

**MARIN COUNTY
EMERGENCY MEDICAL SERVICES AGENCY
PROGRAM SUMMARY
2004 - 2007**

In gratitude, the Emergency Medical Services (EMS) Agency acknowledges the substantial contributions from all Marin County EMS System providers and administrators who work hard to bring their expertise, knowledge and caring to improve emergency medical services for residents and visitors of Marin County. In particular, our gratitude extends to providers in prehospital EMS provider agencies, emergency departments and specialty care centers who attend to the needs of emergency patients, and to the members of the EMS Forum, Field Advisory, Medical Directors, CQI, TAC, Executive and Policy & Procedure Committees for their many hours of attention to detail in quality improvement and policy development for the EMS System.

Table of Contents

| | |
|----------------------------------------------------------------------------|-----------|
| <i>EMS Agency Mission</i> _____ | 1 |
| Plan and regulate the EMS System _____ | 1 |
| Sustain and evolve the Continuous Quality Improvement process _____ | 2 |
| EPCIS _____ | 2 |
| Ambulance Diversion _____ | 2 |
| STEMI Receiving Centers _____ | 2 |
| EMS System Notifications _____ | 2 |
| Trauma Advisory Committee _____ | 3 |
| Trauma Triage Tool _____ | 3 |
| Elderly Falls _____ | 3 |
| EMS Helicopters _____ | 4 |
| Policy and Procedure Manual _____ | 4 |
| Emergency Medical Dispatch Protocols _____ | 4 |
| Prepare EMS System to respond to a disaster _____ | 5 |
| MERA Radio System _____ | 5 |
| ReddiNet Web-based Communications _____ | 5 |
| Marin Medical Reserve Corps _____ | 5 |
| Multiple Patient Management Plan _____ | 5 |
| Disaster Response Exercises _____ | 5 |
| AED Programs _____ | 6 |
| EMS/Public Health Preparedness Grants _____ | 6 |
| Effectively administer the EMS Agency _____ | 6 |
| <i>Summary of 2008 EMS Agency Priorities</i> _____ | 7 |
| CQI Program Priorities _____ | 7 |
| Disaster Response Priorities _____ | 7 |
| Agency Administration Priorities _____ | 7 |
| <i>EMS AGENCY ORGANIZATIONAL CHART</i> _____ | 8 |
| <i>EMS SYSTEM ADVISORY COMMITTEES ORGANIZATIONAL CHART</i> _____ | 9 |
| <i>EMS and TRAUMA SYSTEM TRENDS</i> _____ | 10 |

| | |
|-----------------------------------------------------------------------------|------------------|
| Marin County EMS Call Volume by Paramedic Zone Providers 2001 - 2007 | 11 |
| Marin County EMS Transports by Provider 2001 - 2007 | 11 |
| Marin County EMS Transports by Provider 2001 - 2007 | 12 |
| Marin County EMS, ALS Procedures, 2000 - 2007 | 12 |
| Marin County EMS, ALS Procedures, 2000 - 2007 | 13 |
| Marin County EMS, ALS Procedures, 2000 - 2007 | 14 |
| Marin County EMS, Use of 12 Lead EKGs, 2002 – 2007 | 15 |
| TRAUMA SYSTEM TRENDS | 16 |
| Trauma System Volume by Age | 18 |
| Mechanism of Injury | 19 |
| <i>ANNUAL HELICOPTER REPORT</i> | <i>21</i> |
| HELICOPTER DISPATCH AND TRANSPORT REVIEW: 2004 - 2007 | 22 |
| Air Transports by Year | 23 |
| 1998 - 2007 | 23 |
| Number of Patients Transported by Air | 24 |
| Trauma vs. Medical: 2004 - 2007 | 24 |
| Injury Severity Scores | 25 |

MARIN COUNTY EMS AGENCY PROGRAM SUMMARY

2004 - 2007

This *Program Summary* provides a review of Emergency Medical Services (EMS) Agency activities for 2004 – 2007, and concludes with priorities for 2008. With the statistical reports that follow in the *Program Summary Supplement*, it is an update to the EMS Forum, the Marin County Board of Supervisors and the California State EMS (Emergency Medical Services) Authority. Previous annual reports are on the EMS Agency website for review at <http://www.co.marin.ca.us/ems>. In 2007 the EMS Agency re-stated its mission and goals, through a series of strategic planning sessions with EMS Agency staff and EMS System stakeholders. The mission and goals are provided here, followed by a summary of related activities.

EMS Agency Mission

The EMS Agency is vested with authority from the California Code of Regulations (Health and Safety Code Title 22) to plan, implement, monitor and regulate the EMS System in Marin County. This mission involves the care of people who request and/or need emergency medical treatment. There are 4 primary goals directed by this mission:

- 1) Plan and regulate the EMS System
- 2) Sustain and evolve the EMS System Continuous Quality Improvement (CQI) process
- 3) Prepare the EMS System to respond to disaster
- 4) Effectively administer the EMS Agency

Plan and regulate the EMS System

General EMS System activities include maintaining ambulance Certificates of Operation and inspections, prehospital provider certifications and accreditations, ensuring county-wide compliance with state mandates, and developing and maintaining contractual agreements with providers. During 2004 - 2007, the Agency sustained this core regulatory mission, and incorporated a new policy for use of background checks on all EMT applications. This improves oversight of personnel qualifications prior to issuing a certificate to work as an EMT. Randy Saxe, interim EMS Program Manager, and Lynn Baker, EMS Program Office Manager, head up these core regulatory EMS Agency functions. Lynn is a 35-year Marin County employee, and though she officially retired early in 2008, she continues part-time in the office on a temporary basis. We offer Lynn our congratulations, and sincere thanks for her substantial service to Marin County.

During 2007, the former “Emergency Medical Care Committee” was restructured as the “EMS Forum”. This is a group of EMS System stakeholders that meets quarterly to confer with Department of Health and Human Services (HHS) executives on policy matters relating to the EMS System. The former “Prehospital Medical Care Committee” was restructured in 2007 as the “Field Advisory Committee”, to provide oversight and input to

the EMS Agency on operationally-based EMS System issues. See organizational chart on page 9.

Sustain and evolve the Continuous Quality Improvement process

The Continuous Quality Improvement (CQI) Committee maintains core EMS System clinical quality oversight functions, by providing a forum for EMS System stakeholder input on system data analysis, policy development and prehospital provider training.

The CQI Committee was reorganized through 2004 and early 2005, under the leadership of Alanna Brogan, RN, Kaiser Hospital Trauma Program Manager, with EMS Medical Director Bill Teufel, MD and Karrie Groves, RN. The structure and membership was reconfigured to provide systemwide stakeholder representation with a systematic data review process. The CQI Plan was developed and implemented in April 2005, in accordance with State EMS Authority guidelines. Subcommittees include Executive, Trauma Advisory Committee, Policy and Procedures. The committee chose system indicators using State EMS Authority guidelines. Analysis has been conducted on Pain Management and Advanced Airway Management; 2008 goals include review of Pediatric Seizures and Witnessed VF/VT.

EPCIS

Central to the analysis of EMS System performance is the data derived from the *Electronic Prehospital Care Information System*, or EPCIS. This system was developed in the late 1980's by Jay Myhre, who

continues as a contractor for the EMS Agency. Troy Peterson and Darrin Allen work with Jay and EMS System providers to continuously upgrade EPCIS software and hardware, to improve ease of use for paramedics and CQI coordinators who input and analyze the information. The bulk of information in this Program Summary derives from EPCIS. EPCIS is undergoing an extensive review with EMS System providers and Marin County HHS Information Technology chief, Del Medina, to strategically plan for its evolution over the course of the next 3 years.

Ambulance Diversion

A fundamental change in hospital diversion policy was implemented in 2005 when the Emergency Department Saturation policy was developed. Continued interest in trauma center diversions prompted a revision of the diversion policy in its entirety over the following year. In late 2007, a STEMI Receiving Center Cath Lab diversion category was added.

STEMI Receiving Centers

Initial work on a STEMI Receiving Centers system began in 2006 to ensure integration of the prehospital system with hospital cardiac care programs that rapidly diagnose and treat heart attack patients. This activity is reflected in the increase in the use of 12-lead EKGs seen in EPCIS statistics beginning in 2006.

EMS System Notifications

The Risk Management Subcommittee began a revision of the System Notification Policy in 2006 to improve the

data management process related to unusual occurrences and sentinel events. This new policy implementation date is May 1, 2008.

Trauma Advisory Committee

The Trauma Advisory Committee (TAC) was reactivated in 2006 and continues to provide a forum for principal trauma system stakeholders to evaluate trauma system indicators such as over and undertriage, EMS helicopter use, and mortality. In March 2008 the first meeting of the Trauma Medical Audit subcommittee of TAC met in closed session confidential review of in-hospital trauma cases to address interfacility transfer issues. The Marin General Hospital Level III Trauma Center was reviewed for compliance with Marin County and American College of Surgeons (ACS) standards in 2007, by consultants who recommended the hospital could successfully vie for continued (ACS) verification as a Level III center.

Trauma Triage Tool

The Trauma Triage Tool was addressed during 2005 toward revision and final implementation on January 1, 2006. The revision followed an extensive Trauma System evaluation process conducted between 2002 and 2004, using the American College of Surgeons Trauma System Consultation program, an economic evaluation by Bishop & Assoc., and stakeholder input. The revised Triage Tool directs all in-County ground transports to a single trauma receiving facility (Level III with 24/7 neurosurgery). This represents a significant change in the original trauma system design, which required paramedics to distinguish between two proximally located trauma receiving facilities

(Level III & EDAT [Emergency Dept. Approved for Trauma]), using prehospital field triage criteria that resulted in high overtriage rates. Paramedic judgment was added to the triage tool, allowing for field personnel to decide to activate the trauma system based solely on clinical assessment, even if patients do not meet other triage criteria. Overtriage rates (ISS<9/total trauma activations) measured from 2001-2005 had been in the range of 80%. Since trauma triage tool revision the rates have dropped to a 55% range and continue in a downward trend. See graph on page 17.

With the revision of the triage tool, the prehospital data system (EPCIS) was reprogrammed in October 2006 to more accurately identify prehospital use of the trauma triage tool. The Trauma System CQI process closely monitors the use of the newly-implemented tool. An EPCIS subcommittee, led by Troy Peterson, is steering a project to facilitate a more accurate use of the triage tool in the trauma system.

Elderly Falls

During the triage tool revision process, an “Elderly Fall Victims” study was conducted to provide a focused analysis of cases in which elderly using anticoagulant medication suffer falls. These patients tend to look fairly well immediately after a minor fall, but their condition is often seen to rapidly deteriorate about six hours after the injury, and because of the anticoagulant medication, internal bleeding is difficult to control. A 2001 - 2004 review of “ground level” falls treated in all Marin hospitals revealed that annually, over 100 patients who use

anticoagulants, aged 65 or more, are treated for injuries after minor falls. This represents roughly 25% of all falls treated in Marin's trauma facilities annually. The results corroborated the anecdotal awareness in Marin County that this is a frequent occurrence, and that this population is at risk of poor outcomes if their injuries are not treated promptly in a trauma center. These results were incorporated into paramedic training programs and the trauma triage tool, so that prehospital personnel would have a higher index of suspicion in these cases, and use careful assessment in their decision about whether or not to triage to the trauma center.

EMS Helicopters

The triage tool revision also included a change in the frequent helicopter use pattern in the east-central Marin area prior to 2006. A CQI audit had revealed significant overtriage of trauma patients to EMS helicopters from incidents less than 30 minutes by ground from the scene to the trauma center. Delays in transport time intervals occur in these incidents when helicopters are used instead of ground ambulances. Patients experience costly, unnecessary and lengthier transport to out-of-county trauma centers when helicopters are used in this central Marin area, instead of ground ambulances that would transport to the nearby Marin trauma center. Subsequent audits show a drop in the use of EMS helicopters in Marin County by 15%--down from 26% in 2001 to 11% in 2007—with a concentration of decreased activity in the area within 30 minutes ground travel time to the trauma center. Also significant is the increase in the average injury severity score on trauma patients

transported by aircraft (from an average ISS=12 in 2004 to average ISS=17 in 2007). This is another indicator of the desired decrease in overtriage of air transports. Statistics and graphs on pages 21-25.

Policy and Procedure Manual

Over 100 EMS policies and procedures in the EMS Agency Policy & Procedure manual were reviewed, reformatted, revised and updated during 2007 with extensive stakeholder input and substantial contributions from EMS Agency staff and CQI Committee members. This revision represents a significant milestone in the maturation of the CQI process for the EMS System. The newly revised policies are aligned with policies in neighboring regions, and compliant with current national standards. Final implementation date for the revised policy manual is May 1, 2008.

Emergency Medical Dispatch Protocols

The Marin County Communications Center, under direction of the Sheriff's Office, dispatches EMS resources for all County providers except San Rafael Fire Department. The EMS Agency has oversight responsibility for the EMS protocols dispatchers use to manage medical-related 911 calls, and dispatch emergency response crews. An EMS System priority to upgrade the dispatch protocols was achieved in April 2008, through collaborations with the Dispatch Center and the EMS Agency. The continuous quality improvement process to address these upgrades is in development, and is a priority for 2008.

Prepare EMS System to respond to a disaster

The EMS Agency collaborates with EMS System stakeholders to plan, implement policy for, and train and exercise responses to, large-scale emergencies and disasters.

MERA Radio System

During 2004, the Marin County-wide MERA radio system was implemented. EMS System issues were addressed under the direction of Randy Saxe. Equipment has been placed, and personnel have been trained to use this system. Prehospital providers use the system regularly to communicate with hospital emergency departments when transporting emergency patients. EMS Agency staff regularly monitors radio traffic, and responds to equipment troubleshooting and improvement requests from EMS System providers.

ReddiNet Web-based Communications

Web-based communications software for emergency medical systems was implemented in 2005 under Randy Saxe's direction. The system – “ReddiNet” – is used in EMS Systems throughout California. It provides data linkage with dispatch centers, EMS Agency, prehospital providers and hospitals that allows all password-permitted users to input critical status information and have it available for viewing by their counterparts in the emergency/disaster response system. It is used to communicate information about EMS System resources in “real-time” for emergency and disaster response operations. ReddiNet software upgrade is currently being

implemented to improve ease of use and expand regional communications capabilities.

Marin Medical Reserve Corps

Under the direction of Brian Waterbury, the Marin Medical Reserve Corps (MMRC) volunteer program has developed since 2005. This program trains and deploys volunteer medical professionals to respond to Marin County emergency/disaster needs. There are over 400 registered members, 250 of whom actively participate in community service and training, and who make substantial contributions to Marin County's emergency preparedness. The financial impact analysis by the Marin County Civic Center Volunteers reports the 2,653 hours of MMRC volunteer effort in 2007 provided an estimated \$110,237 of services.

In 2007 Dr. Bill Teufel agreed to assume the role of MMRC Medical Director, with the goal to integrate the MMRC with EMS System disaster response operations.

Multiple Patient Management Plan

The plan to manage a large surge in volume of emergency patients was revised in draft form in 2007, under Randy Saxe's direction, drafted and coordinated by Crystal Wright. The draft will be revised based on input from exercises planned for 2008.

Disaster Response Exercises

In 2003 the EMS Agency, with Troy Peterson and Randy Saxe, began a regular disaster exercise program. These exercises are crucial to a continuity of operations in

large-scale emergencies/disasters. They facilitate communications with multiple public and private provider agencies, including the Department of Health & Human Services (HHS). The exercise activity ranges from tabletop discussions to full-scale emergency response operations. These exercises include MAD (Mutual Aid) drills, State EMSA exercises, ad hoc exercises and EOC (Emergency Operations Center) / DOC (Department Operations Center) activations.

AED Programs

In 2004, the EMS Agency, in collaboration with the Marin County Fire Dept., implemented a public access program at the Civic Center campus. In addition to administering this program, the EMS Agency maintains the HHS clinical site AED programs. These programs provide immediate access to life-saving automatic external defibrillators (AEDs) for people who suffer sudden cardiac arrest.

EMS/Public Health Preparedness Grants

The EMS Agency supports the Public Health Division of HHS with grant projects funded by State and Federal agencies. These activities include training, equipment purchases, outfitting and maintaining supply trailers for multiple casualty incidents, and consulting on EMS System-related grant projects.

Effectively administer the EMS Agency

This function involves oversight and direction of the EMS Agency, including budget, contracts, personnel management, office management and strategic planning. The Agency has experienced a series of staffing changes, including the vacancy of the key role of the EMS Administrator. Staffing adjustments were made to accommodate this, including the appointment of Randy Saxe as interim Program Manager, and appointment of Troy Peterson as EMS Specialist in the Agency. These changes also led to a strategic planning process with staff and external stakeholders during 2007. After an analysis of the EMS Administrator role, with input from all stakeholders, recruitment is underway for qualified candidates. The position is expected to be filled by June, 2008. The Agency will relocate in June 2008 to a new office that will be shared with HHS Public Health Preparedness programs. See organizational chart on page 8.

Summary of 2008 EMS Agency Priorities

CQI Program Priorities

- Review prehospital "Pediatric Seizures" protocol compliance – Fall 2008
- Review prehospital "Witnessed VT/VF" protocol compliance – Fall 2008
- Continue trauma system indicators analysis
- Continue TAC medical reviews
- Collaborate with County Communications Center to expand the dispatch CQI process to accommodate upgrades in the emergency medical dispatch protocols – Fall, 2008
- Review the EPCIS prehospital records data system for upgrades vs. new product purchase – survey EMS System users – Fall, 2008

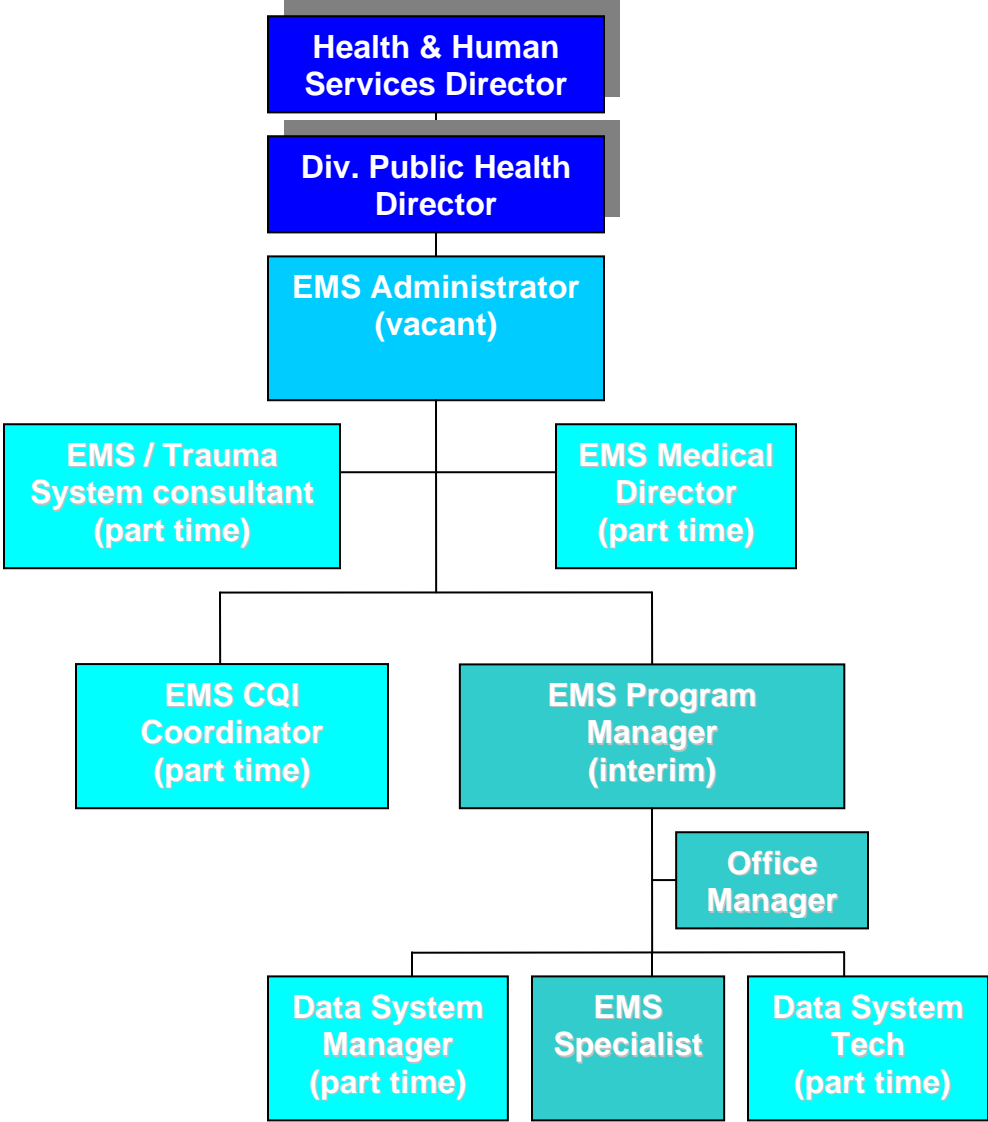
Disaster Response Priorities

- Multiple Patient Management exercise, revise and approve plan – Dec, 2008
- Implement ReddiNet upgrade – June, 2008

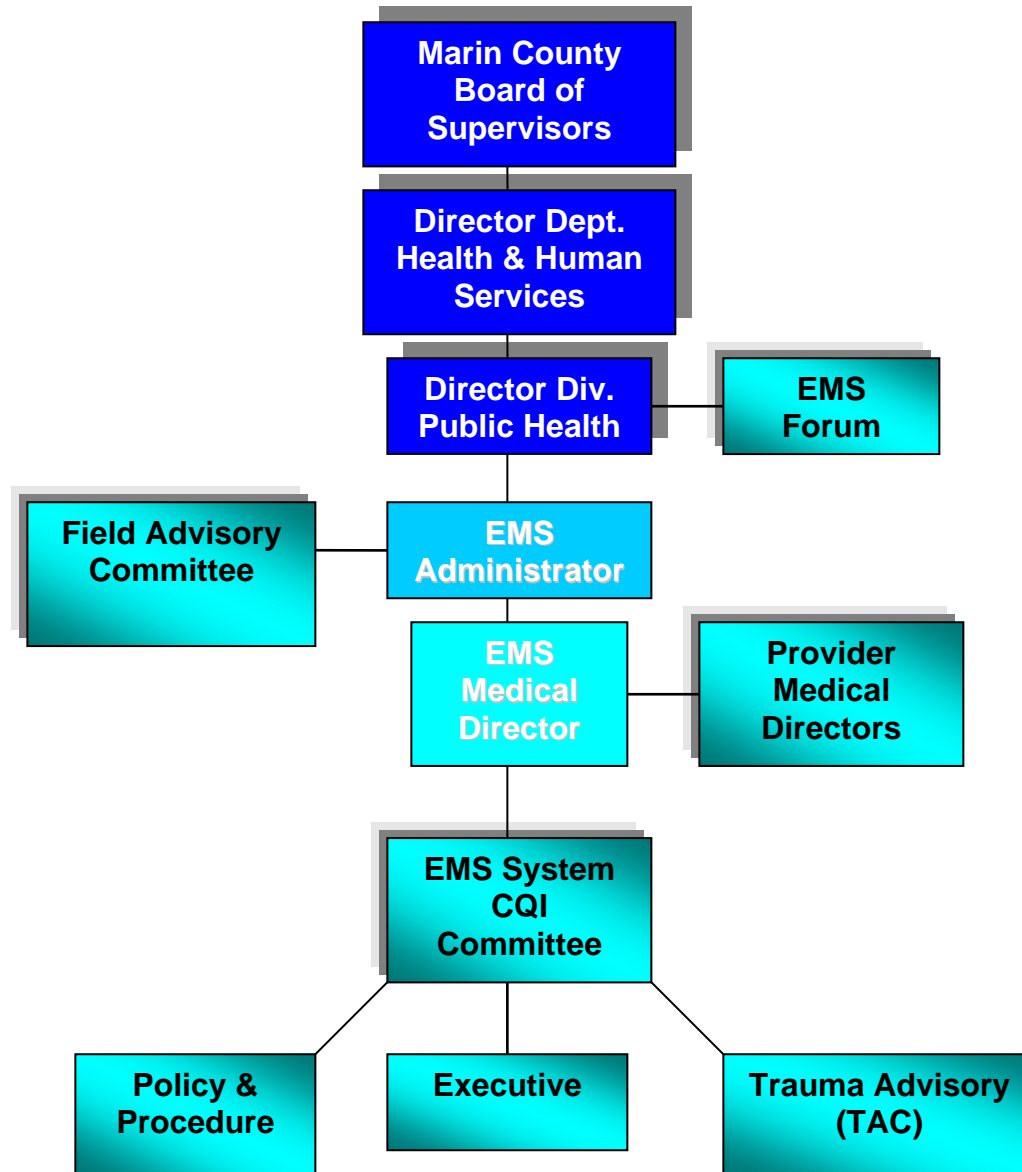
Agency Administration Priorities

- EMS Administrator recruitment and hire – June, 2008
- EMS Agency office relocation – June, 2008

EMS AGENCY ORGANIZATIONAL CHART



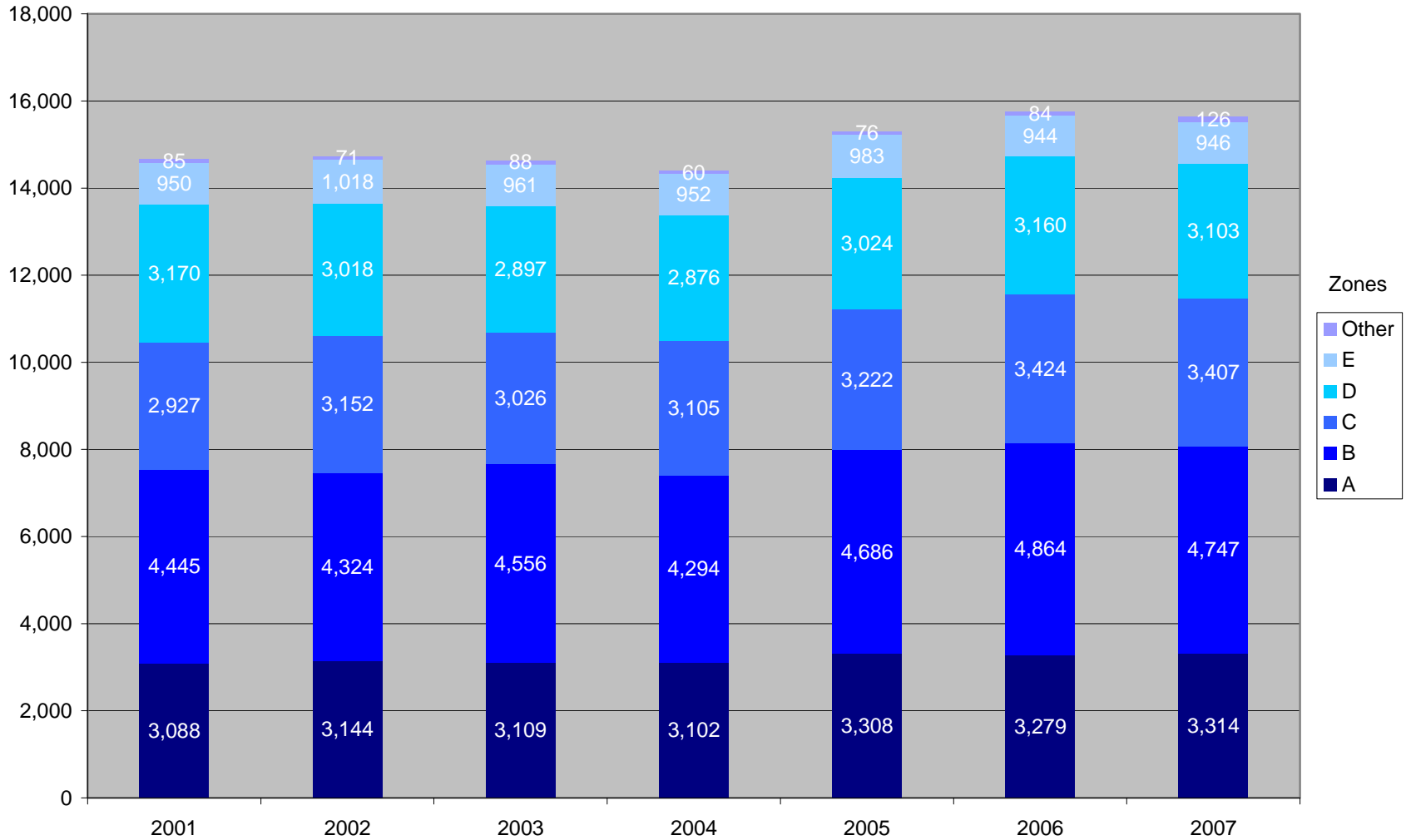
EMS SYSTEM ADVISORY COMMITTEES ORGANIZATIONAL CHART



EMS and TRAUMA SYSTEM TRENDS

The following charts represent a sample of statistics derived from dispatch center, prehospital and hospital databases. The supplemental report that accompanies this program summary contains detailed statistics from CAD and EPCIS.

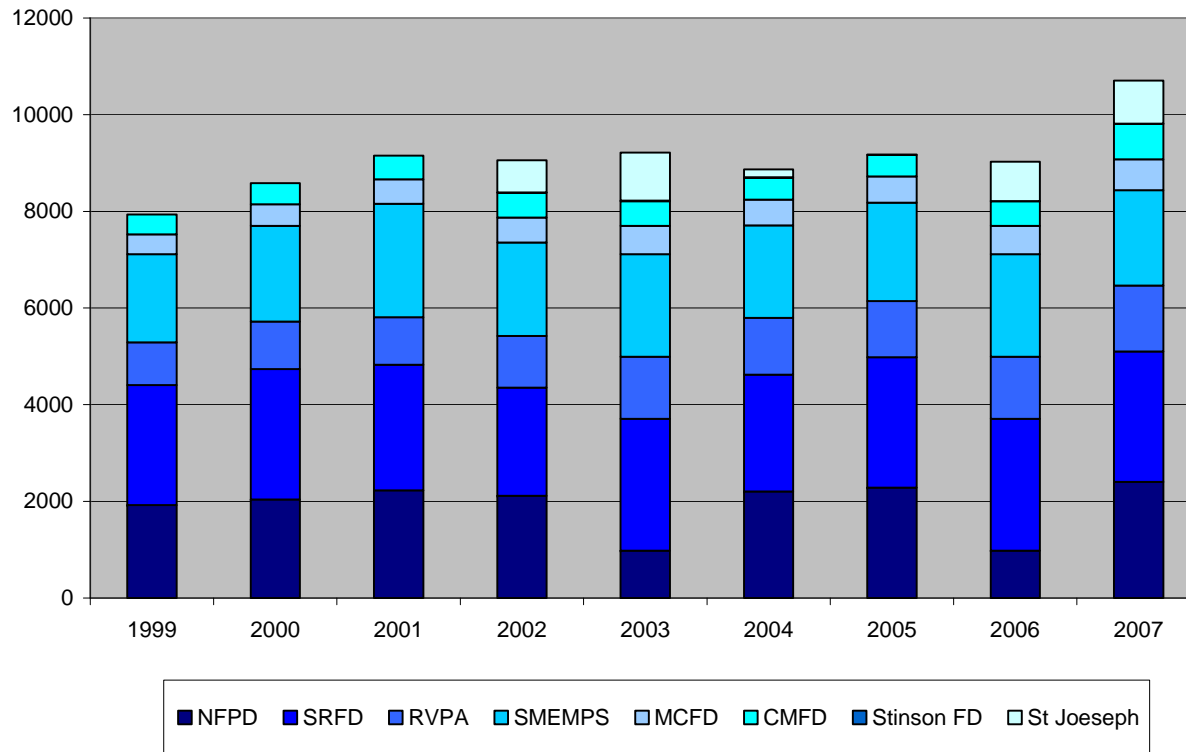
Marin County EMS Call Volume By Paramedic Zone Providers 2001- 2007



Source: Marin County Communications Center Computer Aided Dispatch data

Although the call volume (based on calls to 911 resulting in a dispatch of a vehicle) remains relatively stable, the number of transports in 2007 has risen 14% over the average number of transports. The ratio of ALS to BLS transports continues to remain steady (75% - 25%)

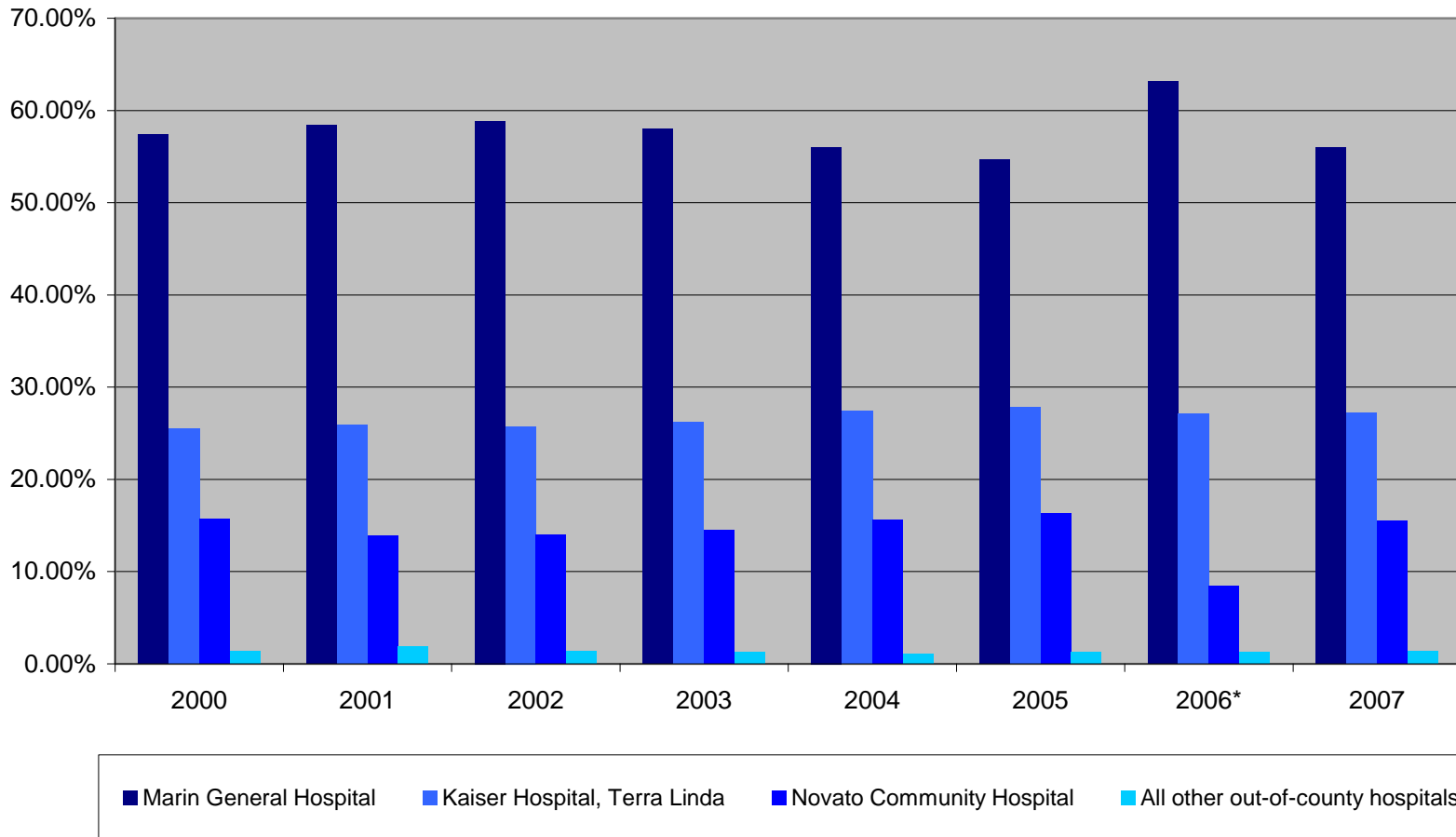
Marin County EMS, Transports By Provider, 2000 - 2007



Data for Novato Fire Protection District not included for the period 05/12/2006 thru 08/30/2006
 Source: Marin County EMS Agency EPCIS data system

The vast majority of EMS patients continue to be transported to Marin county emergency departments.

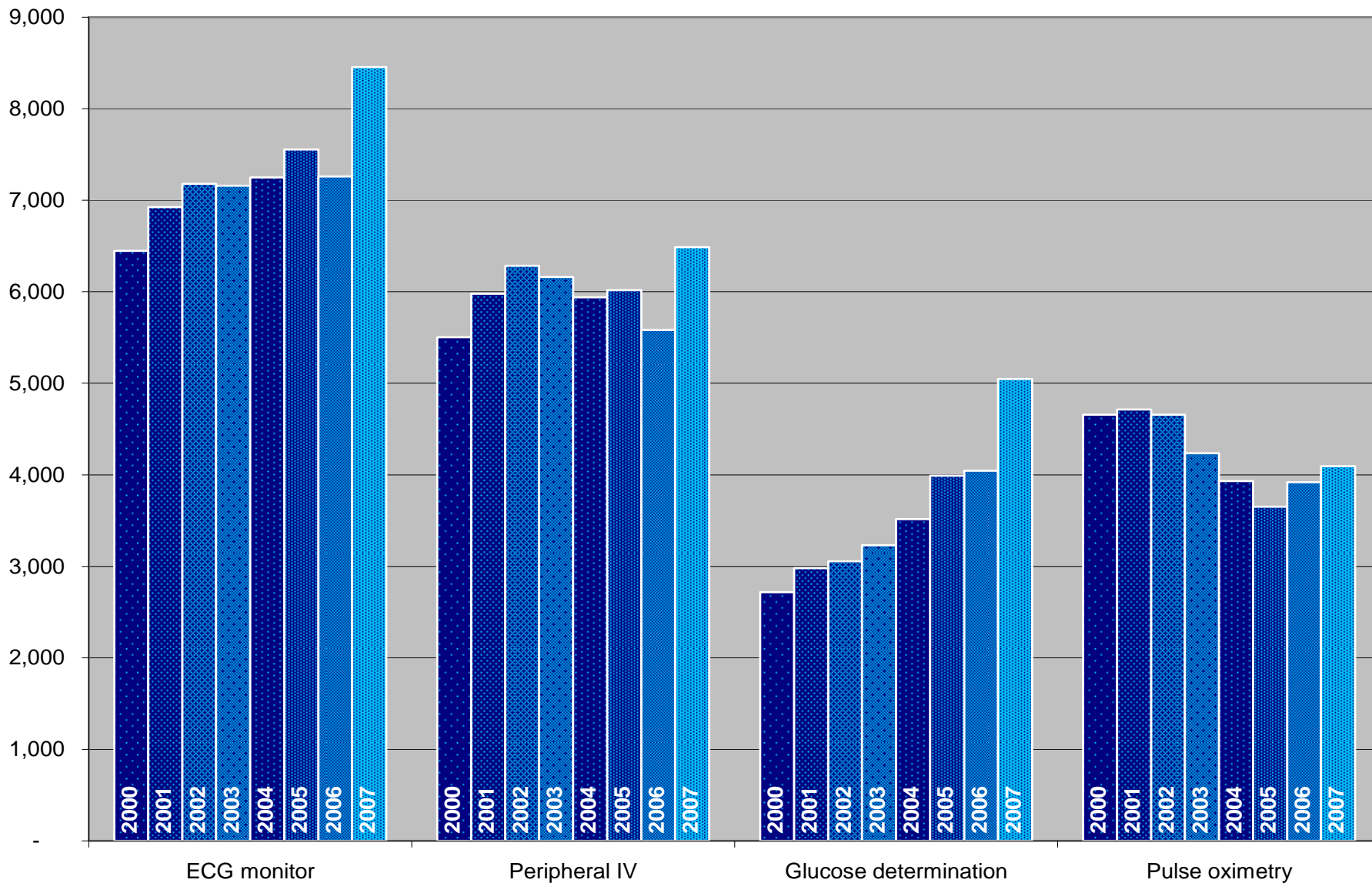
Marin County EMS, Patient Destinations, 2000 - 2007



* Data for Novato Fire Protection District not included for the period 05/12/2006 thru 08/30/2006

Source: Marin County EMS Agency EPCIS data system

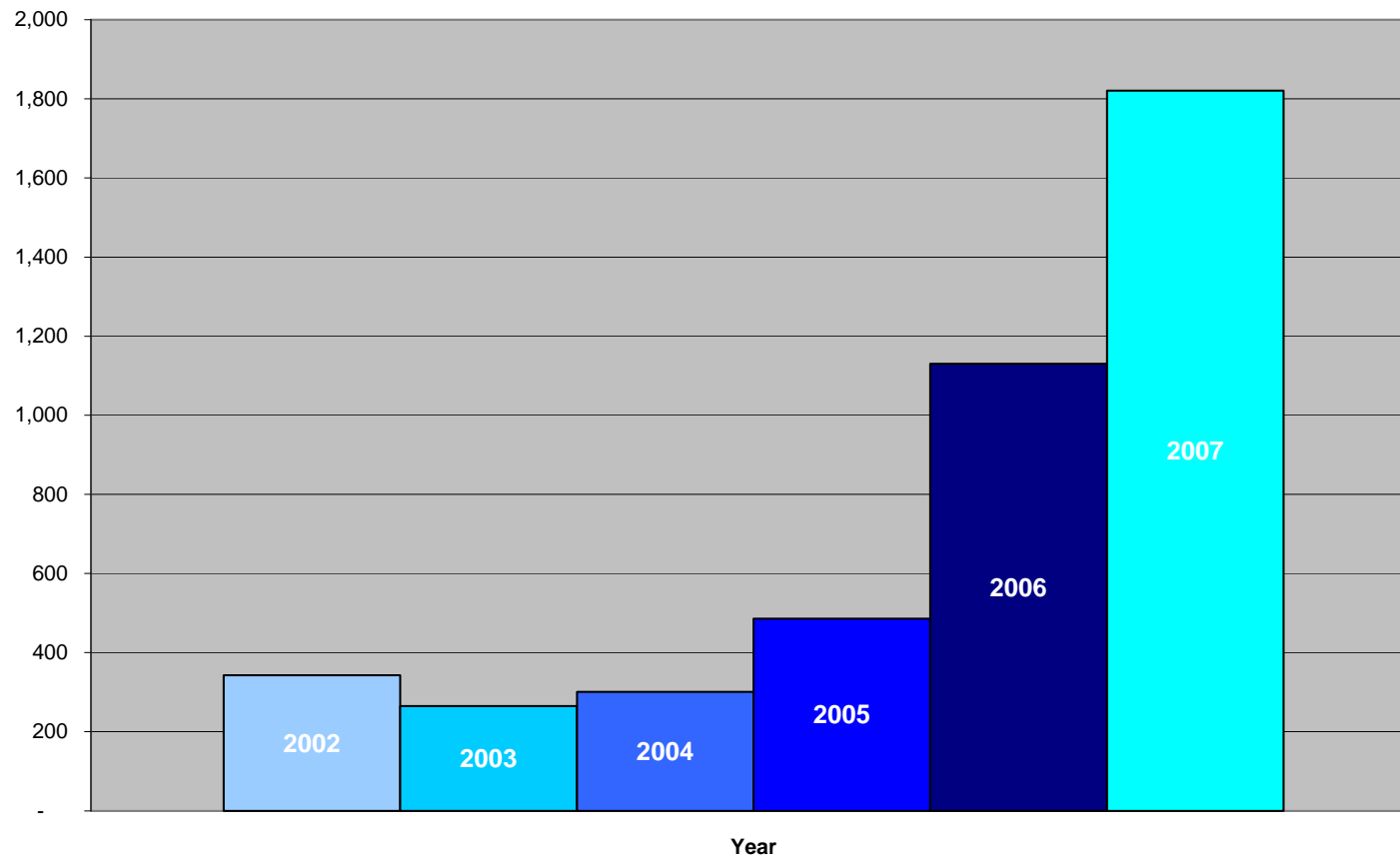
Marin County EMS, ALS Procedures, 2000-2007



Data for Novato Fire Protection District not included for the period 05/12/2006 thru 08/30/2006
 Source: Marin County EMS Agency EPCIS data system

The increase in the use of 12-lead EKGs by paramedics in the field is consistent with the continued integration of the prehospital system with hospital cardiac care programs (STEMI Receiving Centers) that rapidly diagnose and treat heart attack patients.

Marin County EMS, Use of 12 Lead EKGs, 2002 - 2007



TRAUMA SYSTEM TRENDS

What is the total patient volume and severity of injury in Marin's Trauma Receiving Hospitals?

The total volume of trauma patients cared for in Marin County's trauma receiving hospitals is depicted in the following chart. These are patients that meet prehospital trauma triage criteria. The average annual volume over the past five years is 1058, with a downward trend to 900. Also depicted in the chart is the overtriage rate: the percentage of all patients who have injuries that are relatively less severe (ISS <9). The term "ISS" refers to "Injury Severity Score". The trauma receiving hospitals include the Level III Trauma Center (Marin General Hospital) and the Emergency Dept. Approved for Trauma (EDAT: Kaiser Hospital).

Total trauma centers volume is on a downward trend, and the overtriage rate is on a steeper decline. This downward trend likely reflects the maturation of the trauma system since its inception in 2001, and the triage tool revision in 2006. The current Marin County trauma triage tool was revised after extensive evaluation and stakeholder input, using American College of Surgeons (ACS) guidelines, expert consultation from visiting ACS reviewers and an economic trauma system consultant, using benchmarks from other regional, state and national areas. In 2007 the Trauma Advisory Committee, (TAC) agreed to benchmark the overtriage rate to a range between 50% and 70% (using the ISS<9/total volume measure), and closely monitor this system

indicator. Keeping the overtriage rate in this range addresses concerns for fair financing of the trauma system by triaging patients with less-severe injuries away from trauma specialty care if they do not require these resource-intensive services.

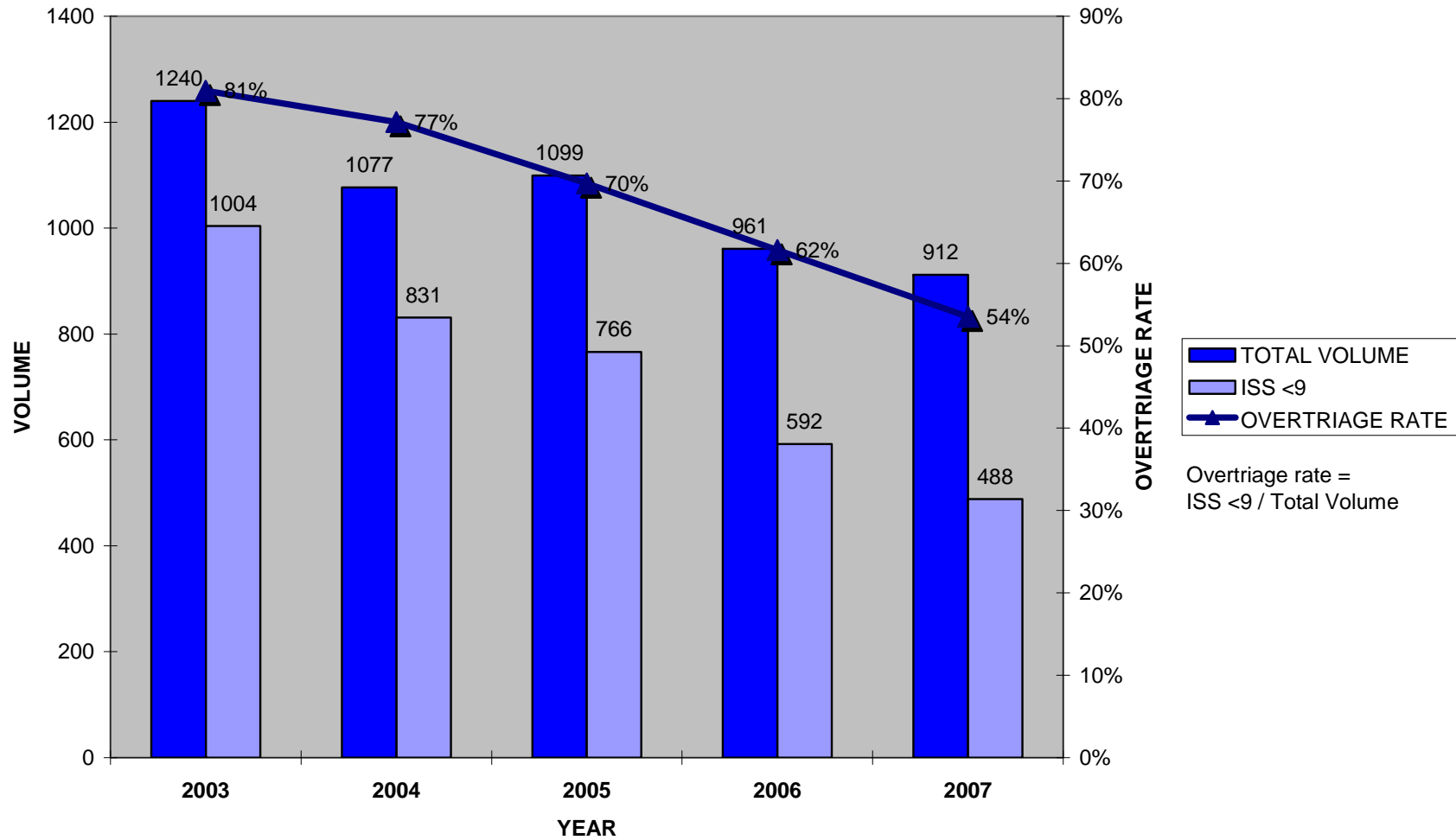
Undertriage Rate

This trauma system indicator tracks the rate at which patients who need specialty trauma services do not receive initial care at a trauma center. The undertriage rate in Marin County consistently is very low – less than 3% of the total trauma system volume. It is tracked regularly by the Trauma Advisory Committee (TAC) on a case by case basis and followed for root cause analysis and system improvements.

How does the volume of trauma patients break out by age Marin County?

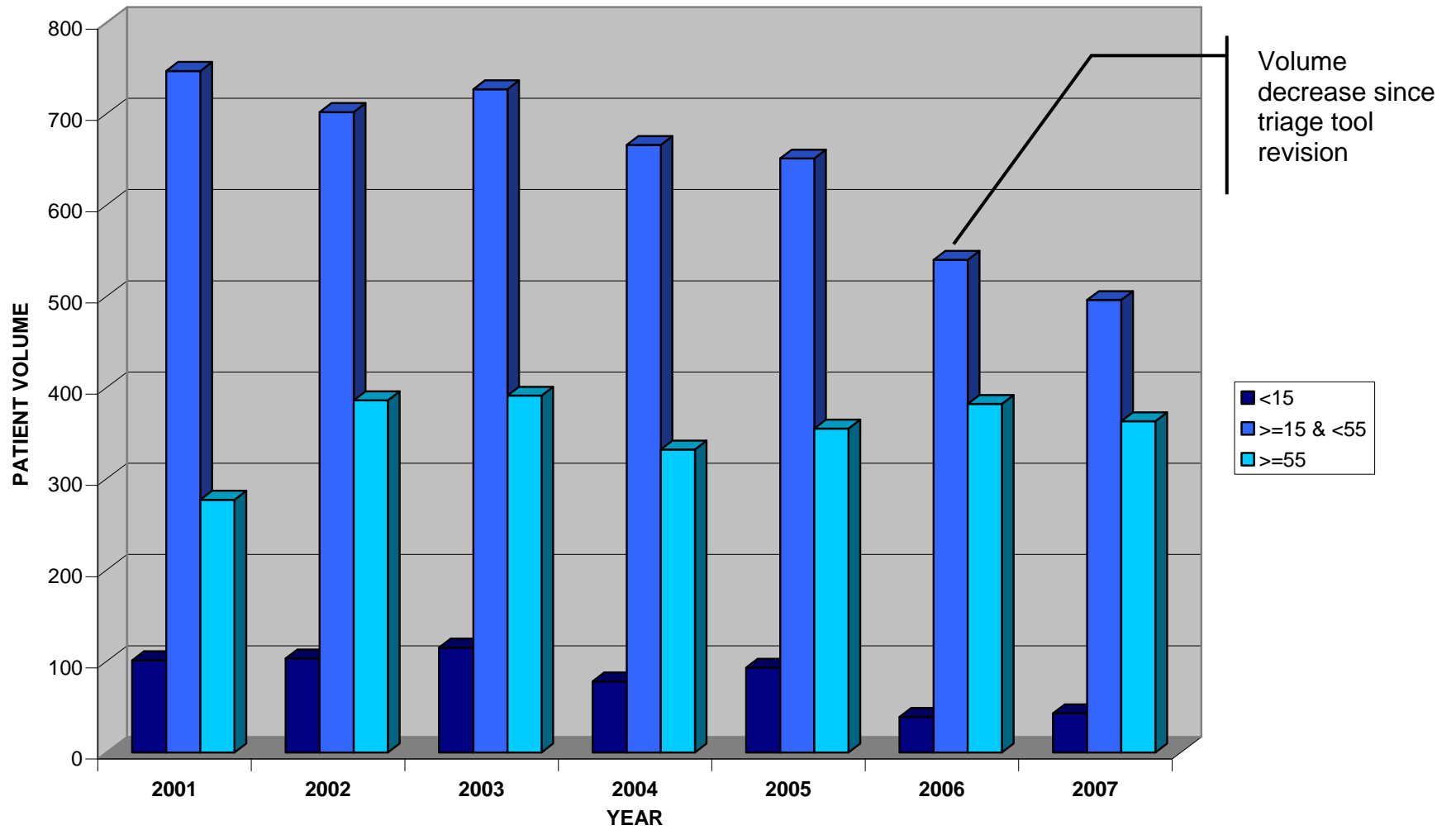
The chart on page 18 shows the trend in trauma system volume by age groups. The volume of young adults and children treated in Marin's trauma facilities has decreased since the triage tool revision, while elderly patient volume has remained stable.

**TRAUMA SYSTEM VOLUME & ISS <9
2003 - 2007**



Source: EMS Agency Trauma System Registry: includes Trauma Registry statistics from Marin General Hospital and Kaiser Hospital, San Rafael, 2003-2007.

TRAUMA SYSTEM VOLUME BY AGE



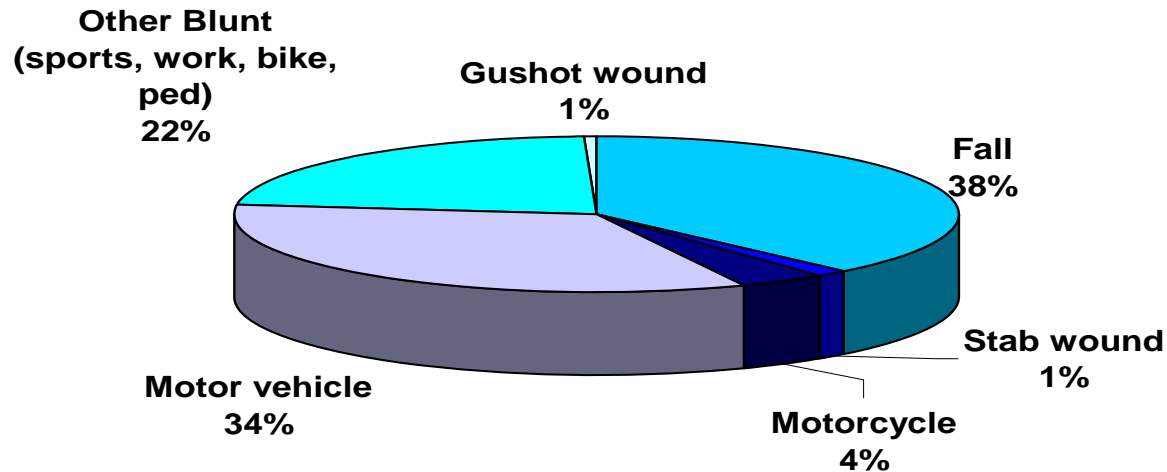
Source: EMS Agency Trauma System Registry: includes Trauma Registry statistics from Marin General Hospital and Kaiser Hospital, San Rafael, 2001-2007

Mechanism of Injury

What are the common mechanisms of injury in Marin County?

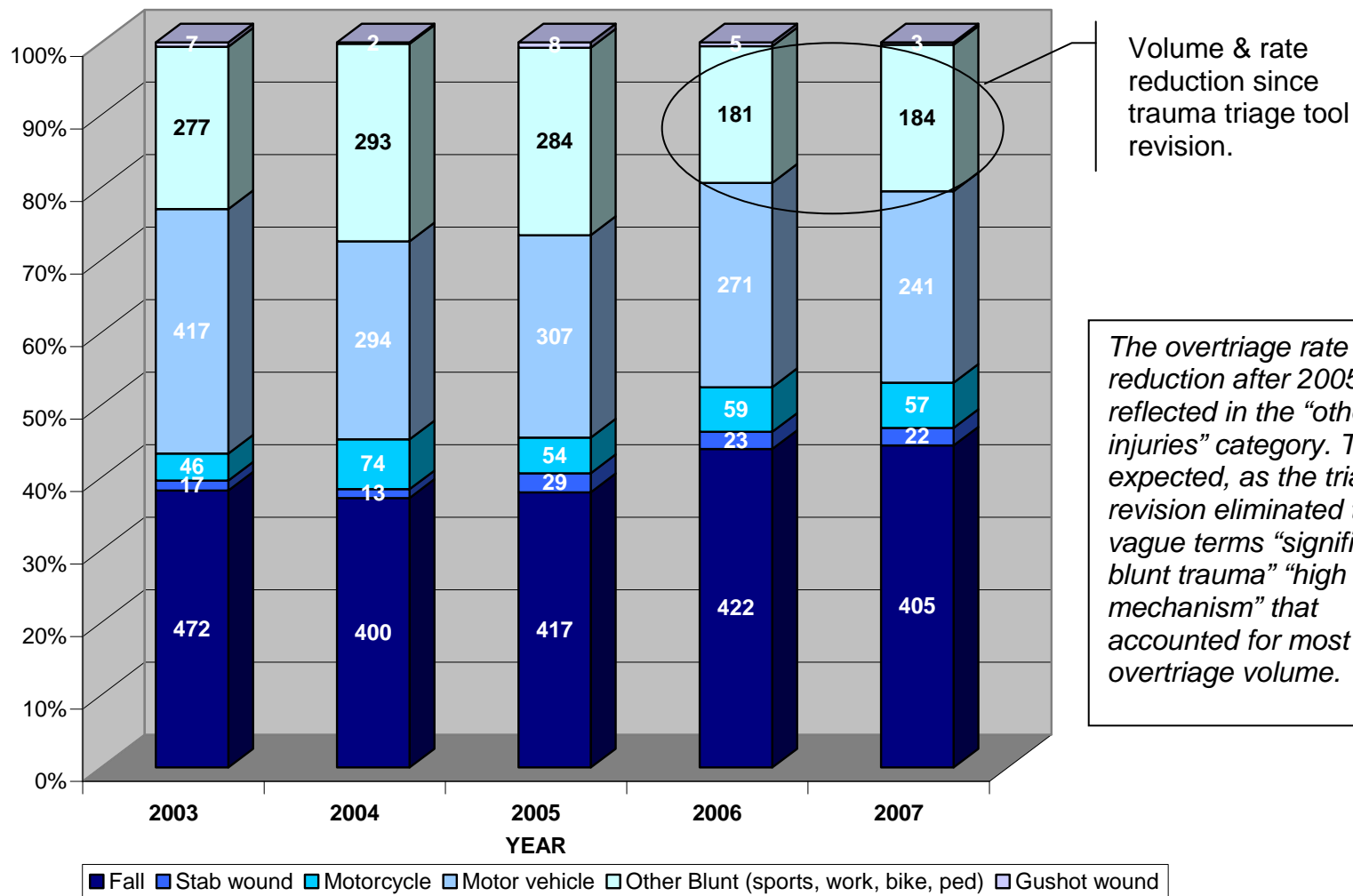
The following charts depict the volume and rate of injury categories treated in Marin's trauma facilities. These are patients who meet prehospital trauma triage criteria. Falls are the leading mechanism of injury, followed by motor vehicle crashes and other blunt force injuries such as bicycle accidents. Injury Prevention programs target the elderly population with fall prevention education, as nearly half of the falls occur in people over the age of 65.

**MECHANISM OF INJURY
SUMMARY
2003 - 2007**



Source: Marin County EMS Agency Trauma Registry

MECHANISM OF INJURY 2003-2007



Source: EMS Agency Trauma System Registry: includes Trauma Registry statistics from Marin General Hospital and Kaiser Hospital, San Rafael, 2003-2007.

ANNUAL HELICOPTER REPORT For the Years 2004-2007

Helicopter dispatches and transports have continued to steadily decrease over the years in Marin County. The rate of utilization of dispatched helicopters declined from 20% in 2004 to 11% 2007. For comparison purposes, data from previous years has been included.

Mission Statement: *“To optimize the quality of patient care of persons who need or may need EMS helicopter transport.”*

Objectives:

1. Oversee the continuous quality improvement process through review of transports and/or dispatches as indicated;
2. Provide direction and leadership in the development and monitoring of policy that affects operational issues;
3. Identify and evaluate outcome measures which specifically validate CQI effectiveness.

| YEAR | DISPATCHES | TRANSPORTS | % AIR TRANSPORTS |
|------|------------|------------|------------------|
| 2007 | 270 | 31 | 11% |
| 2006 | 359 | 50 | 14% |
| 2005 | 431 | 86 | 20% |
| 2004 | 532 | 108 | 20% |

| YEAR | DISPATCHES | TRANSPORTS | % AIR TRANSPORTS |
|------|------------|------------|------------------|
| 2003 | 581 | 120 | 21% |
| 2002 | 464 | 143 | 31% |
| 2001 | 314 | 82 | 26% |
| 2000 | 204 | 65 | 32% |
| 1999 | 158 | 68 | 43% |
| 1998 | 132 | 47 | 36% |
| 1997 | 115 | 43 | 36% |
| 1996 | 114 | 48 | 42% |
| 1995 | 77 | 34 | 44% |
| 1994 | 66 | 31 | 47% |

HELICOPTER DISPATCH AND TRANSPORT REVIEW: 2004 - 2007

MARIN COUNTY EMS PROGRAM, April 2008

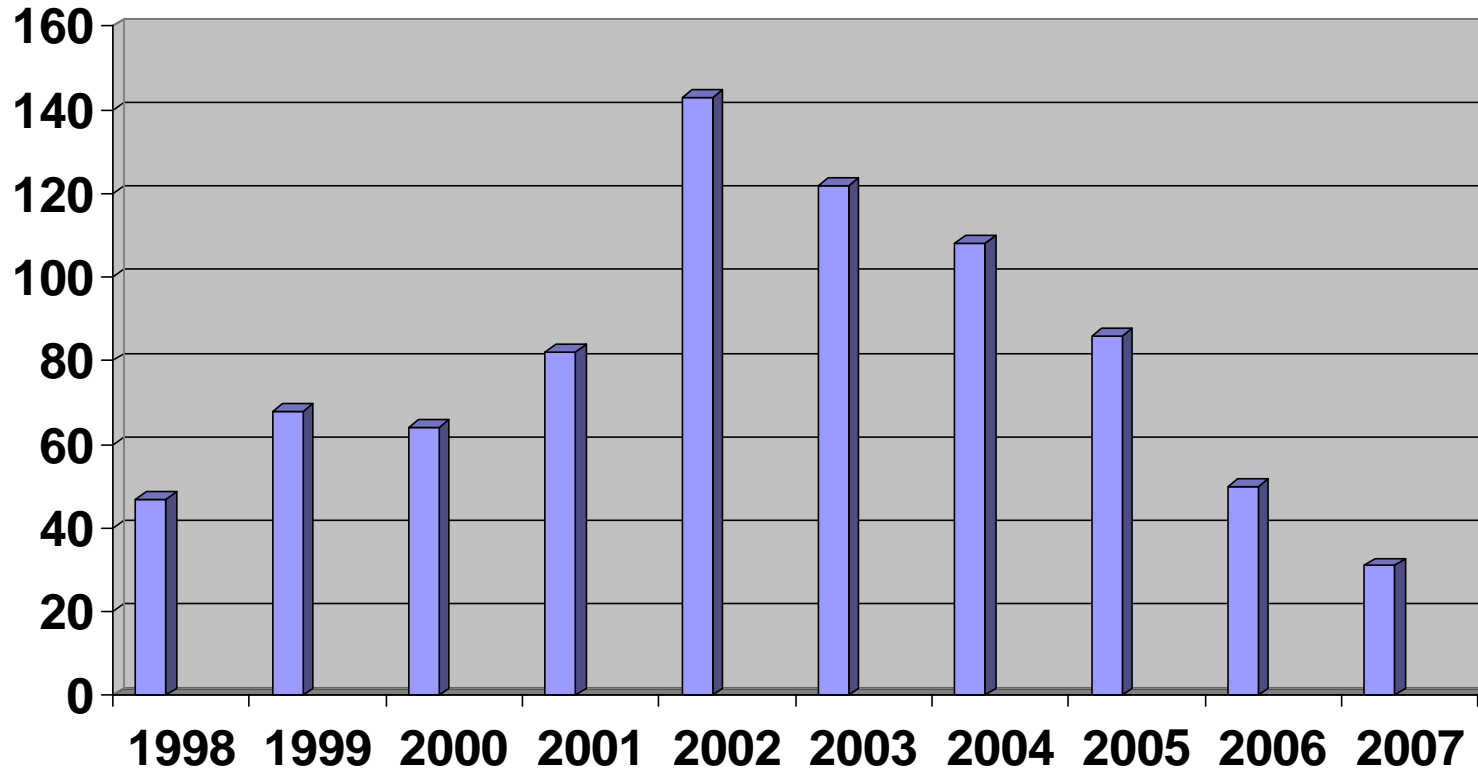
Annual reports prior to 2004 separated out information on helicopter dispatches and transportations from West Marin apart from other areas of Marin County. West Marin locations include Bolinas, Dillon Beach, Dogtown, Inverness, Marshall, Muir Beach, Nicasio, Olema, Point Reyes, Point Reyes Seashore, Stinson Beach, Tomales, and Lagunitas.

Due to 100% review of all helicopter cases and with decreasing numbers in both dispatch and transportation, the EMS Agency has chosen to not separate this information out for this report.

| DATA ELEMENT | 2007 | 2006 | 2005 | 2004 |
|----------------------------------------------------------------------------------------------------|-------------|-------------|-------------|-------------|
| Helicopter Dispatches | 270 | 359 | 431 | 532 |
| Helicopter Transports | 31 | 50 | 86 | 108 |
| Percent (%) of dispatches resulting in air transports | 11% | 14% | 20% | 20% |
| MEDICAL VERSUS TRAUMA | | | | |
| Medical Patients: Transported | 10 | 16 | 24 | 28 |
| Trauma Patients: Transported | 21 | 34 | 62 | 80 |
| RECEIVING HOSPITALS | | | | |
| John Muir Medical Center | 11 | 19 | 27 | 35 |
| Santa Rosa Memorial Hospital | 12 | 22 | 31 | 43 |
| Doctor's Hospital San Pablo | 3 | 6 | 10 | 10 |
| Children's Hospital Oakland | 2 | 0 | 10 | 12 |
| Other (Petaluma Valley Hospital, Santa Clara Medical Center, Queen of the Valley, Stanford) | 3 | 3 | 8 | 8 |

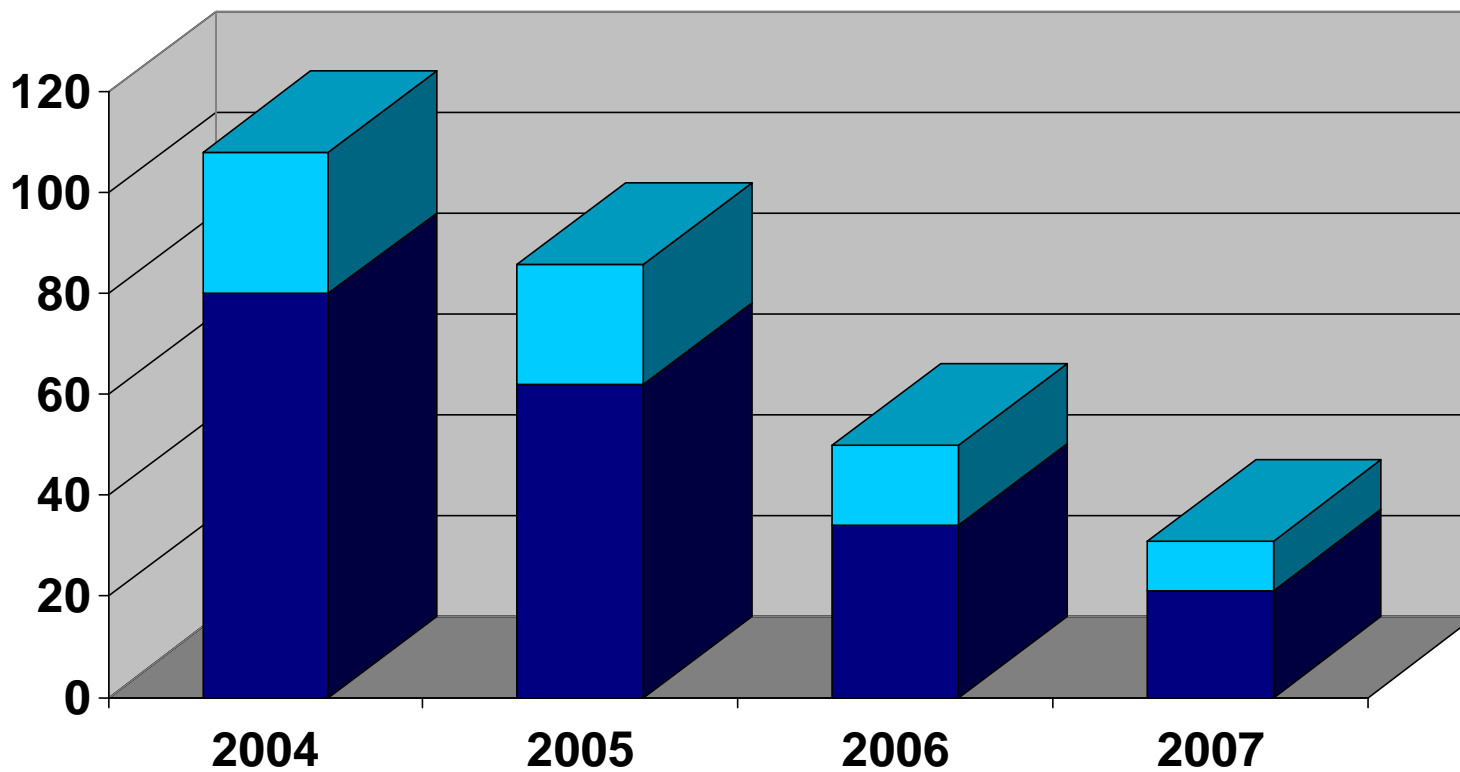
Air Transports by Year

1998 - 2007



Number of Patients Transported by Air

Trauma vs. Medical: 2004 - 2007



Injury Severity Scores

Injury Severity Scores were obtained from the receiving trauma centers (Santa Rosa Medical Center, John Muir Medical Center, Children's Hospital Oakland, Santa Clara Medical Center, and Eden Medical Center).

| Year | Trauma Patients Transported | Injury Severity Scores (ISS) Obtained (%) | Median ISS | Average ISS |
|------|-----------------------------|-------------------------------------------|------------|-------------|
| 2004 | 80 | 58 (73%) | 6 | 12 |
| 2005 | 62 | 53 (85%) | 9 | 13 |
| 2006 | 34 | 30 (88%) | 10 | 16 |
| 2007 | 21 | 21 (100%) | 12 | 17 |