
Prince George's County	123
Queen Anne's County	2
St. Mary's County	11
Talbot County	1
Washington County	10
Wicomico County	4
Worcester County	5
Baltimore City	149
Virginia	3
West Virginia	2
Pennsylvania	3
Delaware	1
Other	2
Not Valued	67
TOTAL	654

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 2015 to May 2016)*

Source: Maryland State Trauma Registry

County of Residence	Number
Allegany County	4
Anne Arundel County	42
Baltimore County	95
Calvert County	6
Caroline County	1
Carroll County	5
Cecil County	4
Charles County	16
Frederick County	6
Harford County	21
Howard County	16
Montgomery County	82
Prince George's County	122
Queen Anne's County	1
St. Mary's County	10
Talbot County	2
Washington County	10
Wicomico County	4
Worcester County	3
Baltimore City	181
Virginia	5
West Virginia	3
Pennsylvania	5
District of Columbia	3
Delaware	2
Other	5
TOTAL	654

Mode 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 2015 to May 2016)*

Source: Maryland State Trauma Registry

Modality Type	CNHSPBC	JHPBC	JHBC	Total
Ground Ambulance	92	190	3	285
Helicopter	9	13	0	22
Other*	143	187	13	343
Not Valued	0	4	0	4
TOTAL	244	394	16	654

**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 2015 to May 2016)*

Source: Maryland State Trauma Registry

Origin Type	CNHSPBC	JHPBC	JHBC	Total
Scene of Injury	199	295	14	508
Hospital Transfer	45	99	1	145
Not Valued	0	0	1	1
TOTAL	244	394	16	654

Etiology of Injuries by Age

*Patients Treated at Pediatric Burn Centers and Patients Less Than Age 15
Treated at Johns Hopkins Burn Center at Bayview
(June 2015 to May 2016)*

Source: Maryland State Trauma Registry

Age Range	Electrical	Chemical	Thermal			Inhalation	Other Burn	Other Non-Burn	Unknown	Total
			Flame	Contact	Scald					
Under 1 year	1	2	2	15	45	0	0	0	7	72
1 to 4 years	7	3	9	106	222	3	1	0	6	357
5 to 9 years	4	2	18	19	84	1	1	3	3	135
10 to 14 years	3	3	15	9	36	3	1	2	0	72
15 years and over	0	0	3	4	11	0	0	0	0	18
Total	15	10	47	153	398	7	3	5	16	654

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 2013 to May 2014	June 2014 to May 2015	June 2015 to May 2016
Home	640	593	597
Home with Services	10	20	20
Transfer to an Acute Care Facility	10	15	9
Transfer to Another Service	1	0	0
Rehabilitation Facility	7	4	13
Morgue/Died	0	2	4
Skilled Nursing Facility	0	0	2
Extended Care Facility	1	0	0
Alternate Caregiver	5	10	4
Foster Care	2	6	2
Transfer to Inpatient Psychiatric Facility	0	1	0
Unable to Complete Treatment/Left Against Medical Advice	0	0	2
Not Valued	2	0	1
TOTAL	678	651	654

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 2015 to May 2016)*

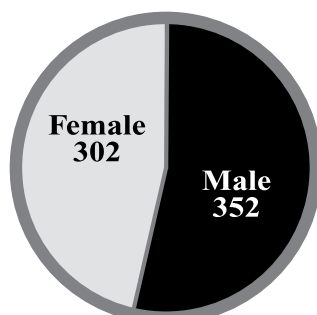
Source: Maryland State Trauma Registry

Length of Stay	Less Than 10% TBSA	10 - 19% TBSA	20% or Greater TBSA	Not Valued	Total
1 Day	494	4	2	67	567
2 - 3 Days	29	6	0	6	41
4 - 7 Days	20	2	0	0	22
8 - 14 Days	8	1	3	0	12
15 - 21 Days	0	2	4	1	7
22 - 28 Days	0	1	1	0	2
Over 28 Days	2	0	1	0	3
TOTAL	553	16	11	74	654

Gender Profile

*Patients Treated at Pediatric Burn Centers and
Patients Less Than Age 15 Treated at
Johns Hopkins Burn Center at Bayview
(June 2015 to May 2016)*

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 2013 to May 2014	June 2014 to May 2015	June 2015 to May 2016
Under 1 year	88	94	72
1 to 4 years	344	336	357
5 to 9 years	138	111	135
10 to 14 years	78	77	72
15 years and over	30	33	18
TOTAL	678	651	654

Number of Patients Treated at the Pediatric Burn Clinics at Johns Hopkins Pediatric Center and Children's National Health System

(3-Year Comparison)

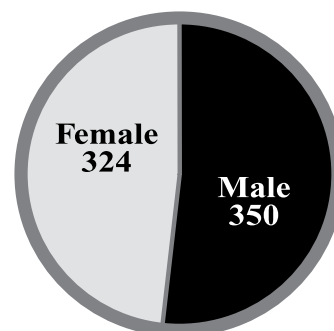
Source: Maryland State Trauma Registry

	June 2013 to May 2014	June 2014 to May 2015	June 2015 to May 2016
Unique Patients	643	662	674
Total Pediatric Burn Clinic Visits	1,403	1,484	1,459

Gender Profile

Patients Treated at the Pediatric Burn Clinics
at Johns Hopkins Pediatric Center and
Children's National Health System
(May 2015 to June 2016)

Source: Maryland State Trauma Registry



Number of Patients by Age Treated at the Burn Clinics at Johns Hopkins Pediatric Center and Children's National Health System

(3-Year Comparison)

Source: Maryland State Trauma Registry

Age Range	June 2013 to May 2014	June 2014 to May 2015	June 2015 to May 2016
Under 1 year	83	81	57
1 to 4 years	330	332	364
5 to 9 years	126	141	154
10 to 14 years	73	77	83
15 years and over	31	31	16
TOTAL	643	662	674

Etiology of Injuries by Age

Patients Treated at the Pediatric Burn Clinics

At Johns Hopkins Pediatric Center and Children's National Health System
(June 2015 to May 2016)

Source: Maryland State Trauma Registry

Age Range	Electrical	Chemical	Thermal			Other Non-Burn	Unknown	Total
			Flame	Contact	Scald			
Under 1 year	0	0	1	17	38	0	1	57
1 to 4 years	1	2	5	122	228	1	5	364
5 to 9 years	0	1	9	32	111	1	0	154
10 to 14 years	0	1	12	14	55	1	0	83
15 years and over	0	0	4	2	9	1	0	16
Total	1	4	31	187	441	4	6	674

CHARLES “MCC.” MATHIAS, JR., NATIONAL STUDY CENTER FOR TRAUMA AND EMERGENCY MEDICAL SYSTEMS

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, in an effort to further basic, translational, and clinical studies in injury research, the University of Maryland School of Medicine (UMSOM) designated the NSC as an Organized Research Center (ORC). Since then, the Shock, Trauma, and Anesthesiology Research ORC (STAR-ORC) is rapidly becoming a world-class, multidisciplinary research and educational center focusing on brain injuries, critical care and organ support, resuscitation, surgical outcomes, patient safety, and injury prevention. The STAR-ORC encompasses the UMSOM’s Program in Trauma and Department of Anesthesiology. Along with the existing NSC, the STAR-ORC is led by Alan I. Faden, MD. The Executive Committee of the STAR-ORC is comprised of Dr. Faden; Thomas M. Scalea, MD, R Adams Cowley Shock Trauma Center (STC); and Peter Rock, MD, Department of Anesthesiology.

Research Activities

Motor Vehicle-Related Injuries: The NSC is a leading participant in the Crash Injury Research and Engineering Network (CIREN) funded by the National Highway Traffic Safety Administration (NHTSA) and continues efforts begun under the Crash Outcome Data Evaluation System (CODES), which is currently funded by the Maryland Department of Transportation’s Highway Safety Office (MDOT-HSO). The NSC was one of six centers awarded the CIREN project on an annually renewable basis; it was funded through May 2016, and the NSC will be applying for additional project funds during the 2016-2017 contract year. During the 2015-2016 contract year, 45 cases were enrolled into CIREN and a comprehensive investigation conducted for each. Case reviews were held each month and the NSC hosted NHTSA administrators on several occasions; the meetings have also been attended by representatives from the automotive industry and from other CIREN centers. NSC’s CIREN center continued partnerships with the Maryland State Police, Baltimore County Police Department, Office of the Chief Medical Examiner, Maryland Motor Vehicle Administration (MVA), and the MDOT-HSO. CIREN cases are frequently used as part of biomechanics presentations at the STC, Maryland Crash Reconstruction Committee, and other local injury prevention programs across the state. CIREN team members gave a presentation entitled “Changing Patterns of Distal Lower Extremity Injuries in Motor Vehicle Collisions” at the CIREN annual meeting in December 2015. CIREN team members are

also working on a manuscript entitled “Correlation of Hospital Charges and Injury Patterns Using Statewide Hospital Discharge Data.” The NSC continues its collaborations with MIEMSS, Impact Research, and Frederick County EMS on a CIREN-funded project to improve the collection and use of advanced automatic collision notification data.

As part of CODES, the NSC has compiled information from a variety of statewide databases to enable in-depth analysis of highway safety programs. Data provided by the Maryland CODES program are used for portions of the Maryland Strategic Highway Safety Plan (SHSP), Highway Safety Plan (HSP), and Annual Report compiled by the MHSO and to support a variety of problem identification and program evaluation activities across the state. NSC staff members serve on the Traffic Records Coordinating Committee as facilitators, the SHSP Implementation and Emphasis Area Teams as data coordinators, the National Traffic Records Advisory Committee, the Association of Transportation Safety Information Professionals Executive Board, and Maryland’s Partnership for a Safer Maryland. The compiled CODES data sets are a valuable resource to Maryland’s highway safety and injury prevention community.

Under a contract with the MDOT-HSO, the NSC serves as a key data analysis resource and partner for the MDOT-HSO and the MVA. During the past year, NSC staff conducted analyses related to nighttime seat belt use, motorcycle safety, older drivers, distracted driving, and pedestrians. In addition, the NSC staff conducted an in-depth analysis of pedestrian crashes in Maryland and presented the findings to MDOT-HSO. NSC staff members also completed an in-depth analysis of the ignition interlock program in preparation for the 2016 legislative session and continue to support efforts related to the Maryland Drunk Driving Reduction Act of 2016, also known as Noah’s Law.

The NSC concluded its analysis of the MHSO Maryland Annual Driving Survey, which was used to fill a gap in data for their annual SHSP and HSP. Survey responses for two years (March 1, 2014, through August 31, 2015) found that 40% of respondents in each year acknowledged using a cell phone without a hands-free device while driving within the past week. Higher proportions were found in the age range of 21-54 years and among males, Hispanics, and African-Americans. Acknowledgement of cell phone use without a hands-free device while driving increased as weekly driving mileage increased, reaching 51% among those who drive more than 300 miles per week. Those in the high risk group who answered “1+ times” decreased slightly in the second year to just under 70%.

Throughout FY 2016 the NSC continued to make enhancements to its existing website. Partnering with the Carey School of Law Legal Resource Center for Public Health Policy to develop a new website, NSC is making many data products available for public use.¹ Partner agencies can submit data requests to NSC epidemiologists and data analysts using the request form on NSC's website.²

NSC staff also attended and presented at the International and State Traffic Records Forums, SHSP Implementation Team meeting, the Safe States Conference, and the annual conferences of the American Association for the Surgery of Trauma, State Motorcycle Safety Administrators, and Lifesavers. Presentation topics included pedestrian safety, traffic records, motorcycle safety, and state-of-the-state data.

Alcohol-Related Injuries: The NSC has two grants funded by the National Institutes of Health (NIH) to study the role that alcohol use and alcohol hangovers play in trauma and subsequent mortality. Each of the two grants is awarded for five years, and together they represent over \$4.7 million in NIH funding.

The first project, Alcohol Involvement in a Cohort of Trauma Patients: Trends and Future Mortality, is innovative because it links unique longitudinal data on alcohol consumption by STC patients with National Death Index data to identify patients who die after discharge. The main objective of the current study is to determine how an elevated blood alcohol concentration (BAC) on admission relates to subsequent mortality risk. The underlying hypothesis is that patients with a BAC above a certain level, which has yet to be determined, have such a high risk of dying of another injury that a tiered approach to treatment can be developed based on the patient's BAC and other characteristics. A number of publications have used this data, including a recent article in the *Annals of Surgery* entitled "Trauma Recidivism Predicts Long-term Mortality: Missed Opportunities for Prevention." Another important aspect of this study is that death certificate data from the National Death Index has been linked to all cases discharged from the STC and has been incorporated into its trauma registry. This is now available for use in other studies and will provide valuable long-term outcome data on mortality for all patients once discharged. The study also looks at drug involvement in injuries, including 1) trauma admissions of patients on methadone therapy and the injuries they sustain and 2) drug overdoses among patients who have been discharged from the STC. Other analyses underway include 1) long-term follow-up of patients with head injuries and those who experienced falls and 2) linkage to Medicare data to study outcomes in the elderly.

The second project, Hangovers and Traffic Injuries: Is Alcohol's Influence Greater Than Expected?, identifies and quantifies the role of residual effects of alcohol in traffic injuries by assessing biomarkers for recent alcohol consumption in the urine samples of drivers involved in motor vehicle crashes who are admitted to the STC.

Additional funding from the Maryland Department of Health and Mental Hygiene to the Maryland Center of Excellence for Problem Gambling has enabled the NSC to examine the impact of the recent legalization of casino gambling in Maryland on traffic crashes, particularly alcohol-related crashes as they are the only facilities in the state where alcohol is available around-the-clock.

Prehospital and In-Hospital Care: Three studies were funded by the US Department of Defense to develop real-time algorithms for predicting blood transfusion and emergency life-saving intervention needs based on field trauma patient real-time vital signs and point of care testing data. Additional funding was received to develop the patient information communication telemedicine platform, which could sustain bandwidth that is unreliable and has limited communication capability.

Retention and Assessment of Surgical Performance Study: A study funded by the US Army has enrolled 106 surgeons from programs in the Northeastern United States and developed surgeon performance metrics and surgical skill retention in vascular control procedures in cadaver and simulated physical models. The performance assessments have been validated before and after Advanced Surgical Skills for Exposure in Trauma (ASSET) course training to determine criteria to define readiness for deployment.

Four papers are published and eight podium presentations are planned for the American College of Surgeons' annual meeting and the Military Health Services Research Symposium.

Training Activities

Within the United States, the NSC actively trains epidemiologists and other health professionals on research topics related to injuries and EMS. Currently there are five epidemiology doctoral students working with NSC faculty on research projects as part of their training, with topics ranging from drug overdose deaths, triage criteria in the elderly, and the effect of statins on traumatic brain injury outcomes. In addition, members of the faculty sit on the dissertation committees for other doctoral students studying injury-related topics in the Department of Epidemiology and Public Health, and they also teach courses on injury epidemiology and prevention. One recent graduate student, funded by the

¹ medschool.umaryland.edu/NSCforTrauma_MCTSA_data.asp; www.law.umaryland.edu/programs/publichealth/injury/index.html

² somvweb.som.umaryland.edu/NSCTrauma/NSCData.aspx

Robert Wood Johnson Public Health Law Research program, evaluated the impact of raising sales tax in Maryland on alcohol and found it significantly reduced alcohol-related crashes. A board-certified emergency physician and UMSOM faculty member recently completed his clinical research fellowship with the NSC. Over the course of the fellowship, he published 10 manuscripts, submitted 6 more, and presented 7 abstracts at national meetings. He was the principal investigator or co-investigator on 16 grants, 5 of which were successful, resulting in \$444,000 of research support. He continues to conduct injury-related research at the NSC while practicing and pursuing his master's degree in clinical research. In addition, a preventive medicine resident worked with NSC faculty to develop a research group on racial disparities in trauma outcomes that successfully published three papers.

Continued funding by the Fogarty International Center of the NIH through their International Collaborative Trauma and Injury Research Training Program has provided training in the United States and the Middle East for about 900 health professionals through a number of injury prevention and emergency response courses. The material covered in these courses, the majority of which are taught by NSC faculty and staff members, includes injury epidemiology and biostatistics, emergency preparedness and disaster response, and the clinical care of trauma patients. As a key component of this grant, 42 trainees from the Middle East and East Africa, including Egypt, Iran, Sudan, and Kenya, have come to the United States during most summers since 2007 to increase their knowledge and understanding of injury-related research through classroom training and completion of a research assignment. Ten additional trainees from Egypt, Sudan, Yemen, and Saudi Arabia are scheduled for seven weeks of training at the NSC from July through August of 2016. In late 2015 and early 2016, the NSC conducted two blended (online/in-person) introductory injury epidemiology courses in Egypt and Sudan. Overall, these courses are designed to strengthen injury prevention and control research and practice within Egypt and the Eastern Mediterranean region.

MIEMSS-NSC Memorandum of Understanding

Through a cooperative memorandum of understanding agreement, the NSC continues to support data management and data analysis needs as requested by MIEMSS. The focus of the past year has been on the development of benchmark reports generated from



MIEMSS data sources, including eMEDS and Flight Vector. These benchmark reports are important quality improvement activities that allow jurisdictions better understanding of their current performance on specific metrics compared to other local jurisdictions and to the entire state. Ongoing activities also include targeted data analysis efforts.

The Maryland Emergency Medical Services Systems Research Interest Group (MEMSS-RIG) is comprised of members from MIEMSS, University of Maryland, and Johns Hopkins University. The group meets monthly to help further EMS research within Maryland and nationally. Over the past five years, MEMSS-RIG members have published over 36 articles related to trauma and EMS, including a key article in the *Annals of Emergency Medicine* entitled “Maryland’s Helicopter Emergency Medical Services Experience from 2001 to 2011: System Improvements and Patients’ Outcomes.” This article concluded that “modifications to state protocols were associated with decreased helicopter EMS use and overall improved trauma patient outcomes.”

In addition to in-house preparation of peer-reviewed research papers, NSC staff also offers manuscript preparation support (including technical writing, research design, and data analysis) for university, hospital, and trauma center researchers. NSC staff members were instrumental in the publication of at least 14 manuscripts by University of Maryland, Baltimore, researchers between June 2015 and May 2016. At least seven additional papers have been accepted for publication and six are still in various stages of critical review.

National Study Center members continue to serve on various MIEMSS committees and provide assistance to meet the mission and the vision of MIEMSS.

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