CITY AND COUNTY OF SAN FRANCISCO

TRAUMA CARE SYSTEM PLAN 2001

Table of Contents

TABLE OF FIGURES 5

SECTION I—TRAUMA PLAN BACKGROUND AND SUMMARY [§100256 (a)(1)] 6
- INTRODUCTION 6
- BACKGROUND AND PURPOSE 6
- BRIEF HISTORY—Development and Structure of the Current Trauma System 7
  - Structure of the Current System 8
- UNIQUE CHARACTERISTICS of the SAN FRANCISCO ENVIRONMENT 9
  - Geography and Demographics 9
  - Organizational and Political Structures 9
  - The Medical Environment—Hospitals and Physician Staffing 10
- STRENGTHS and VULNERABILITIES of the EXISTING SYSTEM [§100256 (a)(1)] 10
  - Single Designated Trauma Center 10
    - Capacity Saturation 10
  - Environmental, Geographical and Medical Transport Constraints 11
  - Multiple Casualty Incident Risk—Natural and Geopolitical 11
  - Pediatric Trauma 11
  - Trauma System Organization—Limited Oversight and Quality Improvement Processes 12
  - Economic Vulnerabilities 12
  - Regional and Local Limitations of Acute Care Resources 13
    - Inpatient Capacity Shortfall 13
    - Emergency Department Utilization and Overcrowding 13
    - Reduced Trauma Center "Unusual Volume" Capacity 13
  - Provider Staffing Vulnerabilities—Nursing & UCSF Faculty/Residents 14
    - Nursing 14
    - UCSF Faculty and Residents 14
- GOALS and OBJECTIVES of the TRAUMA CARE SYSTEM PLAN 2001 [§100256(a)(1)] 15
- REVISIONS to the 1990 TRAUMA CARE SYSTEM PLAN 18
  - Changes to Organizational Structures and Relationships 18
  - Trauma System Design 18
    - Inclusive Trauma Care System 18
  - Trauma Policies 19
  - Data Collection 19
  - Trauma System Evaluation 20
- CONCLUSION 20

SECTION II—ORGANIZATIONAL STRUCTURE [§100256 (a)(2)] 23
- MANAGEMENT and ADMINISTRATION of the TRAUMA SYSTEM 23
  - Governing Bodies 23
    - San Francisco Health Commission 23
    - The San Francisco Fire Commission 23
  - Local EMS Agency 23
    - EMS Section Medical Director 24
  - San Francisco General Hospital Trauma Program 24
- PLANNED CHANGES to TRAUMA SYSTEM ORGANIZATIONAL STRUCTURE 24
  - San Francisco Trauma Audit Committee 24
  - San Francisco Medical Trauma Audit Committee 25

SECTION III—NEEDS ASSESSMENT [§100256 (a)(3)] 26
- DEMOGRAPHICS and PATTERNS OF INJURY in SAN FRANCISCO 26
  - Volume and Acuity 26
  - Pediatric Trauma 26
  - San Francisco Off-shore Rescues and the Neighboring Region 26
- TRAUMA CAPACITY in SAN FRANCISCO 27

Level I Trauma Center Volume Criteria 27
San Francisco Non-trauma Centers 27
Resource Analysis 27
VULNERABILITIES of the EXISTING SYSTEM 28
Trauma Capacity for High Volume Periods and Multiple Casualty Incidents 28
Conditions Affecting Local and Regional Access to Trauma Care 28
Pediatric Trauma Center 28
Trauma System Organization, Data Availability, Monitoring and Quality Improvement 28
Economic Vulnerabilities 29
Local Conditions Affecting Availability of Acute Care Resources 29
Provider Staffing Vulnerabilities—Nursing and UCSF Faculty/Residents 30
Nursing 30
UCSF Faculty/Residents 30
NEEDS of the EXISTING SYSTEM 30
Consistently Available Trauma Resources 30
Comprehensive Pediatric Trauma Care 31
Timely Access to Advanced Trauma Care and Improved Patient Transport 31
Air Medical Access 31
Current Status 33
System-wide Oversight: Data Collection, Monitoring, and Quality Improvement 34
Reduction in Financial Vulnerability 34
Consistent Availability of Acute Care Resources 34
Consistent Availability of Adequate Provider Staffing 34

SECTION IV—TRAUMA SYSTEM DESIGN [§100254] 35

INTRODUCTION [§100256 (a)(4)] 35
EXISTING ELEMENTS 36
Public Access and Communications 36
Radio Communications [§100254(e)] 36
Call Volume 36
Prehospital Services [§100254(f)] [§100254(a)(3)]—Triage, Treatment and Transport 37
Prehospital Response and Transport Time Intervals [§100254(a)(3)] 37
Base Hospital Responsibilities 37
San Francisco General Hospital – Designated Level I Trauma Center [§100254(a)(2)] 38
Medical Organization and Management [§100256(b)(2)] 38
Trauma Program 38
Critical Care Capability [§100256(b)(1)] 39
Quality Improvement [§100256(b)(3)] 39
Level I Volume Criteria [§100254(a)(1)] 39
Service Area [§100254(a)(4)] 40
Non-trauma Center Acute Care Facilities [§100256(a)(4)] 40
Coordination with Neighboring Trauma Systems [§100254(a)(5)] 40
Rehabilitation 40
Functional Recovery 41
2001 PLAN MODIFICATIONS to the TRAUMA CARE SYSTEM DESIGN: REDUCING TRAUMA SYSTEM VULNERABILITIES 42
Insuring System Oversight: Development of Trauma Audit Committees 43
Ensuring Consistently Available Trauma Resources 43
Improving Critical Patient Transport and Ensuring Access to Advanced Trauma Care 44
Ensuring the Availability of Comprehensive Pediatric Trauma Care 44
Reducing Financial Vulnerability 44
Ensuring Consistently Available Acute Care Resources and Trauma Provider Staffing 44

SECTION V—INTERCOUNTY TRAUMA CENTER AGREEMENTS [§100256 (a)(5)] 46

SECTION VI—OBJECTIVES [§100256 (a)(6)] 47

Goals and Objectives of the San Francisco Trauma Care System Plan 2001 47

SECTION VII—IMPLEMENTATION SCHEDULE [§100256 (a)(7)] 50

SECTION VIII—FISCAL IMPACT [§100256 (a)(8)] 64
TRAUMA CARE FINANCING 64
FUNDING TRAUMA PLAN 2001 MODIFICATIONS 64
Trauma System Development 64
Consultants 64
Trauma System Monitoring Operations 64
Personnel 64
Capital Equipment 65

SECTION IX—POLICY AND PLAN DEVELOPMENT [§100255, §100256 (a)(9)] 66
INTRODUCTION 66
EXISTING EMS SECTION POLICIES 66
San Francisco EMS Section Trauma System Policy Summary 66
Facility Standards 69
Definitions 69
Level I Trauma Center Standards 72

SECTION X—WRITTEN LOCAL APPROVAL [§100256 (10)] 83

SECTION XI—DATA COLLECTION [§100257] 84
INTRODUCTION 84
EXISTING DATA COLLECTION PROCESS 84
2001 TRAUMA CARE SYSTM PLAN MODIFICATIONS in the DATA COLLECTION PROCESS 84

SECTION XII—TRAUMA SYSTEM EVALUATION [§100258, §100265, §100266 (c)(d)] 86
INTRODUCTION 86
EXISTING QUALITY IMPROVEMENT PROCESS 86
Trauma Center Responsibilities 86
2001 PLAN MODIFICATIONS 86
Trauma Audit Committee Responsibilities 87
Purpose of Trauma Quality Improvement 87
EMS Section Responsibilities 88

REFERENCES 89

GLOSSARY 92

REGIONAL MAP 99
Table of Bay Area Trauma Centers by Designation 100

APPENDIX A—STATISTICS 102
CHART A5: SFGH ADMISSION VOLUME and RATES 1990-1999 103
CHART A9: ISS SCORES, TRAUMA PATIENTS ADMITTED TO SFGH 104
CHART A10: PEDIATRIC TRAUMA ICU ADMISSIONS, SFGH 105

APPENDIX B—SAN FRANCISCO EMS SECTION TRAUMA POLICIES 106

APPENDIX C—SAN MATEO COUNTY EMS SECTION POLICIES 107

APPENDIX D—DOCUMENTATION OF LOCAL APPROVAL 108

TABLE OF FIGURES

Figure 1. Current Trauma System Organizational Chart _____ 21
Figure 2. Modifications to Trauma System Organizational Chart _____ 22
Figure 3. Modifications to EMS Section Advisory Committees_____ 22a
Figure 4. Elements of the Inclusive Trauma Care System_____ 45

SECTION I—TRAUMA PLAN BACKGROUND AND SUMMARY [§100256 (a)(1)]

INTRODUCTION

The 1990 San Francisco County Trauma Care System Plan is being revised to address current Trauma System strengths and vulnerabilities, and to reflect compliance with recent changes in California State Trauma regulations. This summary provides a brief history of the trauma system, an overview of current strengths and vulnerabilities, a summary of the Trauma Plan 2001 goals and objectives, and a summary of proposed changes to the existing Trauma Plan.

BACKGROUND AND PURPOSE

In the last 50 years, research in the treatment of injured soldiers and civilians has produced mounting evidence to suggest that seriously injured patients are best served by a well-integrated system of care that activates specialized resources on a moment's notice, and provides expert, definitive treatment within an hour [1]. Although estimates vary, some studies have found preventable deaths to range as high as 20-40 percent of deaths due to injury in areas without an organized system of trauma care [2]. Though further work with sophisticated study designs is needed to make definitive conclusions, a recent report of evaluated studies of trauma care cites consistent demonstrated improvements to the survival of hospitalized patients when high standards of trauma care are incorporated [3]. This translates into nationwide annual estimates of approximately 20,000 to 25,000 lives saved [4].

In addition to progress in acute trauma care, the results of injury prevention research and programmatic activity over the last 30 years has shed light on injury risk factors, mechanisms, and effective means to reduce injuries [5]. Morbidity and mortality from gunshot wounds declined substantially in the United States during the last decade [6], and national death rates due to occupational injuries and motor vehicle injuries have been steadily declining over the last 25 years [7], [5, p. 116].

San Francisco's Trauma Care System Plan describes the framework and establishes priorities to reduce disability and loss of life due to injuries within the San Francisco Emergency Medical Services (EMS)/Trauma system jurisdiction. The Trauma Care System Plan is intended to be a working document that provides a blueprint for integration of EMS and Trauma System organizational structures and processes. It describes the goals and objectives that will guide a collaborative process of continuous enhancement of the Trauma System, using input from system stakeholders, systematic review of pertinent data, and an ongoing process of quality improvement. The standards and regulations promulgated by the Trauma Care System Plan are developed in collaboration with system stakeholders via the public comment process overseen by the EMS Section of the City and County of San Francisco's Department of Public Health. The EMS Section, under the authority of California State statutes enforces compliance with these standards and regulations.

BRIEF HISTORY—Development and Structure of the Current Trauma System

On August 1st, 1849, John W. Geary was unanimously elected the "First Alcalde" (mayor) of San Francisco. In a stirring oratory that day, he described the state of public affairs:

> "At this time we are without a dollar in the public treasury, and it is to be feared the city is greatly in debt. You have neither an office for your magistrate, nor any other public edifice. You are without a single police officer or watchman, and have not the means of confining a prisoner for an hour; ***neither have you a place to shelter, while living, sick and unfortunate strangers who may be cast upon our shores*** or to bury them when dead. Public improvements are unknown in San Francisco. In short, you are without a single requisite necessary for the promotion of prosperity, for the protection of property, or for the maintenance of order." [8, p. 230 (emphasis added)]

From the anarchy of San Francisco's early years emerged an integrated public health system of "Receiving Hospitals", beginning in the mid-1870's with a single "Accident or Receiving Hospital" consisting of three rooms, located in a prison. Prior to 1896, when the Department of Public Health acquired its first ambulance, patients were transported in taxis, or police patrols. Additional Emergency Hospitals were opened at the turn of the century, and through the 1930's this network was expanded to total seven hospitals, each equipped with an ambulance, treatment rooms, wards, an operating room, and administered by a Chief Surgeon under the authority of the Director of Public Health [9].

Horse drawn ambulance at Mission Emergency Hospital, 1915[10]

By the mid-1940's an orderly plan for care of injured patients was in place in San Francisco, as described in an historical sketch of the Department of Public Health Emergency Hospital Service during that period [9, p. 3]:

> "In the event of a major accident, as a result of which a large number of injured persons must be handled in a short period of time, police patrols and private ambulances are called into service. Regardless of the district from which the ambulance is called, all cases are taken to the Emergency Hospital of the district wherein the accident occurs unless it is known that that hospital is already working at capacity load."

In the late 1960's when the results of medical research on the battlefields of Korea and Vietnam began to influence civilian trauma care in the United States, Dr. William F. Blaisdell at San Francisco General Hospital (SFGH) directed innovations in the City's trauma care system. Staffed by surgeons from the University of California, SFGH received National Institute of Health (NIH) grant funding and became a NIH designated trauma research center in 1972. Throughout the 1970's and 1980's SFGH's surgical staff played pivotal roles in setting the standards of care in many areas of traumatic injury.

Citywide acute care resources were consolidated in 1983, when all of the Public Health Emergency Hospitals were closed, with the exception of Mission Emergency Hospital (now a part of SFGH). That year, the single public health hospital in the City was designated by EMS Section Ambulance Destination policy as the sole recipient of major trauma patients. The 1990 San Francisco Trauma System Plan proposed that SFGH be designated as a Level I trauma center. This was approved by the Health Commission and the State EMS Authority that year, and SFGH was officially designated by the San Francisco Emergency Medical Services Agency as a Level I trauma center in 1991, following verification by the American College of Surgeons Committee on Trauma.

Structure of the Current System

Through the 1990's San Francisco General Hospital's Trauma Center has continued to develop its programs in clinical care, rehabilitation, functional recovery and violence prevention. SFGH remains the sole trauma center in San Francisco today, and retains its Level I designation. The Department of Public Health retained direction of its citywide ambulance response system until 1997, when the function of the Paramedic Division was transferred to the San Francisco Fire Department. With activation of the multi-lingual 911 Emergency Dispatch system, severely injured patients are transported by EMS protocol to the trauma center. The EMS Division of the San Francisco Fire Department responds to the majority of trauma-related calls. The current system is trauma center-based, with quality improvement activities focusing on the prehospital, emergency and acute care of the most severe injuries.

UNIQUE CHARACTERISTICS of the SAN FRANCISCO ENVIRONMENT

San Francisco's geography and demographics, organizational and political structures, and the medical environment each have unique characteristics relevant to trauma system planning.

Geography and Demographics

San Francisco is bordered on three sides by bay and ocean waters. It is a cultural and financial center with an expanding population that is confined to a 47-square mile peninsula. In the last decade, population density increased by 13% from 15,000/sq. mi. to 17,000/sq.mi. [11, 12]. Compared with the twenty most populated cities in the United States, San Francisco's population density ranks second only to that of New York City [13], [14].

The Trauma System service area extends to the south, over the border of San Francisco County, to include the northern sector of San Mateo County[1]. The diverse San Francisco resident population base of 801,400, with 276,900 persons from northern San Mateo County brings the Trauma System base population to 1.1 million [12]. The numbers of San Francisco visitors and commuters bring the total catchment population to an estimated 1.4 to 1.6 million [15].

Organizational and Political Structures

The organizational structures of the Trauma Care System that provide the majority of trauma-related services are governmental departments of the City and County of San Francisco, under the direction of the Mayor (see organizational chart, p. 21). These essential service provider agencies include the Emergency Communications Department, the Fire Department and the Department of Public Health (DPH). The Director of DPH provides overall direction for the City's sole trauma center and the trauma system regulatory agency (the EMS Section). The Department of Public Health and the Fire Department report to the Health Commission and the Fire Commission, respectively. The Mayor appoints seats on these commissions. Elected officials and their appointments within the governing bodies influence funding and policy decisions for the trauma system.

While under the direction of the Department of Public Health, the EMS Section must carry out its regulatory function as authorized by California State statutes and regulations (EMS Act, Div. 2.5, Health and Safety Code; California Code of Regulations, Title 22). This includes the planning, implementation and evaluation of the Trauma System. With this regulatory authority, the EMS Section enforces compliance with State statutes, regulations and local standards and policies, which have been established in collaboration with EMS Section advisory committees.

San Francisco General Hospital is also one of two trauma receiving hospitals for San Mateo County, by agreement with the San Mateo County EMS Agency. The SFGH trauma center is thus subject to regulatory oversight by two county EMS agencies.

[1] The San Francisco Health Commission approved this regionalization of trauma services in 1998. Trousdale Boulevard in the City of Burlingame serves as the southern boundary for this service area.

The Medical Environment—Hospitals and Physician Staffing

With its unique geography, high density, and catchment population of between 1.1 and 1.6 million persons, San Francisco continues to be served by a single trauma-designated institution--San Francisco General Hospital. The 'City' is also served by 10 additional non-trauma center (NTC) acute care hospitals, including one University Medical Center, the University of California, San Francisco (UCSF). These institutions vary in terms of size and volume of patients, but none has ever received trauma receiving designation at any level, nor do any of these NTC institutions formally serve as backup hospitals in the event that SFGH is incapacitated or overwhelmed, except during mass casualty incidents.

The professional staffing at SFGH is composed entirely of UCSF faculty, many with clinical appointments, and a rich array of house staff (over 1000 at any one time) rotating on various primary, specialty, and sub-specialty services. Compensation for professional services provided by UCSF medical staff to SFGH is provided through a contract between UCSF and the City/County of San Francisco. Specifics of the relationship between UCSF and SFGH are further defined by an Affiliation Agreement, a 38 page document, signed in 1994, specifying a variety of responsibilities, duties, accountability, and payment methods. Under these arrangements, physician staffing levels, including house staff, are determined by each individual department according to educational opportunities and clinical needs. Under this agreement, the University (UCSF) retains sole authority to make decisions regarding the scope of clinical services provided by its faculty and house staff. The administrative hierarchies of the Department of Public Health (including SFGH) and UCSF are largely independent, and accountability for the maintenance of specific clinical services (e.g. trauma) is not defined in the current system.

STRENGTHS and VULNERABILITIES of the EXISTING SYSTEM [§100256 (a)(1)]

Single Designated Trauma Center

San Francisco General Hospital is the sole referral center for major trauma within the City. Research in trauma surgery and injury prevention, and innovations in trauma education and patient care have distinguished San Francisco General Hospital (SFGH) as one of the nation's leading trauma centers. The clinical resources, expertise, severity of injuries and the high volume of trauma patients treated there, qualify SFGH to be a Level I trauma center, the highest designation possible, under Title 22 and the American College of Surgeons requirements. As the sole provider of trauma services to the City and County of San Francisco, SFGH never diverts trauma patients, except in cases of mass casualty incidents or major disruption of the SFGH physical plant. As the result of cost considerations and the need to maintain volume-related clinical performance, now required by Title 22, Trauma Center designation has not been sought by either the EMS Section or other non-trauma center hospitals.

Capacity Saturation

While the volume of major trauma patients treated at SFGH, on average, is sufficient to meet regulatory requirements for Level I centers and support the maintenance of superior provider skills without taxing the Trauma Center's service capacity, there are occasions when the single Trauma Center receives multiple unrelated cases in a short time interval, and trauma service

capacity is saturated. On a busy weekend night, for example, multiple (five to seven) critically injured patients could arrive at the trauma center within a short period of time (one to four hours). On occasion, this can and does employ the staff and equipment in the critical trauma treatment areas to full capacity. There is no system of "back-up" in place for the single trauma center, and there is no other facility in San Francisco that is qualified to care for severely injured patients. While other community hospitals have surgeons and operating rooms, the specialized personnel, equipment, policies and procedures necessary to deliver standard trauma care are not available in any other hospital but SFGH. In a service area of over one million population , there is only one Level I trauma center, and no Level II, III or IV designated centers available for "back-up" care of major injuries.

Environmental, Geographical and Medical Transport Constraints

Local and national standards for trauma care mandate that patients have access to specialized trauma treatment services within one hour of the injury. Code 3 (lights and sirens) ground ambulance service within the immediate trauma system service area currently meets this standard in the majority of trauma cases. The average time interval from initial call to Code 3 arrival at the trauma center is roughly thirty minutes.

Emergency medical transportation to and from the trauma center is limited to ground transportation. Ground routes include a freeway commute thoroughfare, and surface streets in a busy urban neighborhood. The trauma center has no helipad, and there is no licensed medical helipad in San Francisco. As previously described, San Francisco is a very densely populated urban region, bordered on three sides by large bodies of water. Access and egress to the north and east of San Francisco by ground transportation is limited to bridge routes that are chronically congested[2]. Ground transportation routes to the south are more varied, yet these are also increasingly congested. An unlicensed, ad-hoc helicopter landing site at Pier 94-96 is used on an emergency basis, but the lack of security, poor access conditions, and additional transport time via ground to the trauma center adds risk to trauma patients and emergency medical providers.

Multiple Casualty Incident Risk—Natural and Geopolitical

As one of the highest-density, most earthquake-prone regions in the world, San Francisco is vulnerable to a wide range of small and large-scale multiple casualty incidents. These include traumatic incidents common to urban environments such as airplane, mass transit and freeway crashes, school violence, and terrorist acts. San Franciscans are also very familiar with the threats of natural disasters such as earthquakes and fires. San Francisco's geographic isolation, coupled with seismic and high population density risk factors create vulnerabilities that exist in only a few cities in the world. These vulnerabilities are potentially amplified by the lack of air medical access and lack of alternative trauma-ready treatment centers within the city.

Pediatric Trauma

Another vulnerability of the trauma system in San Francisco stems from the fact that the pediatric population is disproportionately small. SFGH currently cares for fewer than three to

[2] As a measure of urban traffic congestion, the Texas Transportation Institute examined traffic patterns in 68 urban areas of the United States [16]. In 1999, the San Francisco-Oakland commute ranked second (after Los Angeles) in the Travel Rate Index, which measures the amount of additional time needed to make a trip during a "normally congested" peak travel period rather than at other times of the day.

four severely injured[3] children under the age of ten each year. This annual pediatric trauma volume at the Trauma Center is not large enough to allow the accumulation of sufficient experience to be able to consistently provide a high level of care to very young victims of critical injury, despite extensive experience and expertise in the care of adult trauma patients. As the result of this very low volume, SFGH cannot meet Title 22 requirements for a Pediatric Trauma Center. The problem is further compounded by the fact that there is no Pediatric Trauma Center in San Francisco, the nearest being Oakland Children's Hospital in the East Bay. While transfer agreements may be made, the difficulties and risks associated with ground transport of a critically injured infant or child from SFGH has rendered routine transfer infeasible.

Trauma System Organization—Limited Oversight and Quality Improvement Processes

The trauma system in San Francisco has long been "Trauma Center-based". As such, there is limited monitoring of the structures, processes and outcomes for care of the most severely injured patients outside of institutional performance improvement. Trauma Center re-designation and overall system evaluation are regulatory functions of the EMS Section, yet there is no formal process established for an ongoing trauma system evaluation. The trauma center has an ongoing review process to monitor all admissions, injury severity, resource needs, outcomes, etc., consistent with Level I Trauma Center performance improvement (quality assurance) requirements contained in Title 22 and the American College of Surgeons guidelines. Prehospital trauma care is monitored by the EMS Section with a system of unusual occurrence reporting and analysis conducted in collaboration with EMS advisory committees. Beyond these elements, there is no direct linkage of data or formal oversight process for related components of trauma care, which include injury prevention research and program activities, pre-hospital death records, rehabilitative care, or care of injured patients in community hospitals. Within the current organization, there is limited information available for accurate assessment and ongoing improvement of the trauma system.

Economic Vulnerabilities

Over the past decade, throughout California and the United States, trauma centers have experienced intense fiscal pressure because significant proportions of their services have been uncompensated. While maintaining the specialty services, equipment, and facilities essential for trauma centers is inherently costly, funding mechanisms have been unstable. Declining reimbursements from government and private insurance sources, managed care contract discounting, unstable federal, state and local funding, and relatively high proportions of uninsured trauma patients have forced the closure of trauma centers in many systems across the United States. In a 1993 national survey of trauma centers at the beginning of "health care reform" with managed care, 58% reported serious financial problems, and 68% reported financial losses [17]. A recent survey of trauma centers in California estimates that 30% of patients are uninsured [18].

San Francisco's trauma center is not unique in this portrait of the current crisis in trauma care funding. With declining reimbursement rates and shrinking state and federal funding, there is mounting reliance on local taxpayer revenue for trauma care support. Although the California State legislature has several bills pending that propose to bolster funding support for trauma

[3] Severe injury referenced to an Injury Severity Score greater than 25 (ISS>25)

systems throughout the State, the proposed amount for allocation is estimated to be a small fraction of what is needed to ensure trauma center funding stability. The combination of high operating costs, opportunity costs and adverse selection will continue to threaten the economic viability of California's trauma centers in general, and SFGH in particular.

Regional and Local Limitations of Acute Care Resources

Inpatient Capacity Shortfall

Hospital closures, mergers and downsizing in the past several years have significantly reduced the availability of inpatient hospital beds in San Francisco and throughout the United States. Nationally, the number of medical/surgical beds declined by 18 percent between 1994 and 1999, and the number of intensive care unit beds declined by almost 3 percent [19]. Anticipating lower utilization under managed care and declining reimbursement from private payers and Medicare, many hospitals have extensively reduced inpatient capacity. Concurrently, inpatient volume has increased, resulting in critical constraints on hospital inpatient unit capacity. This is and will continue to be a critical element in the health care environment in San Francisco, resulting in increased hospital diversion, and ED and critical care unit overcrowding.

Emergency Department Utilization and Overcrowding

An indirect measure of this hospital bed capacity shortfall in San Francisco is the number of hours per month that emergency departments must close to ambulance traffic (ED Diversion Hours). Since 1995 there has been a steady upward trend in the total average number of hours per month that emergency facilities have had to divert ambulance traffic [20], [21], [22]. This local trend reflects the national burden on hospital emergency departments. A recent report from the National Center for Health Statistics [23] cites a 14% increase in Emergency Department (ED) utilization nationwide from 1992 through 1999. The report describes a steady rate of ED visits per population since 1992, but the number of hospitals with EDs has not kept pace with a growing population. Similarly, in the last decade, San Francisco has seen a population increase of 9%, and a closure of three hospital emergency departments [24] [12].

Reduced Trauma Center "Unusual Volume" Capacity

In this setting of reduced inpatient resources and ED overcrowding, the trauma system is recurrently pushed to capacity limitations. There are very few surplus trauma center resources with which to manage the unusually high patient volume that can readily be foreseen, for example, in the event of a rolling blackout-induced multiple car crash, or other multiple casualty incidents. Constrained inpatient/ED resources has forced steady erosion in emergency "stand-ready" capacity that the trauma system needs to manage unusually high volume.

Provider Staffing Vulnerabilities—Nursing & UCSF Faculty/Residents

Nursing

While demand for inpatient beds remains strong, many San Francisco hospitals cannot hire enough nurses to keep existing beds in operation. This is due in part to a nationwide shortage of nurses, particularly acute in California, and to the high cost of housing in the San Francisco Bay Area. At a hearing before the Public Health and Environment subcommittee of the San Francisco Board of Supervisors in May, 2001, community hospital representatives cited marginal success with concerted efforts to hire registered nurses (RNs), and difficulty retaining them because the RNs could not find affordable housing [25]. The 2000 National Sample Survey of Registered Nurses found California to rank 49th among the 50 states in the number of employed RNs per capita[4] [26]. The California Strategic Planning Committee for Nurses predicts a shortfall of 25,000 nurses within the next five years [27].

UCSF Faculty and Residents

The relationship between UCSF and SFGH is a symbiotic one. The University provides high quality medical staffing to the hospital while SFGH provides the infrastructure for a rich and varied clinical practice. SFGH serves as a base for ongoing research, graduate, and post-graduate medical education. The primary missions of UCSF and SFGH are not identical. The former emphasizes education and scholarly activity while the latter emphasizes service and clinical care. The vulnerability with respect to the goal of consistently providing Level I trauma services at SFGH is created by the fact that the current agreement between the University and SFGH specifically states that the University has sole authority over decisions regarding staffing for clinical services. In the event that a significant staffing change is made, the agreement requires only notification by the University. There is no other agreement that serves to prevent or forestall the University from taking abrupt action that acts to compromise the ability of SFGH to function as a Level 1 Trauma Center. While it is highly unlikely that the University, as a matter of policy, would ever condone intentional actions designed to degrade or compromise the function of the Trauma Center at SFGH, there is also little protection in the present system from unintentional or collateral actions that, in effect would do the same thing.

[4] According to this survey, the national average of RNs per capita is 782 per100,000 population. California has 544/100,000.

GOALS and OBJECTIVES of the TRAUMA CARE SYSTEM PLAN 2001 [§100256(a)(1)]

The following goals and objectives of the San Francisco Trauma Care System Plan were developed during a public comment process conducted March through May, 2001. They are directed toward reducing the vulnerabilities of the trauma system.

Goal I: To ensure a high standard of trauma system care in San Francisco.

Objectives:

A. Establish a Trauma Audit Committee that will, at the direction of the EMS Section, improve oversight of the function of the trauma center and other elements of the trauma system, and
   1. Include representative administrators and providers from the inclusive trauma system in San Francisco;
   2. Develop and regularly evaluate trauma system quality indicators;
   3. Develop a data collection process (database centralized in the EMS Section with the EMS Trauma Registry), that links data from the following trauma system structures: a) prevention research and program databases, b) medical examiner, c) communications, d) prehospital care, e) trauma center, f) community hospitals, and g) rehabilitation facilities;
   4. Monitor and analyze system-wide trends in process and outcome data from trauma system structures;
   5. Establish a regular process of trauma system evaluation and issue an evaluation report every two (2) years;
   6. Continuously plan for, and implement changes in the trauma system according to evaluation results, and in accordance with the goals of the San Francisco Trauma Care System Plan.

B. Continue to enforce local, State and Federal standards and regulations that apply to trauma system care in San Francisco.
   1. Update all current trauma related policies by July, 2002; review policies every two years and update as needed;
   2. Verify written transfer agreements between non-trauma center facilities and the trauma center with written criteria for consultation and transfer that conform with EMS Critical Trauma Patient Transfer Guidelines (policy #8021)[§100266(b)];
   3. Evaluate trauma center for re-designation in 2002 and continue with re-designation process every three (3) years;
   4. Establish and maintain an EMS Section Trauma Registry that is linked to the State EMSA Trauma Registry [§100257(a)(2)];
   5. Develop and staff Trauma Audit Committee and Trauma Medical Audit Committee;
   6. Submit Trauma System evaluation reports to system stakeholders every two (2) years, commencing in June, 2002 [§100258(c)];
   7. Submit an annual trauma system status report to the California State EMSA [Title 22, Div. 9, Chp. 7, §100253(j)], including progress on implementing the San Francisco Trauma Care System Plan.

Goal II: To promote continuous improvement in the physical and psychosocial outcomes of significant injury in San Francisco.

Objectives:

A. Develop a Trauma Medical Audit Committee that will:
   1. Include trauma care providers—prehospital, acute care, rehabilitative;
   2. Include providers from all hospitals that receive acutely injured patients;
   3. Regularly provide peer review, as needed, for clinical outcomes from major trauma including trauma-related deaths, major complications and transfers (including interfacility transfers);
   4. Develop and regularly evaluate trauma care quality indicators for physical and psychosocial outcomes of traumatic injury;
   5. Conduct its proceedings in accordance with all local, State and Federal statutes related to provider and patient confidentiality and privacy;
   6. Provide input to the Trauma Audit Committee for trauma system evaluation and quality improvement activities;
   7. Promote proactive education and training for trauma care providers.

Goal III: To ensure the consistent availability of rapid access to an appropriate level of trauma care for injured persons in the San Francisco Trauma Care System service area, and for San Francisco residents injured in neighboring regions.

Objectives:

A. Establish a plan for trauma center "backup" to ensure standard care for injured persons in the event of trauma center capacity saturation, plant disruption, or local multiple casualty incident;
B. Direct the completion of a needs assessment and feasibility study for an EMS helipad in San Francisco by qualified consultants;
C. Develop EMS Section Emergency Air Medical Plan;
D. Develop a formal agreement with UCSF that will help guarantee the consistent availability of medical staffing commensurate with the requirements of a Level I Trauma Center.

Goal IV: To ensure a seamless system of pediatric trauma care in San Francisco.

Objectives:

A. Ensure development of SFGH trauma center policies with "keep-send" protocols for expedient transfer of critically injured younger pediatric patients to a designated pediatric trauma center;
B. Ensure written transfer agreement between SFGH and a regional designated Pediatric Trauma center for critical pediatric patients [§100259 (e)(1)(A)];
C. Incorporate regional pediatric trauma centers into HART system;
D. Standardize pediatric trauma care protocols (including transfer protocols) throughout the EMS System;
E. Improve all hospitals' Emergency Department Pediatric Trauma Care Plans.

Goal V: To promote a decrease in injury rates in San Francisco.

Objectives:

A. Through the activities of the Trauma Audit Committee,
   1. Improve communication between San Francisco injury research, treatment, prevention and education programs;
   2. Develop data linkages with research, prevention and treatment programs in San Francisco;
   3. Promote prevention education programs for providers and the public.

Goal VI: To do all of the above in a cost-effective manner, sensitive to existing and available resources.

Objectives:

A. Avoid duplication of Trauma System data collection efforts by including all system stakeholders in development and implementation of the data collection process;
B. Establish regular, timely reporting of data analysis to all system stakeholders;
C. Use existing Department of Public Health resources to implement and maintain the Trauma System data collection process;
D. Continuously seek alternate funding sources (e.g., State/Federal grants; support legislative initiatives) to enhance the financial stability of the trauma system;
E. Maximize the use of trauma system triage capabilities so that unnecessary interfacility transfers are minimized, where:
   1. Injured patients who do not require trauma center evaluation or treatment are transported immediately from field to patron hospitals; and
   2. Injured patients who do require trauma center evaluation/treatment are transported immediately to the trauma center.
F. Continuously evaluate the fiscal impact of the trauma system and submit a fiscal impact report every two (2) years with the Trauma System Evaluation report.

REVISIONS to the 1990 TRAUMA CARE SYSTEM PLAN

The 2001 Trauma Plan incorporates changes to system structures, design, policies, data collection and evaluation processes, that will strengthen the system, and provide broader, more consistent oversight of structures, processes and outcomes.

Changes to Organizational Structures and Relationships

Development of the San Francisco Trauma Audit Committee (SF_TAC) and the Trauma Medical Audit Committee (SF_TMAC) will incorporate the majority of organizational changes. The Trauma Audit Committee will establish a key link between the various provider, administrative, research, education and regulatory structures of the trauma system. This committee will be tasked with ongoing evaluation and policy development for the trauma system, under the direction of the EMS Section.

The Trauma Medical Audit Committee (SF_TMAC) will provide a confidential forum for local and regional peer medical review of trauma cases, and link with the SF_TAC to provide input for ongoing system evaluation. (See pages 21 and 22 for organizational charts.)

Trauma System Design

In the 2001 revision of the Trauma Care System Plan, there is a conceptual shift in the trauma system design, from trauma center-based to an inclusive model. This will be reflected in changes in the trauma system data collection, evaluation and policy development processes with the formation of the SF_TAC and SF_TMAC. The single Level I trauma center in San Francisco remains the locus of acute care for severely injured patients. There is no plan to designate an additional trauma center.

Inclusive Trauma Care System

An inclusive trauma care system is organized and coordinated in a defined geographic area to deliver the full spectrum of care to an injured patient, from the time of the injury through transport to an acute care facility, to rehabilitative care, and reintegration at work and home [5]. In this type of system, the trauma center remains a key component, but the need for integration of other health care facilities and providers is also recognized.

An overarching goal of a trauma care system is to match the severity of the injury to the most appropriate and cost-effective level of care in a region. This is best accomplished by an inclusive system—one that shares resources of all hospitals and trauma care providers in a community or region to meet the needs of all injured patients, the majority of whom[5] are not severely injured. This type of resource allocation allows patients to move to the highest level of care available and ideally, avoids excessive and inappropriate resource expenditure in a time of limited medical resources [29].

[5] In 1996, 63% of traumatic injury hospitalizations in San Francisco were in "non-trauma centers"—community hospitals that are not designated trauma centers [28].

Trauma Policies

Trauma policy modifications in the 2001 Trauma Care System Plan include:

1. Full review and update of all trauma system related policies by July, 2002;
2. Addition of Trauma Audit Committee and Trauma Medical Audit Committee to the Trauma System organization and management;
3. Development and maintenance of an EMS Trauma System Registry;
4. Trauma Center Quality Improvement process modifications in accordance with Title 22, Div. 9, Chp. 7, (including provision for written system of feedback for pediatric patients' families);
5. Deletion of policy for EMS Section oversight of trauma center marketing plans (1990 Trauma Care Plan, Section III, number 8 [p. 22]).

Further policy development will ensue with the formation of the SF Trauma Audit Committee. Areas for policy development include:

1. Policies providing alternative sites for major trauma treatment in the event of SFGH capacity saturation ("Back-up" plan for trauma center);
2. Standardization of pediatric trauma care plans, transfer guidelines and mechanisms for transfer;
3. Incorporation of regional pediatric trauma centers into San Francisco trauma system design;
4. Emergency Air Medical Plan;
5. Interfacility transfer policy amendments [Title 22, Div. 9, Chp. 7, §100255(h), 100265, 100266] to include provisions for:
    a. Criteria for trauma patient transfers between regional trauma centers and SFGH and from SFGH to regional trauma centers and local community hospitals;
    b. Written transfer agreements between community hospitals and SFGH: Community hospitals to have written criteria for consultation and transfer of patients needing a higher level of care;
    c. Data collection from community hospitals who receive repatriated trauma patients;
    d. Participation in trauma system quality improvement activities from community hospitals that receive transferred (repatriated) trauma patients;
6. Trauma System Evaluation and Quality Improvement Plan; including data collection process, and maintenance of trauma system registry;
    a. Inclusion of all hospitals that receive trauma patients in trauma system data collection process [Title 22, Div. 9, Chp. 7, §100257];
    b. Participation of all hospitals that treat trauma patients in trauma system quality improvement [Title 22, Div. 9, Chp. 7, §100258(d), 100265];
7. Individual prehospital provider policies for early notification of trauma centers impending trauma patient arrival to be approved by EMS Section.

Data Collection

The EMS Section is revising its EMS system-wide Data Collection and Quality Improvement Plan. Modifications to Trauma System data collection will be integral to the EMS System data collection process. The Trauma Audit Committee will work with Trauma System stakeholders to develop standardized quality performance indicators and data elements. Improvements to the

current data collection process will be developed with stakeholder input, while avoiding duplicate data collection and minimizing expenditure of available resources.

Trauma System Evaluation

[Title 22, Div. 9, Chp. 7, §100258]
With the Trauma Audit Committee, the EMS Section will develop an ongoing process for trauma system evaluation. Elements of the evaluation will include, but not be limited to periodic review of the epidemiology of traumatic injuries, triage criteria, fiscal impact, and management of the Trauma Care System Plan, including addressing system vulnerabilities outlined in the Plan. Specifically with regard to the vulnerabilities described in the 2001 Trauma System Plan, the Trauma Audit Committee will use a data-driven process to evaluate and plan for:

a) Optimal care of critically injured young pediatric patients in San Francisco;
b) A response to sudden and unexpectedly large numbers of major and minor trauma patients arriving at the sole trauma center within a short period of time;
c) Optimal care for all victims of major injury in San Francisco, including those initially transported to non-trauma center hospitals;
d) The provision of trauma care in the event of a mass casualty event or major disaster, including transport of materials and personnel and the transport of critically injured patients out of San Francisco; and
e) Participation of the San Francisco trauma system in regional trauma care, serving the need for Level I services.

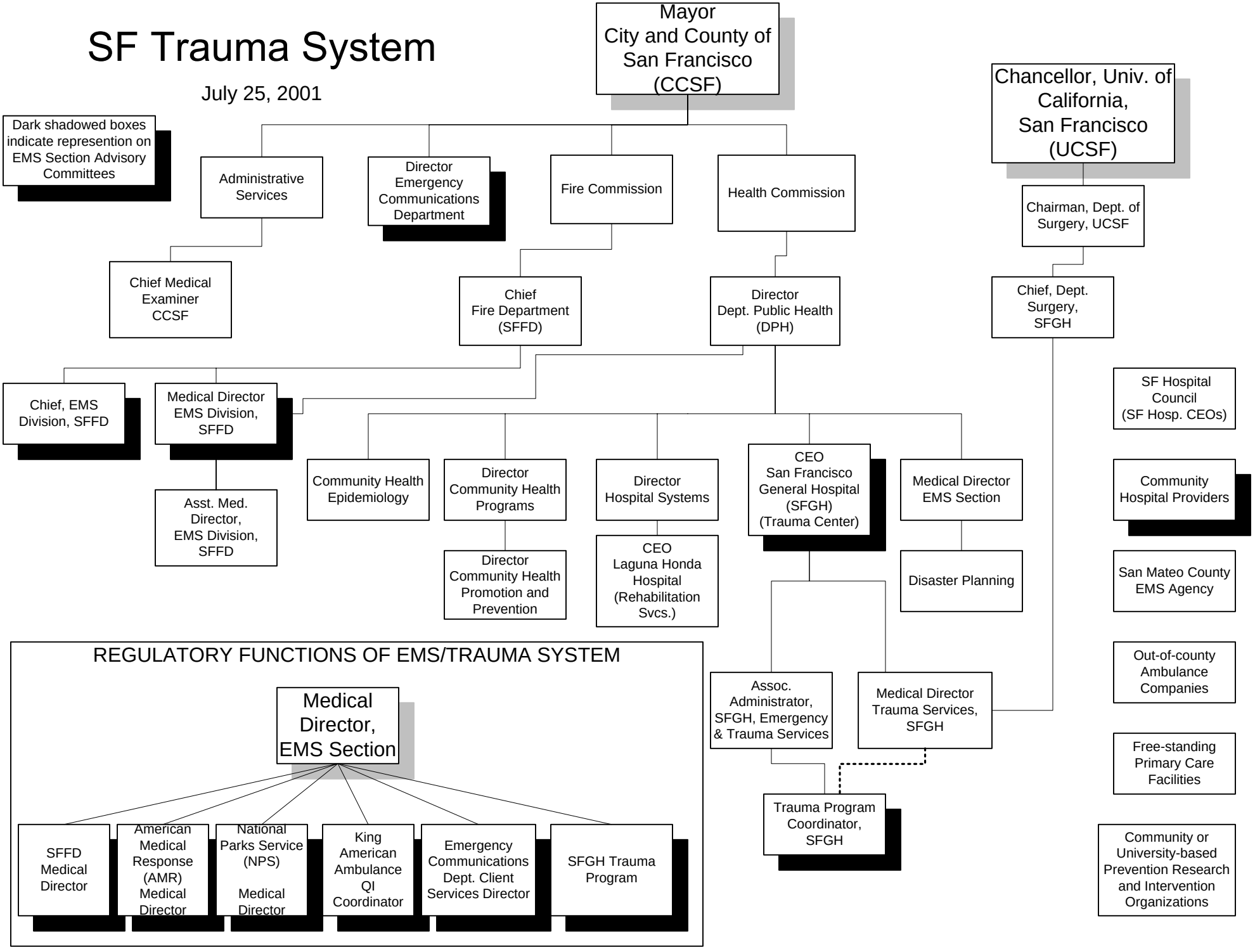
A trauma system performance evaluation will be conducted every two (2) years at minimum, and the results will be made available to all trauma system participants.

CONCLUSION

The San Francisco Trauma Care System Plan is being revised with goals and objectives that address the unique characteristics of the trauma system environment and the strengths and vulnerabilities of the system. Revisions have been incorporated after an extensive public comment process involving written feedback and meetings with key stakeholders. With the proposed changes to the trauma system organization, improved system oversight and ongoing data-driven evaluations will be available for policy decisions that will improve utilization of resources and result in reduction of injury morbidity and mortality.

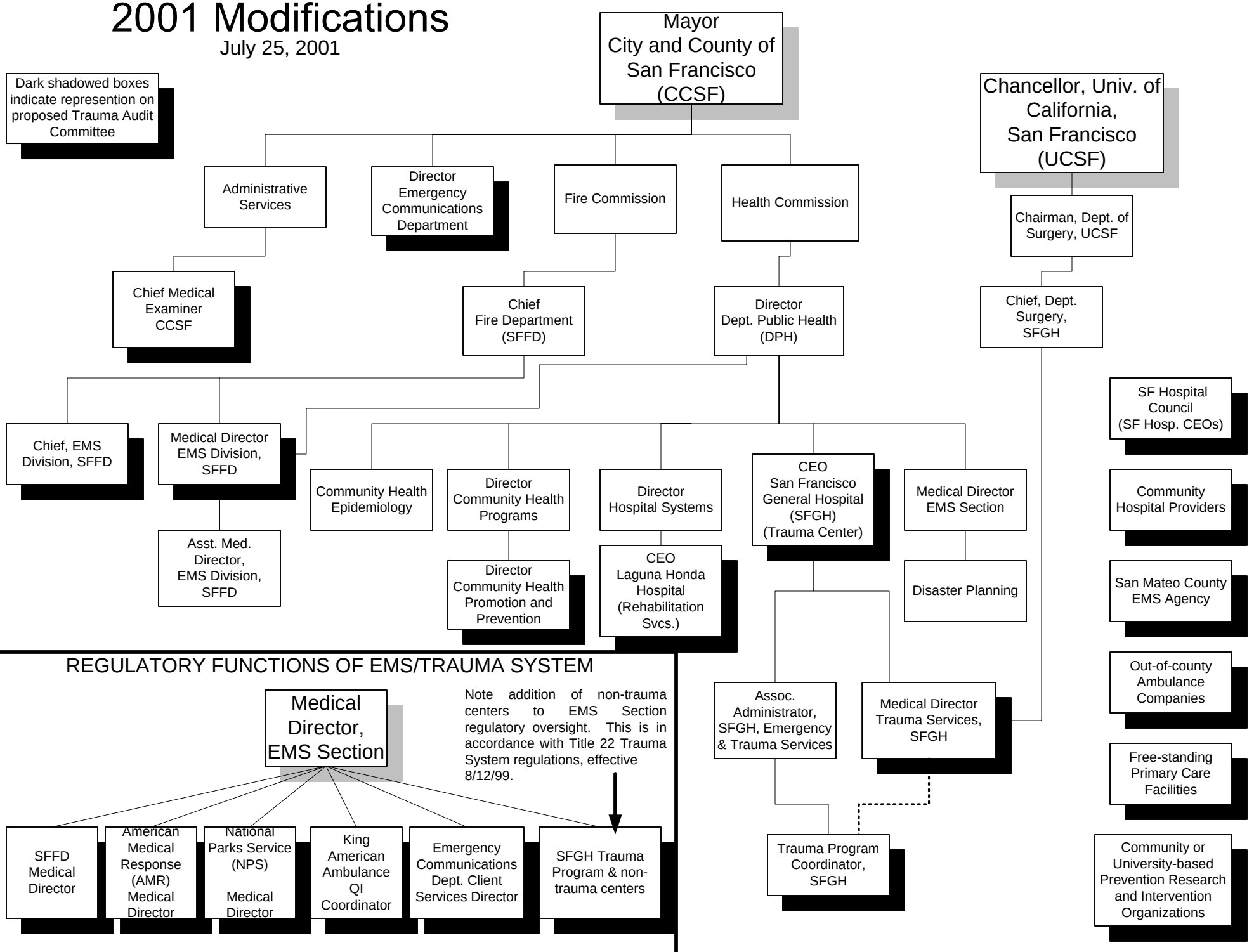
SF Trauma System

July 25, 2001

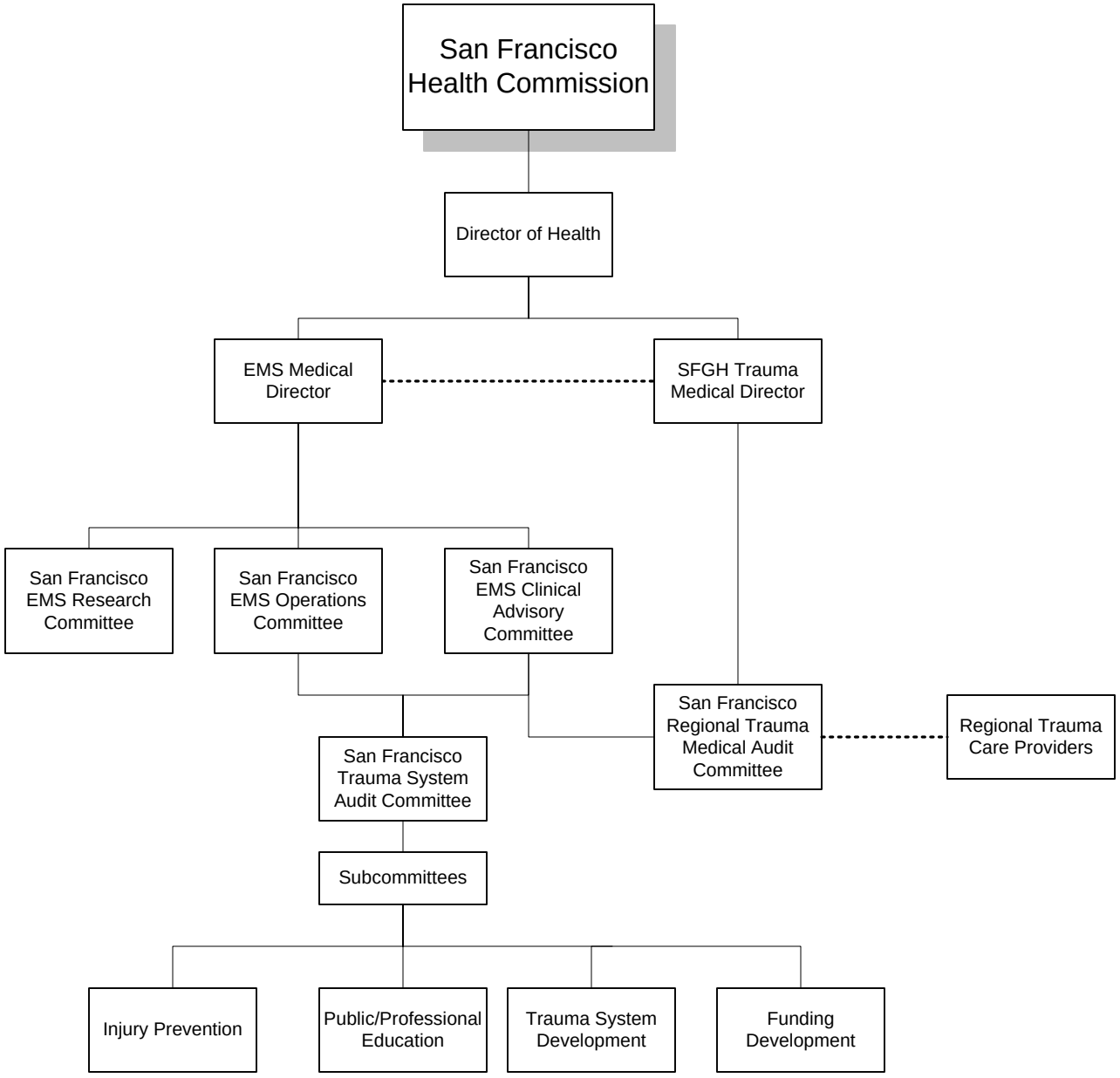


SF Trauma System
2001 Modifications

July 25, 2001



2001 Trauma Plan Modifications to EMS Section Advisory Committees



2001 Trauma Plan modifications include the additions of the San Francisco Trauma System Audit Committee and the San Francisco Regional Trauma Medical Audit Committee to the existing EMS Section Advisory Committee structure.

SECTION II—ORGANIZATIONAL STRUCTURE [§100256 (a)(2)]

MANAGEMENT and ADMINISTRATION of the TRAUMA SYSTEM

The management and administration of the trauma system in San Francisco is executed within a complex system of organizational relationships involving the San Francisco City and County government, the University of California, San Francisco, and a number of public and private stakeholder organizations (see organizational charts, Figures 1 and 2.).

Governing Bodies

The City and County of San Francisco employs a commission form of government, where elected and appointed officials are involved in departmental operations.

San Francisco Health Commission

The San Francisco Health Commission is the governing and policy-making body for the entire Department of Public Health, including the EMS Section. Under this arrangement, the Health Commission must approve the San Francisco Trauma System Plan. The City and County Charter mandates the Health Commission

> "to manage and control the City and County hospitals, to monitor and regulate emergency medical services, and all matters pertaining to the preservation, promotion and protection of the lives, health and mental health of San Francisco residents".

The Mayor of San Francisco appoints all seven members of the Health Commission. The Director of Public Health reports to the Health Commission, and the EMS Section Medical Director reports to the Director of Public Health .

The San Francisco Fire Commission

The EMS Division of the San Francisco Fire Department directs the majority of prehospital trauma care, using an integrated system of fire and paramedic response operations. The medical and operations administration of the Fire/EMS Division is conducted through the offices of the Fire/EMS Medical Director and the EMS Division Chief. The Fire/EMS Medical Director reports both to the Chief of the Fire Department and the Director of Public Health, thus integrating the EMS functions of the two Departments. The San Francisco Fire Commission, with seats appointed by the Mayor, is the governing body for the Fire.

Local EMS Agency

As the designated local Emergency Medical Services agency, the EMS section is the lead agency and regulatory body for the trauma system. The management for the San Francisco trauma system is similar to that for the EMS system, with the additional regulatory oversight of the trauma center and non-trauma centers, specific to the care of injured patients.

EMS Section Medical Director

The full-time EMS Medical Director is a physician who is knowledgeable in trauma system planning and who assumes total responsibility for trauma planning activities, including coordination with EMS Medical Directors from the State and neighboring systems. The medical director is involved in the design, implementation, continual revision, and operation of the trauma system from earliest prehospital contact through delivery to definitive care. He/she is responsible for developing clinical standards and subsequent policies and procedures that assure that these standards of care are observed. Medical direction of the trauma care system provides the operational framework for prehospital personnel and seeks to assure appropriateness of all medical aspects of the prehospital program with the same professional accountability as medical care in healthcare facilities [30].

The EMS Section professional staff supports the EMS Medical Director in system policy development, implementation and evaluation. The EMS Section maintains the San Francisco Emergency Medical Services Section Policy Manual and Trauma Plan, which together address all aspects of the countywide EMS/trauma system. Three EMS Section Committees advise the Medical Director on EMS system policy. The committees are: 1) the EMS Operations Advisory Committee, 2) the EMS Clinical Advisory Committee and, 3) the EMS Clinical Research Committee. A broad-based constituency comprises these committees and includes representatives from physician and nursing groups, communication personnel, ambulance providers, hospitals, and the community-at-large. The general public may comment on any new or revised EMS Section policy through the EMS Section Public Comment process.

San Francisco General Hospital Trauma Program

The Associate Administrator for Emergency and Trauma Services provides Trauma Program administration under the direction of the hospital Executive Administrator, who reports to the Director of Public Health. The Trauma Medical Director provides medical direction of the trauma program at SFGH, and reports administratively to the Executive Director of the hospital. The Trauma Medical Director position is funded by the hospital and staffed by the University of California, San Francisco (UCSF). The Department of Surgery at UCSF, through the Chief of Service at SFGH and the Department Chair, is responsible for providing qualified surgeons to serve as the SFGH Trauma Medical Director.

PLANNED CHANGES to TRAUMA SYSTEM ORGANIZATIONAL STRUCTURE

The 2001 Trauma Plan proposes the addition of the San Francisco Trauma Audit Committee (SF_TAC) and the San Francisco Trauma Medical Audit Committee (SF_TMAC) to the current organizational structure. The EMS Section will staff the committees; the EMS Medical Director will provide oversight of the SF_TAC; the Trauma Medical Director at SFGH will provide oversight of the SF_TMAC.

San Francisco Trauma Audit Committee

The SF_TAC will convene representatives of the inclusive trauma system, under the direction of the EMS Medical Director, to evaluate trauma system structures, processes and outcomes, to assure standard performance within the system, to develop and revise trauma system policies, and to assure that goals and objectives of the Trauma Care System Plan 2001 are accomplished.

The SF_TAC will have a broad membership so that representation from all trauma system elements is assured. The membership will include acute and rehabilitative trauma care providers and administrators, injury prevention program researchers, educators and administrators, and representatives from the medical examiners office and emergency communications. With the addition of the Trauma Audit Committee to the trauma system, there will be a fundamental change in organizational relationships among all the various elements (see organizational chart, Figure 2). This committee will be the formal communications link for local and regional trauma system structures and elements and provide a forum for ongoing coordination of trauma system resources. It will be a key organizational structure for evaluation, planning and implementation of the Trauma Plan.

San Francisco Medical Trauma Audit Committee

The SF_TMAC, led by the SFGH Trauma Medical Director, will convene a multidisciplinary group of trauma care providers that represent the prehospital providers, trauma center, and non-trauma centers from San Francisco and the immediate neighboring regions (San Mateo and Marin County trauma systems). Members will be appointed for their expertise and other professional qualities. The role of this committee is to conduct a peer review of patient care outcome data; study results for patterns, trends, and undesirable outcomes; and recommend actions as indicated by the results. This committee will meet in a closed forum, adhering to all statutes relating to confidentiality. Responsibilities of the SF_TMAC will be to review EMS Section trauma registry data, patient care complaints or issues, and, if necessary, request that specific cases or providers be examined. This committee will guide the EMS Section in disseminating summary Quality Improvement results to the ambulance services, trauma centers and non-trauma centers in a timely informative and confidential manner.

SECTION III—NEEDS ASSESSMENT [§100256 (a)(3)]

DEMOGRAPHICS and PATTERNS OF INJURY in SAN FRANCISCO

Volume and Acuity

Trauma center patient volume has been steadily declining in San Francisco, and is projected to continue to do so. The median age in San Francisco is projected to increase over the next 40 years from 39 to 49 [24]. San Francisco injury rates concentrate in the 15-24 year old age group [28], reflecting a nationwide pattern. Total annual admissions to the trauma center at SFGH over the last decade have fallen from 1,512 in 1990 to 1,233 in 1999 [31]. The annual trauma center admission rate per 1000 population averaged 2.1 in the early part of the last decade, far exceeding the national norm of 1.4. However, with the addition in 1993 of the northern San Mateo County service area, and steadily declining penetrating trauma volume, this admission rate figure has dropped to 1.2 in recent years [31], [12], [11] (Appendix A5).

Despite the decline in volume, the relative severity of injury in these admissions remains high. The trauma program admitted an average of 460 patients per year with Injury Severity Score (ISS) greater than 15 over the last decade, with more recent figures approaching 400. This figure exceeds the California State minimum annual Level I high acuity volume criterion by 70% [31] (Appendix A6).

Pediatric Trauma

Young children in San Francisco constitute a smaller proportion of the population than in neighboring Bay Area counties. California Department of Finance projections for the years 2000-2040 estimate that children ages 4 and under in San Francisco will make up 4 -5% of the population, while neighboring Bay Area counties have pediatric population projections in the same age group ranging from 6-8% [11].

From 1995 to 1999, an average of 6 trauma patients under the age of 2 was admitted annually to the intensive care unit at San Francisco General Hospital [31]. There are approximately two to four very young critically injured children (ages 0-6) treated at SFGH on an annual basis who require a high level of specialized pediatric trauma care. (Appendix A9, A10).

San Francisco Off-shore Rescues and the Neighboring Region

There are dozens of occasions every year when San Francisco citizens and visitors require rescue from the cliffs or surf offshore, or from neighboring islands (the Farrallons/Alcatraz/Angel Island). The National Park Service alone reports 12 deaths a year in their San Francisco based operations [32]. These include parts of Marin and San Mateo Counties. The San Francisco Fire Department station near the western shore (Lands End) reports that they responded to 13 cliff rescue incidents and 14 surf incidents in the year 2000 [32].

On a regional basis, San Francisco General Hospital is the closest Level I trauma center for northern San Mateo County, Contra Costa County, the northern San Francisco Bay region and the remote coastal regions of Mendocino County. Limited air access to SFGH however, has

resulted in reliance on other, more distant Level I centers in Palo Alto (Stanford University Medical Center), and Sacramento (UC Davis Medical Center).

TRAUMA CAPACITY in SAN FRANCISCO

Level I Trauma Center Volume Criteria

California State trauma regulations (Title 22, Div. 9, Chapter 7, §100260) specify that one of three criteria, based on annual admissions volume, must be met in order to qualify as a Level I trauma center. These annual volume-based criteria are:

1) a minimum of 1200 trauma program hospital admissions, or
2) a minimum of 240 trauma patients per year whose Injury Severity Score (ISS) is greater than 15, or
3) an average of 35 trauma patients (with an ISS greater than 15) per trauma program surgeon.

With current volume at 1200 per year and relatively high patient acuity, the trauma program at SFGH continues to meet minimum requirements for Level I trauma designation.

San Francisco Non-trauma Centers

In San Francisco, among the ten non-trauma center receiving hospitals, there are resources available for care of patients with relatively minor injuries involving only one organ system, who do not meet trauma center triage criteria. Kaiser San Francisco, St. Mary's Hospital and California Pacific Medical Center (CPMC) have general surgery capabilities. Orthopedic surgery is available at St. Mary's Hospital; and CPMC, Davies Campus has reimplantation surgical capacity[6]. The University of California, San Francisco has most of the surgical specialty capacity to support trauma center services, though the specialized trauma care equipment, trauma care providers, ongoing education, administration, policies and quality improvement processes necessary to provide trauma care as a designated center have not been established at this facility.

Resource Analysis

There is only one hospital in San Francisco with the annual trauma patient volume and high acuity that supports the maintenance of superior trauma provider skills. Despite the current climate of shrinking hospital inpatient and ED capacities, SFGH has not diverted trauma patients from its facility since 1989, when a flood in the Radiology Department disrupted service availability. With substantial resources in research and education, the ongoing commitment of the institution to the trauma program at SFGH, and its high volume and acuity service capacities, this facility qualifies as the designated Level I trauma center for San Francisco and northern San Mateo counties. Of the ten EMS receiving hospitals in San Francisco that complement the services of San Francisco General Hospital, none has ever applied for trauma center designation, nor has the EMS Section solicited applications for a second trauma center. Should an additional Level I or II trauma center be developed in San Francisco, SFGH would most likely fall below the volume/acuity requirements necessary for Level I center designation.

[6] Resource capacity information based on a hospital survey conducted in preparation for the "Millenium" celebrations in San Francisco, 1999 [33].

VULNERABILITIES of the EXISTING SYSTEM

Trauma Capacity for High Volume Periods and Multiple Casualty Incidents

SFGH is, as mentioned, the sole referral center for major trauma within the City. There is no designated Level II, III or IV trauma center. This state of affairs places almost the entire burden for injury care on SFGH. Occasionally there are high volume periods at the trauma center, typically on a weekend night, when multiple unrelated trauma cases are admitted with critical injuries in a short period of time. The numbers of patients requiring immediate surgical consultation or surgery simultaneously may stretch the trauma care capacity at SFGH to very thin margins. Under such circumstances as these, or in the case of a mass casualty incident like a school shooting, when internal capacity is saturated, there is no system in place in San Francisco that preserves standard trauma care beyond the capacity of the single trauma center.

Conditions Affecting Local and Regional Access to Trauma Care

To get to the trauma center from within San Francisco, ground ambulances travel through traffic in one of the most densely populated cities in the nation. There is one freeway commute thoroughfare and one main surface artery available to access this single trauma center located in the central portion of a hilly peninsula. Ground access from more remote areas to the north and east is available only across bridges that are chronically congested during commute time intervals that continue to lengthen. Commute traffic patterns in this region entail delays that rank second only to Los Angeles among the most congested urban regions nationwide [16]. The increasing density and congestion place emergency ground transportation from within San Francisco and from beyond its immediate borders at higher risk for delay, which can prolong critical intervals to definitive trauma treatment and promote preventable morbidity and mortality.

Pediatric Trauma Center

The pediatric population in San Francisco is proportionately small by comparison with surrounding counties. There are few very young, critically injured children admitted to SFGH on an annual basis. This consistently small annual admission volume entails infrequent exposure to critically ill young children and infants for trauma care providers. There is not enough cumulative experience to support the expertise required to sustain a high level of trauma care for the very young victims of critical injury. The pediatric admissions volume at SFGH is not sufficient to support the maintenance of a pediatric intensive care unit that could provide the highly specialized personnel and equipment necessary to care for these critical pediatric trauma patients.

To transport a critically injured patient via Code 3 ground ambulance, the time interval from SFGH to Oakland Children's Hospital (the closest designated pediatric trauma center) ranges from 25 to 50 minutes, depending on prevailing traffic patterns. Occasionally, during commute hours, Bay Bridge traffic is at a standstill for prolonged periods. There is no other direct ground access route to the East Bay from San Francisco.

Trauma System Organization, Data Availability, Monitoring and Quality Improvement

Additional significant vulnerabilities in the San Francisco trauma system stem from the lack of coordination of the inclusive elements and the paucity of accurate data with which to evaluate the system.

The trauma system's lead agency, the EMS Section, does not have the staff support commensurate with its role and responsibilities to provide oversight and continuously evaluate the trauma system. The inclusive trauma system, incorporating the multiple elements of prehospital, trauma center, non-trauma center, rehabilitation and prevention, presents a large cadre of structures and complex organizational relationships that require ongoing coordination for optimal system performance. There is no organizational structure in the trauma system that serves this function.

The Quality Improvement process for the EMS system relies on unusual occurrence reporting from system elements and the tracking of trends with this data. Regular analysis and reporting of this information proceeds through the Clinical Advisory Committee, and corrective actions are taken based on this analysis. Computerized data from the Emergency Communications Department allows tracking of 911 call volumes according to dispatch codes, which provides limited information about the emergency 911 system. There is no direct link to standardized data from prehospital patient care records. There is no data link with medical examiner records, non-trauma center injury data, or rehabilitation facility data. Accurate, standardized information to support regular analysis and reporting for a Quality Improvement process is not available in the EMS system.

Regular reporting of trauma center registry data is available to the EMS Section, but there is no formal trauma system quality improvement process in place for the regular collection, analysis or reporting of this data or any other data that might be available from prehospital or non-trauma center sources. There is no regional, confidential peer review process for trauma system care. The trauma system predominantly relies on standard guidelines to establish prehospital triage criteria. There is no standardized data source or mechanism with which to evaluate how well these criteria optimize triage capabilities in San Francisco. Without the organizational structure, standardized data sources and quality improvement process in place with which to evaluate San Francisco's trauma system, it is impossible to know, for example, if patients that need trauma services at SFGH consistently have access to them. Conversely, there is no information with which to evaluate to what extent patients that don't need to go to the trauma center are transported there inappropriately.

Economic Vulnerabilities

The inherent high cost of trauma center operations and the unstable nature of trauma center funding sources present a constant threat to the trauma system in San Francisco. Shrinking reimbursements, managed care contract discounting and high proportions of uncompensated care have forced trauma center closures nationwide. SFGH faces these fiscal pressures, and must increasingly rely on local taxpayer support for the continuance of its trauma services.

Local Conditions Affecting Availability of Acute Care Resources

In the current climate of acute care resource capacity reduction and increasing demand, the Emergency Department at San Francisco General Hospital is routinely overcrowded. An inpatient capacity saturation of non-trauma patients coupled with ED overload potentially compromises trauma care service capacity at SFGH.

Provider Staffing Vulnerabilities—Nursing and UCSF Faculty/Residents

Nursing

Current projections forecast that the national supply of nurses will no longer meet demand for services by 2010. This prediction is based on evidence that the average age of employed registered nurses is 43, enrollments in schools of nursing continue to decline, and the demand for nursing services will increase as a result of the aging of the U.S. population and the growing need for management of chronic illnesses and conditions. Increasing numbers of RNs are retiring [19], and these numbers are not being replaced. Since 1980, the U.S. population of nurses under the age of 30 has dropped from an estimated 25% to only 9 percent in 2000 [26].

According to the U.S. Department of Housing and Urban Development [34], the San Francisco Bay Area rental market remains tight, despite the recent economic downturn, with the rental vacancy rate in properties of 100 units or more at 2 percent. This persistent pressure on affordable housing forces the shrinking number of available nurses to seek employment outside of San Francisco. The current nursing shortage is particularly acute in specialty care areas such as trauma, emergency, operating room and intensive care, because the numbers of nurses with the required advanced educational preparation does not meet employers' demand [27].

UCSF Faculty/Residents

All of the trauma medical staffing at SFGH is provided through the University of California, San Francisco, but is done so in the absence of any formal multidisciplinary agreement with UCSF, specifically related to trauma. As the provision of trauma services at SFGH may or may not be a goal of UCSF, and there is no guarantee of the continuation of medical staff services or the provision of house staff support, even on a short-term basis. The absence of agreements that would prevent the abrupt discontinuation of trauma-related services leaves SFGH and the victims of major trauma in San Francisco, vulnerable to unpredictable changes in UCSF faculty, and/or resident physician services.

NEEDS of the EXISTING SYSTEM

The majority of prehospital and acute care trauma needs are being met by the current system of trauma, but a number of major gaps exist in the continuity of trauma care.

Consistently Available Trauma Resources

There is a lack of resources and organizational structure, policies and protocols that will guarantee optimal care of victims of major injuries in the event that San Francisco General Hospital becomes incapacitated, or saturated with victims of major injury. Similarly, the trauma system lacks the resources, personnel policies and organizational structure policies and procedures for ensuring that in the event of multi-casualty incident or mass casualty disaster, patients will be treated, triaged and transported to the appropriate facilities in an optimal manner. During such an event some patients will not have access to a trauma center, and the trauma center may not have access to the personnel and supplies needed to sustain operations. In the event of SFGH incapacity of any circumstance, major trauma victims in San Francisco do not have timely access to another trauma center, of any variety (see regional map, p___).

Comprehensive Pediatric Trauma Care

There is a lack of resources and organizational structure, policies, and protocols that will ensure the optimum care of critically injured very young children and infants within the City and County of San Francisco. In the event of major pediatric injury exceeding the capacity of SFGH, such patients do not have expeditious access to a designated pediatric trauma center.

Timely Access to Advanced Trauma Care and Improved Patient Transport

There is a lack of resources, organizational structure, policies and protocols to ensure that all residents and visitors in San Francisco and surrounding regions have time-critical access to the most proximal Level I trauma services in the area. In light of the vulnerabilities of the existing trauma system—the isolating geography, increasing traffic congestion and population density and the mounting potential for delayed transport; the vulnerabilities to earthquakes, mass casualty events and terrorism; the vulnerabilities to trauma center capacity disruption or saturation; the lack of definitive advanced pediatric trauma care and limited access to expeditious pediatric trauma center transfers; and the lack of consistent expeditious access to the Level I center from remote areas—there is a need to evaluate alternatives to ground transportation for critical trauma patients in San Francisco and its neighboring regions.

Air Medical Access

No air access site intended for medical use has ever been licensed and approved within the City/County of San Francisco. An ad-hoc helicopter landing site at Pier 94-96 is used on an emergency basis, but the lack of security, poor access conditions, and additional transport time via ground to the trauma center adds risk to trauma patients and emergency medical providers. The need for and feasibility of air medical access within the City and County of San Francisco has been addressed by a number of commissioned reports in the past [35]. After a feasibility study was completed in 1983, the Department of Public Health approved a resolution[7] to participate in the CALSTAR air ambulance program [36]

> "to provide patients with quicker access to the trauma center at San Francisco General Hospital".

While considerable effort and discussion has been devoted to the subject of helicopter utilization in San Francisco over the past 30 years, distinctions between the various purposes for helicopter use are sometimes blurred. From 1985 to 1990, while local community leaders and a "Heliport Supporters" group were examining the pros and cons of helicopter use in San Francisco, neighborhood concerns included noise and safety issues and usage for commercial purposes. However the Mayor's appointed "Citizen's Heliport Study Committee" was unanimous in its support for the emergency medical use of helicopters [35]. The following are excerpted from meeting minutes of this committee from 1985-1986:

> *"Emergency medical transport is a legitimate issue that deserves proper consideration."*—Father Peter Sammon, Potrero Hill Heliport Committee representative

[7] San Francisco Health Commission resolution no. 033-85

> *"Potrero Hill might not have a significant problem with helicopter use at General Hospital…life and death is different than moving bank checks."*—Peter Furth, Potrero Hill Helicopter Committee representative

> *"Time marches on. The need for medical and emergency uses for a helicopter are clear."*—John Kirby-Miller, Chamber of Commerce

In 1988, the San Francisco Port Commission received funding from the Federal Aviation Administration (FAA) to investigate the needs and feasibility of a public use "Vertiport" in San Francisco. A San Francisco Chamber of Commerce status report of the Vertiport Study in 1989 [37] referenced the advisory committee for this study, and indicated

> *"almost unanimous agreement on the crucial medical services of helicopters..."*

The author of the report goes on to say:

> *"...I would predict that the heliport opponents intend to support one or more helipads in the vicinity of hospitals, but that they will never agree to a heliport. By clearly separating these needs, they offer a divide-and-conquer scenario that will enable the Board of Supervisors an easy out: approve one or two hospital helipads and the heliport idea will go away."*

The Vertiport Study found needs for both medical and commercial air access site development in San Francisco, and recommendations for these were forwarded to the Board of Supervisors. No further action was taken, however, because of opposition to the development of commercial landing sites, serving banking and the tourist industry. The Port Commission elected to discontinue the Vertiport study in 1990, and recommended that remaining funds be transferred to another "appropriate agency" in San Francisco. The EMS agency requested these remaining funds from the FAA so that an investigation of needs and feasibility for EMS helipads could be continued. The FAA denied funding appropriation to the EMS agency because the EMS system jurisdiction isn't broad enough. The FAA funds were to support general use development, not just EMS use.

Current Status

The availability of the temporary, limited use air access site at Pier 94-96 is tentative due to Port Commission development plans. The Police Department is investigating the licensing of a public safety helipad in the Hunter's Point district which would provide a safer site, but would continue to impose secondary (ground) transport time to the trauma center, making it largely unsuitable for the transport of critically injured patients.

The existing situation in San Francisco where no medical air access is available to either the sole Level I trauma center or any other medical centers in the City is largely unprecedented. A recent survey of the 25 largest cities in the United States found that only one city failed to provide direct helicopter access to any of their hospitals: **San Francisco** [37]. Despite being one of the highest density, most earthquake prone urban areas in the United States, San Francisco would appear to fall below the national standard for urban medical care and public safety in the provision of medical air access to its trauma center and/or community hospitals. In light of the current trauma system vulnerabilities, there is a growing need to seriously evaluate alternatives to ground transportation that will help ensure consistent, expedient access to trauma care. Definitive answers to the following questions would serve to examine the need for, and risks, costs, benefits and feasibility of improved air medical access in the San Francisco trauma system:

1. Are San Francisco citizens getting substandard care now because there is no access to air medical transportation?
2. Are San Francisco citizens subject to a compromise in safety because there is no access to air medical transportation?
3. How would better air medical access benefit our residents?
4. How many San Francisco citizens per year would benefit?
5. How would air medical access benefit the Trauma Center?
6. How would air medical access benefit the broader San Francisco trauma system region?
7. If it is found that San Francisco needs better air medical access, what would be the risks of using it?
8. How safe would it be?
9. How noisy would it be and for what duration?
10. How often would takeoffs and landings occur?
11. During what hours would takeoffs and landings occur?
12. Where would a landing site be placed?
13. What has been the experience in other locales with medical helipads? Have they been found to benefit the communities they serve? What is the safety record?
14. How much would a medical helipad cost to construct?
15. How much would a medical helipad cost to maintain?

There is a need for careful evaluation of air medical access in the San Francisco trauma system which would identify and assess the need for and risks, costs, benefits, feasibility and impact of establishing a licensed, approved air medical access site(s) consistent with defined trauma system needs. Such an evaluation would proceed with careful analysis by experts from several fields of expertise, including trauma care systems, air medical transport utilization, community

heliport development, National Disaster Medical System, Federal Aviation Administration, and architectural and land/site use feasibility analysis. An objective analysis of data from multiple sources is required, including noise level comparisons, safety records, estimated transport time intervals, number of patients annually diverted, current and projected traffic patterns, urban development projections, past feasibility studies, current published studies of air medical utilization, and cost projections for development and maintenance of a medical helipad(s).

System-wide Oversight: Data Collection, Monitoring, and Quality Improvement

There is a lack of resources, organizational structure, policies and procedures to ensure consistent system performance, system improvement and tracking of appropriate trauma-related outcomes.

Reduction in Financial Vulnerability

There is no organizational structure or plan that will promote the enhancement of trauma system funding from local, state, federal or private sources.

Consistent Availability of Acute Care Resources

There is a lack of resources, organizational structure, policies and protocols that will ensure optimal care of injured patients in San Francisco in the event of overwhelming SFGH non-trauma inpatient capacity saturation.

Consistent Availability of Adequate Provider Staffing

There is a lack of resources, organizational structure, policies and protocols that will ensure the consistent availability of nursing care for trauma patients at SFGH. Additionally, there is a lack of written agreement, MOU, contract, resolution, or statement of commitment, that acts to ensure that no abrupt change in UCSF faculty or house staff is made that could compromise or degrade the ability of SFGH to function as a Level I Trauma Center.

SECTION IV—TRAUMA SYSTEM DESIGN [§100254]

INTRODUCTION [§100256 (a)(4)]

The San Francisco Trauma Care System is designed to address the significant public health problem of injury in San Francisco. One-third of all EMS ambulance responses is coded as trauma-related. Highest injury rates are among young males and elderly females, with firearm injuries and falls causing most of the trauma in these respective populations, and most of the hospitalization charges and lengths of stay overall [28]. With an aging population, declining penetrating injury rates, and a relatively stable population, the single Level I trauma center, integrated with prehospital EMS response and rehabilitation, comprises the trauma system structure designed to ameliorate the impact of injury in the San Francisco/northern San Mateo service area.

The 1990 San Francisco Trauma System Plan described a system design that is "exclusive" in nature; one that is driven by the major (severely injured) trauma patient who requires immediate treatment at the designated trauma center. An inclusive trauma care system design is proposed by the San Francisco 2001 Trauma Care System Plan that not only incorporates provisions for the designated trauma center to care for the most severely injured patients, but also recognizes the importance of other acute care facilities within the trauma system in caring for the majority of less severely injured (see Figure 4, p. 45). The range of injury severity risk and extent of actual injury occurs along a spectrum of minor to severe injury, and the resources needed to provide optimal care for these patients also exist along the same spectrum. The goal of the inclusive trauma care system is to match each trauma care facility's (or provider's) resources to the needs of injured patients so that every patient receives optimal care from the initial recognition of the injury through return to the community [30].

At the "central core" of the San Francisco trauma system are clinical and operational elements that provide direct patient care once an injury has occurred. These consist of the hospitals and public service agencies that have a pre-planned response to caring for injured patients. They require the use of coordinated communication mechanisms, accurate identification of the level of care needed by an injured patient, rapid transport to the appropriate care facility and integration of support and rehabilitative services designed to return the patient in a productive way back to the community.

The administrative organization of the San Francisco Trauma Care System comprises the framework within which care is given and continual development of the system is promoted. These elements consist of the leadership authority responsible for system oversight, the mechanism of continual planning and development of the system, and the legislation that established the system and authorizes both responsibility and funding. These elements form an outer sphere of stability that is vital for the continuation of activities directly related to patient care.

The 2001 Trauma Care System Plan describes vulnerabilities in the current trauma system and proposes modifications to the organizational relationships with the addition of a multi-

disciplinary, multi-departmental Trauma Audit Committee that will be the key mechanism for continual planning and development.

EXISTING ELEMENTS

Public Access and Communications

Through the Emergency Communications Department, state of the art public safety facilities, technology & consolidated operations serve the City and County of San Francisco. Voter approval in 1994 of Proposition B enabled 911 capital improvements. This consolidation of 911 operations and public safety dispatch ensures coordination of emergency response for those in need of public safety help in San Francisco. Construction of a new combined emergency communications center (CECC) consolidates all 911 Police/Fire/EMS dispatch functions, improving coordination of public safety response. The new facility co-located the Office of Emergency Services command center for disaster response and recovery. In addition, major technology investments have improved operations efficiency, service delivery and emergency communications capabilities.

The communications system provides essential coordination among the elements of the EMS and trauma care systems in San Francisco. Through the Emergency Communications Department, the public accesses the trauma/EMS system by calling 911. Translation services are available for non-English speaking callers. Dispatchers screen all 911 calls using a standardized medical dispatch system called Criteria Based Dispatch (CBD)[8]. The CBD guidelines specifically address traumatic injury and assign standardized response codes based on mechanism of injury, anatomic and physiologic criteria. Local hospital capacity information is consistently updated with an internet-based resource database (HART) to which all receiving hospitals and the dispatch center have access.

Radio Communications [§100254(e)]

The entire public safety communications system in San Francisco is linked with an 800 mHz two-way radio system. All San Francisco receiving hospitals have been provided with 800 mHz radios for direct communication with ambulances and the 911 dispatch center. Ambulances carry this equipment and communicate with receiving hospitals in accordance with EMS Section Communications policies #4010-4060. The 911 dispatch center and receiving hospitals have Hearnet radios for backup use.

Call Volume

In the year 2000, the San Francisco EMS System received over 67,000 calls for medical assistance through the 911 Emergency Medical Dispatch Center. Of these medical emergencies, 62% were categorized as Code 3, which required immediate response (“red lights and sirens”) from the closest fire engine/first responders in addition to the closest advanced life support capable ambulance. Of all 911 calls to the dispatch center, 30% are trauma-related [21].

[8] This system was acquired from the King County EMS Division in Seattle, Washington and was customized for San Francisco.

Prehospital Services [§100254(f)] [§100254(a)(3)]—**Triage, Treatment and Transport**

The trauma system, integrated with the EMS system in San Francisco, plans for the rapid decisions required during initial management of trauma patients with prehospital policies and protocols for triage, treatment and transport. Triage is the process of sorting injured patients by actual or perceived degree, or risk, of injury and assigning them to the most appropriate care resources. Prehospital triage and transfer criteria are based on national and state models.

The San Francisco Fire Department provides the majority of EMS responses in San Francisco. Three Advanced Life Support ambulance providers—King & American Ambulance, American Medical Response, and National Parks Service—manage the remaining volume.

Prehospital Response and Transport Time Intervals [§100254(a)(3)]

Average Code 3 response time intervals (from dispatch to arrival on scene of emergency) in San Francisco are 10 minutes. Code 3 transport time intervals within San Francisco range from 2 to 10 minutes, and from north San Mateo County, the average is 15 minutes.

The EMS Section requires Advanced Life Support (ALS) ambulances to provide dual paramedic staffing. Prehospital personnel must comply with the EMS Section Prehospital Treatment Protocols that address all aspects of clinical care for injured patients. The EMS Section Policy Manual standardizes clinical care and operational policies, including trauma triage. The Ambulance Destination Policy #8000 designates SFGH as the sole recipient of critical trauma patients. The Critical Trauma Criteria and Triage Decision Scheme Policy #8020, and the Diversion Policy #8010 provide guidelines for field triage. Two Basic Life Support ambulance companies provide routine transport services and are not involved in day-to-day EMS responses.

In compliance with 1999 Title 22 Trauma System regulations [Article 2, §100254(f)], the EMS Section will require all prehospital providers to have a policy approved by the EMS Section for the early notification of trauma centers of the impending arrival of a trauma patient. Objectives of this Trauma Plan include revision of EMS Section policy #2120—ALS Providers Standards—by November, 2001. This revision will provide for an examination of prehospital provider policy manuals during site visits to ensure compliance. Current EMS Section policy #4060 provides for early notification for any Code 3 transport, and any patient meeting criteria for transport to a Specialty Care Facility, including the Trauma Center.

Base Hospital Responsibilities

A single Base Hospital at SFGH provides on-line medical control and direction of prehospital personnel, according to policies established by the EMS Section. This includes management of all trauma calls. The Base Hospital is responsible for:

1. Maintenance of qualified base hospital physician consultation 24 hours per day, 7 days a week, for EMS providers with questions regarding trauma patient treatment/triage or trauma policy questions;

2. Compliance with all Base Hospital standards as required by EMS Section Policy #2100, including maintenance of a Base Hospital contact log/database; and

3. Incorporation of Quality Improvement evaluation feedback into EMS provider trauma clinical education, provided according to Base Hospital standards.

San Francisco General Hospital – Designated Level I Trauma Center [§100254(a)(2)]

San Francisco General Hospital is the county's only comprehensive emergency department and the only trauma center for critical adult and pediatric trauma patients. With its Level I designation, it is a tertiary referral center for patients with complex injuries from the neighboring region, including San Mateo and Marin Counties, the East Bay, and rural coastal regions of Sonoma and Mendocino counties.

Medical Organization and Management [§100256(b)(2)]

The Medical Staff Bylaws describe the rules and regulations for the SFGH medical staff including its committee structure. The medical organization and management of trauma center care is a departmental function at San Francisco General Hospital with formal programmatic guidance and oversight coming through the hospital Trauma Quality Assurance Subcommittee, reporting through the hospital Quality Assurance Program.

Trauma Program

The Trauma Program at SFGH is administratively responsible to the SFGH Executive Administrator through the Associate Director for Trauma and Emergency Services. It provides trauma program coordination (clinical and fiscal), trauma nurse practitioner services, clinical case management services and trauma social work services that are integrated with the trauma surgery service component of care.

Medical Director [§100254(a)(2), §100256(b)(2)]

A Board Certified Surgeon with expertise in trauma care is the Medical Director of the Trauma Program, and reports administratively to the Executive Administrator. As a member of the UCSF faculty, the Trauma Medical Director is academically responsible to the Chief of Surgery at SFGH and the Department Chair at UCSF/Parnassus. The trauma Medical Director a nationally recognized clinical leader and researcher. Roles and responsibilities of this position have been delineated by SFGH. Duties include, but are not limited to: trauma surgery, surgical resident attending, surgical staff teacher and lector, clinical supervision of trauma nurse practitioners, surgical treatment protocol development and evaluation and trauma services performance improvement. Medical director responsibilities are included in Level I trauma center criteria in accordance with Title 22 Trauma Care Systems regulations, §100259 (a) (1), as described in Section IX of the San Francisco Trauma Care System Plan.

Trauma Program Manager[§100254(a)(2)]

A full-time Trauma Program Coordinator manages the day-to-day programmatic aspects that include, but are not limited to: budgetary management, coordination of multi-disciplinary trauma team in acute care services, trauma program policy and planning, trauma registry supervision, trauma education activities, trauma center accreditation and trauma quality improvement. The Trauma Program Coordinator is a masters prepared registered nurse with extensive trauma care experience and a nationally recognized trauma educator. Trauma coordinator responsibilities are included in Level I trauma center criteria in accordance with Title 22 Trauma Care Systems

regulations, §100259 (a) (2), as described in Section IX of the San Francisco Trauma Care System Plan.

Trauma Surgery Services [§100254(a)(2)]

The Trauma Surgery Service is an organized component of the surgical services at SFGH. The service responds to the Emergency Department for trauma resuscitations, using well-defined roles in the management of the trauma patient, and follows patients throughout their hospital stay to surgical clinic visits post discharge. Trauma surgery services are integrated with SFGH Trauma Program services.

Critical Care Capability [§100256(b)(1)]

SFGH has two fully staffed critical care units. Trauma patients are admitted to the 16-bed medical-surgical ICU. A medical ICU that has cross-trained nursing staff takes trauma overflow. Pediatric patients are always admitted to a designated area in the trauma Medical-Surgical ICU, where specialized pediatric equipment and supplies are kept. Neurosurgical services and Burn Surgery specialty staff and equipment for the acute care of spinal cord injuries and burns are available at SFGH. The rehabilitation department staff provides physiatry services and acute care rehabilitation services with protocols for trauma patient physical therapy beginning in the ICU.

Quality Improvement [§100256(b)(3)]

The Trauma Quality Assurance (QA) Committee is a multi-disciplinary committee with the primary role of oversight of trauma care in the hospital. Responsibilities include regular audits of trauma program structure, process and outcomes, which focus on improvement efforts to identify root causes of problems, intervene to reduce or eliminate these causes, and take steps to correct the process. The Trauma Quality Assurance Committee is a standing committee of the Medical Staff. The Medical Director is the committee chair and both the Trauma Program Coordinator and Administrator participate as members on the Trauma Quality Assurance Committee. Responsibilities of the Trauma QA Committee are included in Level I trauma center criteria in accordance with Title 22 Trauma Care Systems regulations, §100265, as described in Section IX of the San Francisco Trauma Care System Plan.

Level I Volume Criteria [§100254(a)(1)]

The San Francisco Health Commission approved the 1990 Trauma System Plan, and San Francisco General Hospital was designated a Level I center by the EMS Section in 1991. In the 1999 revision of Title 22 Trauma System regulations, patient volume criteria for Level I trauma centers were added. A Level I center must admit a minimum of 1200 patients per year, or a minimum of 240 patients with ISS (injury severity scores) greater than 15. An additional option for meeting Level I volume criteria is to admit an average of 35 patients per year to each trauma program surgeon. Although injury rates have been declining, SFGH continues to meet volume criteria, with admissions totaling 1200-1300 since 1996. The injury severity scores remain very high. Total patients with ISS over 15 continue to be over 400, despite declining admission rates.

Service Area [§100254(a)(4)]

The San Francisco trauma system service area incorporates the urban and suburban areas of the City and County of San Francisco and the northern portion of San Mateo county[9], incorporating a population base estimated between 1.1 and 1.6 million, with commuters and visitors.

Non-trauma Center Acute Care Facilities [§100256(a)(4)]

Ten designated emergency receiving hospitals in addition to SFGH provide care to patients with minor injuries. Seven of these hospitals provide basic emergency department services. These include: California Pacific Medical Center—Pacific Campus, California Pacific Medical Center—Davies Campus, Kaiser Permanente Medical Center, University of California at San Francisco, St. Francis Memorial Hospital, St. Luke's Hospital, and St. Mary's Medical Center. Chinese Hospital, located in the heart of San Francisco's Chinatown, operates as a standby emergency department within the County, as does the Federal Veterans Administration Medical Center. Seton Hospital, in northern San Mateo County, also receives San Francisco patients. According to EMS Section policy, patients with critical injuries who arrive by private vehicle at any of the non-trauma center facilities must be stabilized and transferred to the trauma center (policy # 8021 in Appendix B).

Coordination with Neighboring Trauma Systems [§100254(a)(5)]

The EMS Section coordinates inter-county disaster trauma services through the San Francisco Bay Area Medical Mutual Aid Policy #5040, and the Multi-Casualty Incident Plan #5010. The Bridge Response Policy #8050 and Inter-county Response and Transport Policy #8060 address specific multi-agency coordination issues with EMS ground responses on the Golden Gate Bridge and Oakland-Bay Bridges, and between San Francisco and San Mateo counties.

Rehabilitation

Intensive care, acute care and outpatient rehabilitation services at San Francisco General Hospital are under the medical direction of a physiatrist, and include physical, occupational and speech therapy services for adults and children. Short term in-patient rehabilitation services are available at the Skilled Nursing Facility at SFGH. The Mental Health Rehabilitation Facility at SFGH is also a resource for post-acute trauma care.

At Laguna Honda Hospital—within the Community Health Network of the City and County of San Francisco, a breadth of rehabilitation services are provided under the direction of a physiatrist, using a multidisciplinary team model. Programs include acute rehabilitation with physical, occupational and speech therapy services for in-patient care, as well as short term, long-term, out-patient and home care rehabilitation services. A Head Trauma Day program and an Adult Day Health Care program provide specialized services to maximize independence and community reintegration. All acute care and post-acute programs include multi-disciplinary conferences with families and caregivers to educate those who will assist in patients' transition to home or another rehabilitation environment.

[9] North of Trousdale Blvd.

Specialized rehabilitation facilities for spinal cord injuries, head injuries and burns are available in San Francisco and the Bay Area community, including the Spine Center at St. Mary's hospital in San Francisco, the Burn Center at St. Francis hospital, and spinal cord and head injury rehabilitation facilities at Santa Clara Valley Medical Center in San Jose and Kentfield Rehabilitation Center in Marin County.

Functional Recovery

SFGH Department of Psychiatry recently secured State funding for a three year Post-Traumatic Recovery Program that targets recent victims of accidents and violence. In this model program, a highly-trained multilingual team will address the psychological and social needs of trauma survivors and their families, dealing with permanent injuries, loss of family and jobs, and the emotional effects of serious trauma. The program will give special attention to trauma victims whose life-style (i.e. drugs, alcohol or gang activities) place them at risk for recurring traumatic injury.

Injury Acute Care and Prevention Research, Education and Community Outreach

SFGH serves as a center for trauma clinical research and education in its academic affiliation with the University of California at San Francisco. The Trauma Center's physician staff is composed of nationally recognized faculty from the University of California at San Francisco, with ongoing commitments to advancing trauma care through research and post-graduate medical training. As part of these efforts, the Trauma Center provides clinical and research fellowship programs to train future leaders in the field of trauma care. Recent trauma program developments at SFGH include violence and injury prevention, functional recovery programs, the institution of trauma case management and nurse practitioner services, the use of specific treatment protocols, algorithms and critical pathways, and expanded community outreach.

The San Francisco community has a considerable depth and breadth of injury prevention research and education resources that serve the local population and influence community organizations and public policy nationwide.

The Community Health Promotion and Prevention Branch of the Department of Public Health in San Francisco conducts community-focused injury research and primary prevention programs, some of which are collaborative efforts with the UCSF San Francisco Injury Center for Research and Prevention. Current research projects include the development of a Firearm Injury Reporting System, and a Pedestrian Injury study. Community education programs address violence prevention, pedestrian safety, child carseat safety, and injury prevention for seniors.

The UCSF San Francisco Injury Center for Research and Prevention (SFIC) [38], located on the SFGH campus, is one of ten Injury Control Research Centers funded by the National Centers for Disease Control and Prevention (CDC). Current research ranges from studies of cellular pathophysiology to prospective clinical trials in trauma patients. A major objective is the design and conduct of research in the five phases of acute care delivery: 1) the prehospital setting; 2) the emergency department phase of initial evaluation and resuscitation; 3) definitive surgical care provided in the operating room; 4) intensive care management, and 5) acute rehabilitation.

A second major objective of the SFIC focuses on injury prevention and policy activities that represent an important collaboration with the Trauma Foundation at San Francisco General Hospital and includes supporting the Injury and Violence Prevention Library which represents one of the country's largest collections of injury information available to researchers, practitioners, policy makers, media professionals, and the public; leading the efforts to improve injury surveillance through collaboration with the National Center for Health Statistics and the National Center of Injury Prevention and Control on the standardization of external cause of injury codes; semi-annual publication of "Profile of Injury in San Francisco" which serves as an important planning document at the local level for agencies and organizations involved in prevention; education programs, fellowships, and internships aimed at training health professionals about injury prevention; and injury control policy advocacy.

The Trauma Foundation [39] is a freestanding non-profit organization, on the SFGH campus. This organization sponsors a number of community-based programs in violence and injury prevention and is active nationally and internationally in collaborations and consultations for injury prevention policy change. Its mission is to reduce the number of injuries and deaths due to injuries, through prevention, improved trauma care, and improved rehabilitation. It houses the Pacific Center for Violence Prevention, the Injury and Violence Prevention Library and numerous other injury and violence prevention programs. The Pacific Center is dedicated to reducing youth violence in California. The library has violence prevention literature and materials and more recently, has evolved into a manager of various websites serving as injury and violence prevention information hubs.

Recent projects of the Trauma Foundation include the development of a web site which provides information and resources, to make it easier for survivor advocates and injury prevention professionals to find and help each other. Other projects include raising public awareness about the need to implement policies that can deter red light running in local communities and statewide; leading efforts to organize a national coalition to restore the federal flammability standard for children's sleepwear, and an international effort to reduce the global trade in small arms.

The Family Violence Prevention Fund is a San Francisco-based national non-profit organization promoting innovations to end domestic violence through public education/prevention campaigns, public policy reform, model training, advocacy programs, and community organizing.

2001 PLAN MODIFICATIONS to the TRAUMA CARE SYSTEM DESIGN: REDUCING TRAUMA SYSTEM VULNERABILITIES

Strengths of the trauma system design in San Francisco include the rapid response and coordinated communications systems; the concentration of highly trained professionals in trauma and rehabilitative care; the extensive programs in acute care and prevention research and education; and the well-established history of commitment to emergency and trauma care from the City and County of San Francisco. The needs of the trauma system have been described in Section III, and will be addressed with modifications in the trauma system design.

Insuring System Oversight: Development of Trauma Audit Committees

The fundamental modification to the trauma system design will be the establishment of the multi-disciplinary, multi-departmental Trauma Audit Committee (SF_TAC) and Trauma Medical Audit Committee (SF_TMAC), which will provide a key nexus for collaboration and information from the broad representation of trauma system elements to evaluate system vulnerabilities and implement solutions. The addition of these elements to the system design will strengthen the administrative organization of the trauma system and the central core of patient care services. Responsibilities of these bodies will include:

- Periodic review of the epidemiology of all traumatic deaths occurring in San Francisco and northern San Mateo County; identification of trends in mechanism, injury severity and demographics; collaboration with the Population Health and Prevention division of the Department of Public Health, using epidemiologic resources for injury surveillance.

- System-wide quality improvement activity involving communications providers, ambulance service providers, EMS Section staff, the medical examiner, trauma center and non-trauma center staff, rehabilitation providers and prevention research and program specialists.

- Development of system-wide policy and/or approaches to related issues such as injury surveillance, major trauma-related pre-hospital care, communications, trauma transfers, repatriation, and long-term outcomes;

- Public information and education about the trauma system [§100255(r)];

- Coordination of system-wide injury prevention and control activities, including injury surveillance, public education, interaction between various Department of Public Health and agencies, the conduct of pilot programs. The SF_TAC should also be involved in the formulation of public policy regarding major injury in San Francisco;

- The management of the Trauma Plan, including oversight responsibility for addressing system vulnerabilities outlined in the Trauma Plan;

- The Trauma Medical Audit Committee will be charged specifically with peer review of all injury deaths, major complications and interfacility transfers for critically injured patients within the San Francisco trauma system. SF_TMAC proceedings will be conducted in accordance with all local, state and federal statutes relating to privacy and confidentiality.

Ensuring Consistently Available Trauma Resources

To ensure that critically injured patients in San Francisco consistently have access to standard trauma care, the SF_TAC will conduct a systematic evaluation of the viable options for changes to the current trauma system design. Options include better triage of single system injuries to non-trauma center hospitals for SFGH “back-up” during incidents of capacity saturation, and the transportation of supplies and personnel to SFGH or to other facilities capable of providing the infrastructure for emergency trauma care during multiple casualty incidents or disasters.

Another option that has not been fully evaluated is that of an additional trauma center in San Francisco. Policy, procedure and protocols to ensure consistent availability of trauma resources will be developed by the SF_TAC after an evaluation of options.

Improving Critical Patient Transport and Ensuring Access to Advanced Trauma Care

The primary reliance on ground transportation for trauma care in San Francisco and its neighboring regions will be examined by the SF_TAC, and the option of consistent air medical access to the trauma center will be considered. A definitive evaluation of the need for air medical access by trauma system and air medical consultants will be requested and overseen by SF_TAC. Once the need has been evaluated, and if found to be present as a deficiency in the trauma system, an analysis of the risks, benefits costs, feasibility and impact of air medical access using a licensed medical helipad will be performed, under the direction of the SF_TAC.

Ensuring the Availability of Comprehensive Pediatric Trauma Care

An examination of pediatric trauma care in San Francisco will be conducted by SF_TAC to evaluate options to ensure the availability of comprehensive care for critically injured young children. Policy development directions include the standardization of pediatric trauma care plans among all receiving facilities in San Francisco with “keep-send” protocols; written transfer agreements intra-county and inter-county between SFGH and non-trauma centers and SFGH and Oakland Children’s Hospital; emergency air medical policy for the EMS system and protocols for critical patient transfers; and inclusion of regional centers capable of pediatric critical trauma care on the EMS computerized resource database (HART).

Reducing Financial Vulnerability

An additional responsibility of the Trauma Audit Committee will be to monitor for, support, promote, and participate in the development of funding sources and opportunities for trauma care systems, and work collaboratively as needed with other California or regional organizations/government agencies toward this end. Options include the development of local initiatives, and collaboration with City and County of San Francisco efforts to lobby for related legislative initiatives at the State and Federal levels. State and Federal sponsored grants, although less durable, are other options for reducing financial vulnerability.

Ensuring Consistently Available Acute Care Resources and Trauma Provider Staffing

The Trauma Audit Committee will work in concert with local hospitals and the City and County of San Francisco to evaluate and implement solutions to the local nursing staffing shortage in critical care service areas. The SF_TAC will pursue, with the City and County of San Francisco, an agreement that will limit abrupt unilateral actions that compromise trauma surgery services professional staffing and disrupt trauma care services at SFGH.

Elements of the Inclusive Trauma Care System

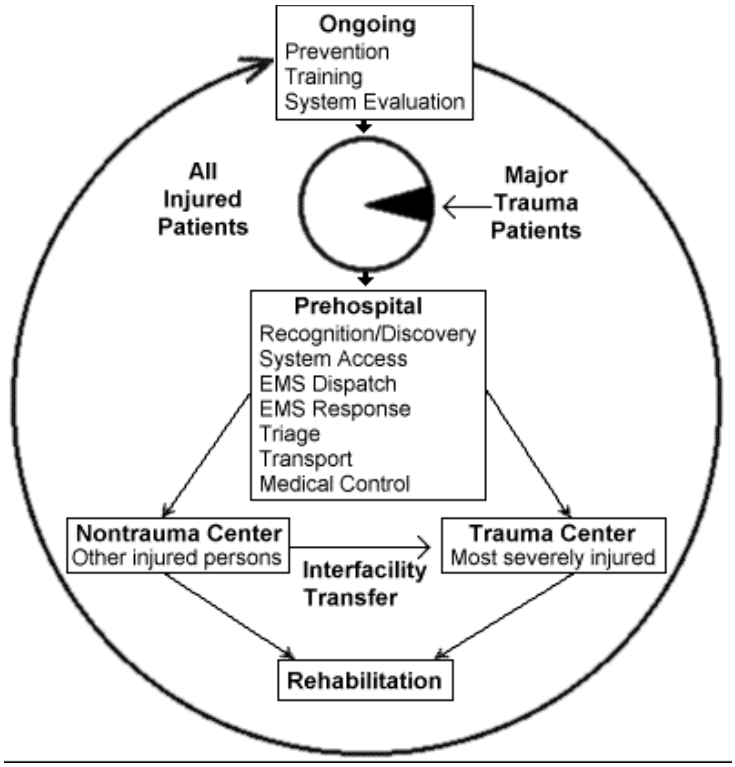


FIGURE 4.

ELEMENTS OF THE INCLUSIVE TRAUMA CARE SYSTEM
[40], [30]

SECTION V—INTERCOUNTY TRAUMA CENTER AGREEMENTS [§100256 (a)(5)]

San Francisco General Hospital is the designated trauma center for northern San Mateo County trauma patients. A written agreement is in place between San Francisco General Hospital and the San Mateo County Health Services Agency describing the roles and responsibilities for trauma care between the two organizations.

Interfacility trauma transfer agreements have been signed between San Francisco General Hospital and Marin General Hospital and Sutter Novato Hospital in Marin County, and Sutter Lakeside Hospital in Lake County. The EMS Section is working closely with San Francisco General Hospital to examine the needs for transfer agreements for the care of burn patients, complex pediatric trauma patients, and acute rehabilitation services.

SECTION VI—OBJECTIVES [§100256 (a)(6)]

Goals and Objectives of the San Francisco Trauma Care System Plan 2001

The following goals and objectives of the San Francisco Trauma Care System Plan were developed during a public comment process conducted March through May, 2001. They are directed toward reducing the vulnerabilities of the trauma system.

Goal I: To ensure a high standard of trauma system care in San Francisco.

Objectives:

A. Establish a Trauma Audit Committee that will, at the direction of the EMS Section, improve oversight of the function of the trauma center and other elements of the trauma system, and
   1. Include representative administrators and providers from the inclusive trauma system in San Francisco;
   2. Develop and regularly evaluate trauma system quality indicators;
   3. Develop a data collection process (database centralized in the EMS Section with the EMS Trauma Registry), that links data from the following trauma system structures: a) prevention research and program databases, b) medical examiner, c) communications, d) prehospital care, e) trauma center, f) community hospitals, and g) rehabilitation facilities;
   4. Monitor and analyze system-wide trends in process and outcome data from trauma system structures;
   5. Establish a regular process of trauma system evaluation and issue an evaluation report every two (2) years [§100258(c)];
   7. Continuously plan for, and implement changes in the trauma system according to evaluation results, and in accordance with the goals of the San Francisco Trauma Care System Plan.

B. Continue to enforce local, State and Federal standards and regulations that apply to trauma system care in San Francisco.
   1. Update all current trauma related policies by July, 2002; review policies every two years and update as needed;
   2. Verify written transfer agreements between non-trauma center facilities and the trauma center with written criteria for consultation and transfer that conform with EMS Critical Trauma Patient Transfer Guidelines (policy #8021)[§100266(b)];
   3. Evaluate trauma center for re-designation in 2002 and continue with re-designation process every three (3) years;
   4. Establish and maintain an EMS Section Trauma Registry that is linked to the State EMSA Trauma Registry [§100257(a)(2)];
   5. Develop and staff Trauma Audit Committee and Trauma Medical Audit Committee;
   6. Submit Trauma System evaluation reports to system stakeholders every two (2) years, commencing in June, 2002 [§100258(c)];
   7. Submit an annual trauma system status report to the California State EMSA [Title 22, Div. 9, Chp. 7, §100253(j)], including progress on implementing the San Francisco Trauma Care System Plan.

Goal II: To promote continuous improvement in the physical and psychosocial outcomes of significant injury in San Francisco.

Objectives:

A. Develop a Trauma Medical Audit Committee that will:
   1. Include trauma care providers—prehospital, acute care, rehabilitative;
   2. Include providers from all hospitals that receive acutely injured patients;
   3. Regularly provide peer review, as needed, for clinical outcomes from major trauma including trauma-related deaths, major complications and transfers (including interfacility transfers);
   4. Develop and regularly evaluate trauma care quality indicators for physical and psychosocial outcomes of traumatic injury;
   5. Conduct its proceedings in accordance with all local, State and Federal statutes related to provider and patient confidentiality and privacy;
   6. Provide input to the Trauma Audit Committee for trauma system evaluation and quality improvement activities;
   7. Promote proactive education and training for trauma care providers.

Goal III: To ensure the consistent availability of rapid access to an appropriate level of trauma care for injured persons in the San Francisco Trauma Care System service area, and for San Francisco residents injured in neighboring regions.

Objectives:

A. Establish a plan, including policies, procedures and protocols for trauma center "backup" to ensure standard care for injured persons in the event of trauma center capacity saturation, plant disruption, or local multiple casualty incident;
B. Direct the completion of a needs assessment and feasibility study for an EMS helipad in San Francisco by qualified consultants;
C. Develop EMS Section Emergency Air Medical Plan;
D. Develop a formal agreement with UCSF that will help guarantee the consistent availability of medical staffing commensurate with the requirements of a Level I Trauma Center.

Goal IV: To ensure a seamless system of pediatric trauma care in San Francisco.

Objectives:

A. Ensure development of SFGH trauma center policies with "keep-send" protocols for expedient transfer of critically injured younger pediatric patients to a designated pediatric trauma center;
B. Ensure written transfer agreement between SFGH and a regional designated Pediatric Trauma center for critical pediatric patients [§100259 (e)(1)(A)];
C. Incorporate regional pediatric trauma centers into HART system;
D. Standardize pediatric trauma care protocols (including transfer protocols) throughout the EMS System;
E. Improve all hospitals' Emergency Department Pediatric Trauma Care Plans.

Goal V: To promote a decrease in injury rates in San Francisco.

Objectives:

A. Through the activities of the Trauma Audit Committee,
   1. Improve communication between San Francisco injury research, treatment, prevention and education programs;
   2. Develop data linkages with research, prevention and treatment programs in San Francisco;
   3. Promote prevention education programs for providers and the public.

Goal VI: To do all of the above in a cost-effective manner, sensitive to existing and available resources.

Objectives:

A. Avoid duplication of Trauma System data collection efforts by including all system stakeholders in development and implementation of the data collection process;
B. Establish regular, timely reporting of data analysis to all system stakeholders;
C. Use existing Department of Public Health resources and to implement and maintain the Trauma System data collection process;
D. Continuously seek alternate funding sources (e.g., State/Federal grants; support legislative initiatives) to enhance the financial stability of the trauma system;
E. Maximize the use of trauma system triage capabilities so that unnecessary interfacility transfers are minimized, where:
   1. Injured patients who do not require trauma center evaluation or treatment are transported immediately from field to patron hospitals; and
   2. Injured patients who do require trauma center evaluation/treatment are transported immediately to the trauma center.
F. Continuously evaluate the fiscal impact of the trauma system and submit a fiscal impact report every two (2) years with the Trauma System Evaluation report.

SECTION VII—IMPLEMENTATION SCHEDULE [§100256 (a)(7)]

Goal I: To ensure a high standard of trauma system care in San Francisco.

Objective	Evaluation Methodology	Resources Needed	Implementation Schedule	Outcome
I.A.1. Establish a Trauma Audit Committee that will include representative administrators and providers from the inclusive trauma system in San Francisco	Representatives of inclusive trauma system convened; minutes of meetings on file in EMS Section	• EMS Section trauma coordinator • EMS Section data analyst • EMS Medical Director • Trauma system stakeholder organizations representatives	Completion date: November, 2001 (3 months from start date of August, 2001)	• Committee structure and membership developed • Administrative roles and subcommittees defined • Meeting schedule and initial agendas defined
I.A.2. Develop and regularly evaluate trauma system quality indicators	• ACS standards • HRSA (Model Trauma System standards [30] • Title 22 standards • San Francisco Trauma Care System Plan • Other evidenced based guidelines	• SF_TAC (as described above) • Trauma systems consultant for regional Quality Improvement process development	• Determine priority areas for evaluation (January, 2002) • Define quality indicators and required data elements (March, 2002)	Data element set defined

Objective	Evaluation Methodology	Resources Needed	Implementation Schedule	Outcome
I.A.3. Develop a data collection process that links data from trauma system	• Title 22 standards • HRSA Model Trauma Care System Plan • SF 2001 Trauma Care System Plan	• SF_TAC • Trauma Systems QI consultant • Medical Database consultant	• Identify data sources and analyze feasibility of collection process (September, 2002) • Develop standard collection tool for above data elements (Oct., 2002)	• Stakeholder collaboration established for data collection process
I.A.4. Monitor and analyze system-wide trends in process and outcome data from trauma system structures	• Title 22 standards • HRSA Model Trauma Care System Plan • SF 2001 Trauma Care System Plan • ACS standards	• SF_TAC • Trauma Systems QI consultant	• Pilot data collection process using standardized batched tool (November 2002-February, 2003) • Analysis of pilot data (April, 2003)	• Pilot Data collection process completed • Analysis presented to SF_TAC • SF_TAC recommendations issued for further development of data collection process
I.A.5. Establish a regular process of trauma system evaluation and issue an evaluation report every two (2) years.	• Title 22 standards • HRSA Model Trauma Care System Plan • SF 2001 Trauma Care System Plan • ACS standards • SF_TAC quality indicators	• SF_TAC	• Initial report issued (June, 2002)	• SF_TAC reports on progress with Trauma Plan goals and plans for regular 2 year reporting cycle

Objective	Evaluation Methodology	Resources Needed	Implementation Schedule	Outcome
I.A.6. Continuously plan for, and implement changes in the trauma system according to evaluation results, and in accordance with the goals of the trauma system	• Title 22 standards • HRSA Model Trauma Care System Plan • SF 2001 Trauma Care System Plan • ACS standards • SF_TAC quality indicators	• SF_TAC	• Every 2 years beginning June, 2002	Ongoing trauma system evaluation and proactive implementation of changes based on evidence.
I.B. Continue to enforce local, State and Federal standards and regulations that apply to trauma system care in San Francisco	• Title 22 standards • HRSA Model Trauma Care System Plan • SF 2001 Trauma Care System Plan • ACS standards • SF_TAC quality indicators	• EMS Section staff	• Ongoing	Trauma care system in San Francisco meets all regulatory requirements.
I.B.1. Update all current trauma related policies by July, 2002; review policies every two years and update as needed	• Title 22 regulations • ACS standards • Current trauma system configuration • Public comment process	• EMS Section Trauma Coordinator • EMS Section data analyst • SF_TAC	July 2002	All trauma-related policies are updated and reflect current system configuration and standards

Objective	Evaluation Methodology	Resources Needed	Implementation Schedule	Outcome
I.B.2. Verify written transfer agreements between non-trauma center facilities and the trauma center with written criteria for consultation and transfer that conform with EMS Critical Trauma Patient Transfer Guidelines (policy #8021)[§100266(b)]	• EMS Section policy # 8021 • Title 22 regulations • SF_TAC quality indicators	• EMS Trauma Coordinator	July 2002	Written interfacility trauma transfer agreements signed between all EMS receiving hospitals and SFGH
I.B.3. Evaluate trauma center for re-designation in 2002 and continue with re-designation process every three (3) years	• ACS standards • Title 22 standards • SF 2001 Trauma Care Plan • JCAHO standards	• EMS Trauma Coordinator • EMS Medical Director	• ACS evaluation visit Winter, 2002 • Re-designation by EMS Section following ACS re-verification report	• Level I Trauma Center re-verified and re-designated. • Re-verification and re-designation on regular schedule every 3 years
I.B.4. Establish and maintain an EMS Section Trauma Registry that is linked to the State EMSA Trauma Registry	• California State EMSA guidelines • Title 22 standards • SF 2001 Trauma Plan • EMS Section policies	• EMS Trauma Coordinator • EMS data analyst • Trauma systems consultant (for startup) • Medical database consultant (for startup)	• Initiate registry with pilot data collection process (February, 2002) • Maintenance of registry ongoing	EMS trauma system registry established and operational

Objective	Evaluation Methodology	Resources Needed	Implementation Schedule	Outcome
I.B.5. Develop and staff Trauma Audit Committee and Trauma Medical Audit Committee	• SF 2001 Trauma Plan • ACS guidelines • Title 22 standards • Federal, state and local statutes applicable to privacy and confidentiality	• EMS Trauma Coordinator • EMS data analyst • EMS Medical Director • Trauma Medical Director	November, 2001	Committees established,; minutes on file in EMS Section
I.B.6. Submit Trauma System evaluation reports to system stakeholders every two (2) years	• Title 22 standards • HRSA Model Trauma Care System Plan • SF 2001 Trauma Care System Plan • ACS standards • SF_TAC quality indicators	• EMS Trauma Coordinator • EMS data analyst • EMS Medical Director	Initial report June, 2002	Reports to submitted every 2 years, systematically evaluating the trauma system
I.B.7. Submit an annual trauma system status report to the California State EMSA, including progress on implementing the San Francisco Trauma Care System Plan.	• Title 22 standards • HRSA Model Trauma Care System Plan • SF 2001 Trauma Care System Plan • ACS standards • SF_TAC quality indicators	• EMS Trauma Coordinator • EMS data analyst • EMS Medical Director	Ongoing	Reports submitted yearly with EMS Plan update.

Goal II: To promote continuous improvement in the physical and psychosocial outcomes of significant injury in San Francisco.

Objective	Evaluation Methodology	Resources Needed	Implementation Schedule	Outcome
II.A. 1., 2. Develop a Medical Audit Committee that will include trauma care providers—prehospital, acute care, and rehabilitation, from all	• Title 22 standards • HRSA Model Trauma Care System Plan • SF 2001 Trauma Care System Plan • ACS standards • Federal, State and local statutes related to privacy and confidentiality	• EMS Trauma Coordinator • EMS data analyst • Trauma Medical Director • Trauma Systems consultant • Trauma System stakeholders from local and regional systems	• Initial meeting November, 2001 • Explore including Marin, Contra Costa and Alameda county trauma system providers by November, 2002	• Committee operational • Regional medical audit committee expands to include Marin County • Possible expansion to include Contra Costa and Alameda Counties
II.A.3. Regularly provide peer review, as needed, for clinical outcomes from major trauma including trauma-related deaths, major complications and transfers (including interfacility transfers)	• ACS standards • Federal, State and local statutes related to privacy and confidentiality	• EMS Trauma Coordinator • EMS data analyst • Trauma Medical Director • Trauma System stakeholders from local and regional systems	Ongoing, beginning with data availability	• Ongoing peer reviewed audits; • Ongoing trauma continuing education at a regional level; • Beginning regional collaboration and improvement of regional trauma care.

Objective	Evaluation Methodology	Resources Needed	Implementation Schedule	Outcome
II.A.4. Develop and regularly evaluate trauma care quality indicators for physical and psychosocial outcomes of traumatic injury.	• ACS standards • Other standards based on systematically evaluated evidence	• EMS Trauma Coordinator • EMS data analyst • Trauma Medical Director • Trauma System stakeholders from local and regional systems	Ongoing, beginning with data availability	Indicators evaluated using accurate, standardized data
IIA.5 Conduct proceedings in accordance with all local, State and Federal statutes related to privacy and confidentiality	• Local, State and Federal statutes • ACS guidelines	• EMS Trauma Coordinator • EMS data analyst • Trauma Medical Director • Trauma System stakeholders from local and regional systems	Ongoing	Privacy and confidentiality ensured in SF_TMAC proceedings
II.A.6. Provide input to the Trauma Audit Committee for trauma system evaluation and quality improvement activities	• ACS guidelines • SF_TAC, TMAC quality indicators	• EMS Trauma Coordinator • EMS data analyst • Trauma Medical Director • Trauma System stakeholders from local and regional systems	Ongoing	SF_TAC and SF_TMAC have developed a reporting system that ensures confidentiality and enhances the trauma system evaluation process.

Objective	Evaluation Methodology	Resources Needed	Implementation Schedule	Outcome
II.A.7. Promote proactive education and training for trauma care providers	• ACS guidelines • Other provider standards	• EMS Trauma Coordinator • EMS data analyst • Trauma Medical Director • Trauma System stakeholders from local and regional systems	Ongoing	SF_TMAC establishes a regular series of educational forums for trauma care providers, and uses systematic evaluation methods to establish educational objectives.

Goal III: To ensure the consistent availability of rapid access to an appropriate level of trauma care for injured persons in the San Francisco Trauma Care System service area, and for San Francisco residents injured in neighboring regions.

Objective	Evaluation Methodology	Resources Needed	Implementation Schedule	Outcome
III.A. Establish a plan, including policies, procedures and protocols for trauma center "backup" to ensure standard care for injuired persons in the event of trauma center capacity saturation, plant disruption, or local multiple casualty incident.	• Assessment of San Francisco "backup" resources—hospitals survey • Consideration of option to designate an additional trauma center • Table-top exercise of proposed backup policy • Functional exercise of proposed backup policy	• EMS Trauma Coordinator • SFGH Trauma Program staff • SF_TAC	• Draft policy developed (December, 2001) • Table-top exercise (March, 2002) • Draft policy revised and functional exercise implemented (June, 2002) • Public comment (July, 2002) • Policy approved and effective (August, 2002)	Trauma center backup policy effective, ensuring optimal utilization of San Francisco local resources for care of injured persons.

Objective	Evaluation Methodology	Resources Needed	Implementation Schedule	Outcome
III.B. Direct the completion of a needs assessment and feasibility study for an EMS helipad in San Francisco by qualified consultants	• Standard City and County of San Francisco RFP process • Local, State and Federal statutes relating air medical operations • Determinations from trauma systems, national disaster systems, and helicopter utilization consultants	• Qualified consultants • SF_TAC	• 6 month RFP process • 6 month study	• Definitive evaluation of the need for improved air medical access in San Francisco • If the need is found to be a trauma system deficiency, a definitive evaluation of the costs, risks, benefits, feasibility and impact of establishing a licensed air medical landing site is completed.
III.C. Develop EMS Emergency Air Medical Plan	• Local, State and Federal air medical statutes • Tabletop and functional exercises	• EMS Section staff • SF_TAC	Plan effective date June, 2002	Policies, procedures and protocols developed, tested and approved for the emergency use of air ambulances in San Francisco.

Objective	Evaluation Methodology	Resources Needed	Implementation Schedule	Outcome
III.D. Develop a formal agreement with UCSF that will help guarantee the consistent availability of medical staffing commensurate with the requirements of a Level I Trauma Center	• City and County of San Francisco and University of California requirements • SF_TAC review	• SF_TAC	Completion date December, 2002	• Agreement signed • Improved assurance of medical staffing for SFGH Trauma services

Goal IV: To ensure a seamless system of pediatric trauma care in San Francisco.

Objective	Evaluation Methodology	Resources Needed	Implementation Schedule	Outcome
IV. A. Ensure development of SFGH trauma center policies with "keep-send" protocols for expedient transfer of critically injured younger pediatric patients to a designated pediatric trauma center	• ACS guidelines • Title 22 regulations	• Trauma Medical Director • SF_TAC	Winter, 2001	Internal policy developed, approved.

Objective	Evaluation Methodology	Resources Needed	Implementation Schedule	Outcome
IV.B. Ensure written transfer agreement between SFGH and a regional designated Pediatric Trauma center for critical pediatric patients.	• Title 22 regulations	• SFGH administration • SF_TAC	Winter, 2001	Transfer agreement signed.
IV.C. Incorporate regional pediatric trauma centers into EMS HART system	Regional pediatric trauma center capacities accessible on HART	• EMS Trauma Coordinator	Winter, 2001	Pediatric trauma center resource capacities available to EMS system via HART 24x7
IV.D. Standardize pediatric trauma care protocols (including transfer protocols) throughout the EMS System	• ACS guidelines • California EMSC guidelines • ACEP/AAP Guidelines for Preparedness consensus document [40]	• EMS Medical Director • SF_TAC	August, 2002	Standardized pediatric trauma care protocols throughout EMS system
IV.E. Improve all hospitals' Emergency Department Pediatric Trauma Care Plans	• ACS guidelines • California EMSC guidelines • ACEP/AAP Guidelines for Preparedness consensus document [40]	• EMS Medical Director • SF_TAC	February, 2003	Consensus reached among SF_TAC and community EDs for improved pediatric trauma care plans; Implementation plan established.

Goal V. To promote a decrease in injury rates in San Francisco.

Objective	Evaluation Methodology	Resources Needed	Implementation Schedule	Outcome
V.A.1. Improve communication between San Francisco injury research, treatment, prevention and education programs	• Representatives from all elements are collaborating on SF_TAC	• SF_TAC • Representation from all system elements	• Representation from all elements established by February, 2002	Better understanding of resource and information available; action plans developing for improving communication (e.g., web sites, staff inservice)
V.A.2. Develop data linkages with research, prevention and treatment programs in San Francisco	To be developed by SF_TAC	• SF_TAC • Database consultant	To be developed by SF_TAC	Improved access to information for program planning
V.A.3. Promote prevention education programs for providers and the public.	To be developed by SF_TAC	• SF_TAC	To be developed by SF_TAC	Improved dissemination of injury prevention information

Goal VI. To do all of the above in a cost-effective manner, sensitive to existing and available resources.

Objective	Evaluation Methodology	Resources Needed	Implementation Schedule	Outcome
VI.A. Avoid duplication of Trauma System data collection efforts by including all system stakeholders in development and implementation of the data collection process	• State required data elements for trauma systems (Title 22, Div. 9, Chapter 7, §100257) • OSHPD required data sets	SF_TAC	Ongoing	Data collection process is implemented with stakeholder input and economy of effort, time and financial resources.
VI.B. Establish regular, timely reporting of data analysis to all system stakeholders	• Regular reporting for quality improvement process • Trauma System evaluation every 2 years • Trauma System status update with EMS Plan every 2 years	• SF_TAC • EMS Trauma Coordinator • EMS data analyst	Commencing with establishment of data collection process	Data is analyzed in a timely manner and reports are issued on a regular basis to all system stakeholders so that the information is timely and useful for system stakeholders and proactive changes in Trauma System design.
VI.C. Use existing Department of Public Health resources to implement and maintain the Trauma System data collection process		• EMS Trauma Coordinator • EMS data analyst	Ongoing	EMS trauma system data collection process is supported by DPH resources

Objective	Evaluation Methodology	Resources Needed	Implementation Schedule	Outcome
VI.D. Continuously seek alternate funding sources (e.g., State/Federal grants; support legislative initiatives) to enhance the financial stability of the trauma system	SF_TAC establishes a "Trauma System Development" subcommittee that continuously seeks opportunities to develop stable funding support for the trauma system	• EMS Trauma Coordinator • EMS data analyst • SF_TAC	Ongoing	Successful grant applications and more stable financial support for San Francisco Trauma System
VI. E. Maximize the use of trauma system triage capabilities so that unnecessary interfacility transfers are minimized	• ACS trauma triage guidelines • San Francisco EMS Section trauma triage performance indicators	• SF_TAC • EMS Trauma Registry	Commencing with establishment of EMS Trauma Registry	Trauma system triage capacities are maximized; under and over triage rates are within limits defined by SF_TAC
VI. F. Continuously evaluate the fiscal impact of the trauma system and submit a fiscal impact report every two (2) years with the Trauma System Evaluation report.	Methodology defined by SF_TAC	• SF_TAC • DPH fiscal analyst support	Commencing with quantification of trauma system finances on schedule defined by SF_TAC	Fiscal impact reporting capabilities are improved as T rauma system finances are quantified.

SECTION VIII—FISCAL IMPACT [§100256 (a)(8)]

The actual costs of providing municipal and regional trauma care are difficult to capture, as many are absorbed by system components and have been integrated into their budgets over the history of the trauma system.

TRAUMA CARE FINANCING

The centralization of a relatively high incidence of non-funded and under-funded trauma system care to the single Level I trauma center tends to concentrate adverse selection in one facility. Weighed against this adverse selection are the additional idling and opportunity costs created by a large trauma program at a single institution. The ultimate result is that the single provider of advanced trauma care substantially bears the cost of services for the San Francisco system, with limited compensation from other private healthcare providers. Additionally, through the gross under-funding of Medical, the State, in effect, is off-setting the cost of providing trauma care to the City of San Francisco.

FUNDING TRAUMA PLAN 2001 MODIFICATIONS

Trauma System Development

Consultants

Improvements to the trauma system data collection and quality improvement processes and evaluation of the need for and feasibility of improved air medical access in San Francisco will require expert consultation. Expert consultants in the fields of trauma system development and quality improvement, medical database construction and maintenance and air medical access utilization will be required. Investigation into estimated costs for these services has been made, however, prior to proceeding with the City and County of San Francisco vendor bidding process, these costs cannot be accurately quantified.

Trauma System Monitoring Operations

Personnel

A 1.0 FTE EMS Section Trauma Coordinator and a 0.5 FTE data analyst will staff the Trauma Audit Committees. This additional staffing will be supported by the Department of Public Health.

Costs to all other trauma system element for development of the data collection system will be staff time for internal data collection and reporting to the EMS Section, and Information Services staff time for computer operations oversight. Each trauma system element to be represented at the Trauma Audit Committees will provide staffing for the committees.

Capital Equipment

Existing computer hardware and software upgrades may be required in trauma system facilities to meet the requirements for the data collection system. New computer equipment for each facility is not anticipated to be a requirement.

SECTION IX—POLICY AND PLAN DEVELOPMENT [§100255, §100256 (a)(9)]

INTRODUCTION

It is the objective of EMS Section trauma policies to promote the integration of all components in each phase of trauma system care and draw upon the capacity of health care providers to reduce mortality and disability regardless of the severity of the injury involved. The development of the Trauma Care System Plan 2001 has provided the opportunity for close examination of the trauma system vulnerabilities; one of which is the lack of system oversight. Modifications to address this vulnerability include the formation of the Trauma Audit Committee and the addition of a Trauma Coordinator to the EMS Section staff. With the addition of these elements, trauma system policies will be reviewed, revised and updated to better meet the objective of system integration and maximizing health care provider capacities.

EXISTING EMS SECTION POLICIES

The policies developed by the EMS Section for trauma system implementation are summarized in the following table, in accordance with Title 22 Trauma Care System regulations [§100255 (a-t)]. Actual policies are included in Appendix B.

San Francisco EMS Section Trauma System Policy Summary

§ 100255 Subheading		San Francisco EMS Policy
(a)	System organization and management	1010 - EMS Agency Components
		1020 - Committees
		1060 - Policy Development Process
		8000 - Ambulance Destination Policy
		8010 - Diversion Policy
		8020 - Critical Trauma Criteria and Triage Decision Scheme Policy
		8021 - Critical Trauma Patient Transfer Guidelines
		8040 - Interfacility Transfers Standards
		8041 - Interfacility Transfer Procedures
		San Francisco Trauma Plan - 2001
(b)	Trauma care coordination within the trauma system	8000 - Ambulance Destination Policy
		8010 - Diversion Policy
		8011 – Trauma Center Diversion Policy
		8020 - Critical Trauma Criteria and Triage Decision Scheme Policy
		8021 - Critical Trauma Patient Transfer Guidelines
		8040 - Interfacility Transfers Standards
		8041 - Interfacility Transfer Procedures
		San Francisco Trauma Plan - 2001

(c)	Trauma coordination with neighboring jurisdictions	5010 - Multi-Casualty Incident Plan
		5040 - Medical Mutual Aid Policy
		8050 - Bridge Response Policy
		8060 – Intercounty Response and Transport Policy: San Mateo and San Francisco Counties
		San Francisco Trauma Plan - 2001
(d)	Data collection and management	2000 – Quality Assurance Plan
		2000 Addendum – Advanced Life Support Provider Quality Assurance Activities Requirements
		2020 Documentation Policy
		2040 - Quality Assurance In Trauma Care
(e)	Fees	The EMS Section shall charge the trauma center an annual fee for trauma center designation based on the cost of a 1.0 FTE EMS Specialist position (step 5).
(f)	Establishes trauma center service area	8000 - Ambulance Destination Policy
		8021 - Critical Trauma Patient Transfer Guidelines
		San Francisco Trauma Plan - 2001
(g)	Trauma Center designation or re-designation process	8000 - Ambulance Destination Policy
		San Francisco Trauma Plan - 2001
(h)	Coordination with all health care organizations within the trauma system to facilitate the transfer of an organization member	8021 - Critical Trauma Patient Transfer Guidelines
		8040 - Interfacility Transfers Standards
		8041 - Interfacility Transfer Procedures
		San Francisco Trauma Plan - 2001
(i)	Coordination of EMS and trauma system for transportation including inter-trauma center transfer and transfer from a receiving hospital to a trauma center	8021 - Critical Trauma Patient Transfer Guidelines
		8040 - Interfacility Transfers Standards
		8041 - Interfacility Transfer Procedures
		8043 – Helicopter Standards for Interfacility Transfers
(j)	Integration of pediatric hospitals (if applicable)	2110 – Receiving Hospital Standards
		2112 – Emergency Department Approved for Pediatrics
		8000 - Ambulance Destination Policy
		San Francisco Trauma Plan - 2001

(k)	Trauma Center equipment	2110 – Receiving Hospital Standards
		2112 – Emergency Department Approved for Pediatrics
		San Francisco Trauma Plan - 2001
(l)	Ensuring the availability of trauma team personnel	San Francisco Trauma Plan - 2001
(m)	Criteria for Activation of trauma team	San Francisco Trauma Plan - 2001
(n)	Mechanism for prompt availability of specialists	2110 – Receiving Hospital Standards
		San Francisco Trauma Plan - 2001
(o)	Quality Improvement and system evaluation to include responsibilities of the multi-disciplinary trauma peer review committee (includes also § 100265)	2000 – Quality Assurance Plan
		2000 - Addendum – Advanced Life Support Provider Quality Assurance Activities Requirements
		2040 - Quality Assurance In Trauma Care
(p)	Criteria for pediatric and adult trauma triage including destination	8000 - Ambulance Destination Policy
		8020 - Critical Trauma Criteria and Triage Decision Scheme Policy
(q)	Training of prehospital EMS Personnel to include trauma triage	2120 – Advanced Life Support Provider Standards
		2130 – Basic Life Support Provider Standards
		3020 – Emergency Medical Technician - 1 Scope of Practice
		3030 – Emergency Medical Technician – Paramedic Scope of Practice
		8020 - Critical Trauma Criteria and Triage Decision Scheme Policy
(r)	Public information and education about the trauma system	San Francisco Trauma Plan - 2001
(s)	Marketing and advertising by trauma centers and prehospital providers as it relates to the trauma care system	San Francisco Trauma Plan - 2001
(t)	Coordination with public and private agencies and trauma centers in injury prevention programs	San Francisco Trauma Plan – 2001

Facility Standards

The City and County of San Francisco trauma center standards meet, and in some areas exceed those levels required by the State of California. The City and County of San Francisco will adhere to the trauma standards of the American College of Surgeons Committee on Trauma.

Definitions

The source for the following definitions is the California Code of Regulations, Title 22, Division 9, Chapter 7, §100236 – 100249.

Abbreviated Injury Scale (AIS)

"Abbreviated Injury Scale" or "AIS" is an anatomic severity scoring system. For purposes of data sharing, the standard to be followed is AIS 90. For purposes of volume performance measurement auditing, the standard to be followed is AIS 90, using the AIS code derived or computer derived scoring.

Immediately Available

"Immediately" or "immediately available" means: (a) unencumbered by conflicting duties or responsibilities; (b) responding without delay when notified; and (c) being physically available to the specified area of the trauma center when the patient is delivered in accordance with the EMS Section requirements for trauma centers.

Implementation

"Implementation" or "implemented" or "has implemented" means the development and activation of a trauma care system plan by a local EMS agency, including the actual triage, transport and treatment of trauma patients in accordance with the plan.

Injury Severity Score

"Injury Severity Score" or "ISS" means the sum of the squares of the Abbreviated Injury Scale score of the three most likely injured body regions.

On-Call

"On-call" means agreeing to be available to respond to the trauma center in order to provide a defined service.

Promptly Available

"Promptly" or "promptly available" means (a) responding without delay when notified and requested to respond to the hospital; and (b) being physically available to the specified area of the trauma center within a period of time that is medically prudent and in accordance with the local EMS Agency policies and procedures.

Qualified Specialist

"Qualified specialist" or "qualified surgical specialist or "qualified non-surgical specialist" means a physician licensed in California who is board certified in the specialty by the American Board of Medical Specialties, the Advisory Board for Osteopathic Specialties, a Canadian board or other appropriate foreign specialty board as determined by the American Board of Medical Specialties for the that specialty.

(a) A non-board certified physician may be recognized as a "qualified specialist" by the local EMS agency upon substantiation of need by a trauma center if:

(1) the physician can demonstrate to the appropriate hospital body and the hospital is able to document that he/she has met requirements which are equivalent to those of the Accreditation Council for Graduate Medical Education (ACGME) or the Royal College of Physicians and Surgeons in Canada;
(2) the physician can clearly demonstrate to the appropriate hospital body that he/she has substantial education, training, and experience in treating and managing trauma patients which shall be tracked by the trauma quality improvement program; and
(3) the physician has successfully completed a residency program.

Receiving Hospital

"Receiving Hospital" means a licensed general acute care hospital with a special permit for basic or comprehensive emergency service, which has not been assigned as a trauma center according to California Code of Regulation, Title 22, Division 9, Chapter 7, but which has been formally assigned a role in the trauma care system by the local EMS agency. In rural area, the local EMS agency may approve standby emergency services if basic or comprehensive services are not available.

Residency Program

"Residency Program" means a residency program of the trauma center or a residency program formally affiliated with a trauma center where senior residents can participate in educational rotation, which has been approved by the appropriate Residency Review Committee of the Accreditation Council Graduate Medical Education.

Senior Resident

"Senior resident" or "senior level resident" means a physician licensed in the State of California, who has completed at least two (3) years of the residency or is in their last year of residency training and has the capability of initiating treatment and who is in training as a member of the residency program as defined in the California Code of Regulation, Title 22, Division 9, Chapter 7, Section 10024, at the designated trauma center.

Service Area

"Service area" means that geographic area defined by the local EMS agency in its trauma care system plan as the area served by a designated trauma center.

Trauma Care System

"Trauma care system" or "trauma system" or "inclusive trauma care system" means a system that is designed to meet the needs of all injured patients. The system shall be defined by the local EMS agency in its trauma care system plan as described in the California Code of Regulation, Title 22, Division 9, Chapter 7, §100256.

Trauma Center

"Trauma Center" or "designated trauma center" means a licensed hospital, accredited by the Joint Commission on Accreditation of Healthcare Organizations, which has been designated as a Level I, II, III or IV trauma center and / or Level I or II pediatric trauma center by the local EMS agency, in accordance with the California Code of Regulation, Title 22, Division 9, Chapter 7, Articles 2 – 5.

Trauma Resuscitation Area

"Trauma Resuscitation Area" means a designated area within a trauma center where trauma patients are evaluated upon arrival.

Trauma Service

A “trauma service” is a clinical service established by the organized medical staff of a trauma center that has oversight and responsibility of the care of the trauma patient. It includes, but is not limited to, direct patient care services, administration, and as needed, support functions to provide medical care to injured persons.

Trauma Team

"Trauma team" means the multidisciplinary group of personnel who have been designated to collectively render care for trauma patients at a designated trauma center. The trauma team consists of physicians, nurses and allied health personnel. The composition of the trauma team may vary in relationship to trauma center designation level and severity of injury, which leads to trauma team activation.

Triage Criteria

“Triage criteria” means a measure or method of assessing the severity of a person’s injuries that is used for patient evaluation and that utilizes anatomic or physiologic considerations or mechanisms of injury.

Level I Trauma Center Standards

The following requirements delineate the standards for a Level I Trauma Center designation in the City and County of San Francisco. Authority for the requirements is derived from the California Code of Regulation, Title 22, Division 9, Chapter 7, §100256-100262, and §100265-100266. An asterisk (*) denotes requirements exceeding the state regulations:

I. The Trauma Center shall:

A. Be licensed as a general acute care hospital according to California Administrative Code, Title 22, Division 5, Chapter 1;

B. Be accredited as an acute care hospital by the Joint Commission for Accreditation of Healthcare Organizations (JCAHO);

C. Possess and maintain all necessary licenses, special permits, and services necessary to meet the requirements for a Level I trauma center in the City and County of San Francisco;

D. *Be located in the City and County of San Francisco; and

E. Meet one or more of the following Level I patient volume requirements annually (based on the calendar year):

1. A minimum of 1,200 trauma program hospital admissions, or
2. A minimum of 240 trauma patients per year whose Injury Severity Score (ISS) is greater than 15, or
3. An average of 35 trauma patients (with an ISS score greater than 15) per trauma program surgeon per year.

II. The Trauma Center shall have:

A. A Trauma Service, which can provide for the implementation of the requirements specified in this Section and provide for coordination with the local EMS agency. The Trauma Service shall have programmatic oversight and responsibility of the care for the trauma patient. This includes, but is not limited to, direct patient care services, administration, and as needed, support functions to provide medical care to the injured.

III. The Trauma Service shall have:

A. A trauma service medical director who is a board-certified surgeon with demonstrated special competence in trauma care. The director shall have administrative authority for the hospital's trauma service program. The trauma service medical director responsibilities include, but are not limited to, factors that affect all aspects of trauma care. Those factors include:

1. Recommending trauma team physician privileges;
2. Working with the hospital administration and the department of nursing to support the needs of trauma patients;
3. Developing trauma treatment protocols;
4. Determining appropriate equipment and supplies for trauma care;
5. Ensuring the development of policies and procedures to manage domestic violence; elder and child abuse and neglect;
6. Having oversight authority and accountability for the quality improvement peer review process; correcting deficiencies in trauma care or excluding from trauma call those trauma team members who no longer meet standards;
7. Coordinating pediatric trauma care with other hospital and professional services;
8. Coordinating with the local and State EMS agencies;
9. Assisting in the coordination of the budgetary process for the trauma program; and identifying representatives from neurosurgery, orthopedic surgery, emergency medicine, pediatrics and other appropriate disciplines to assist in identifying physicians from their discipline who are qualified to be members of the trauma program.

B. A trauma nurse coordinator / manager who is a registered nurse with qualifications including evidence of educational preparation and clinical experience in the care of the adult and / or pediatric trauma patient, administrative ability, and responsibilities that include, but are not limited to:

1. Organizing services and systems necessary for the multidisciplinary approach to the care of the injured patient;
2. Coordinating day-to-day clinical process and performance improvement as it pertains to nursing and ancillary personnel; and
3. Collaborating with the trauma program medical director in carrying out the educational, clinical, research, administrative and outreach activities of the trauma program.

C. A Trauma Team, which is a multidisciplinary team responsible for the initial resuscitation and management of the trauma patient.

IV. The Trauma Center department(s), divisions(s), services(s) or sections(s) shall include at least the following surgical specialties, which are staffed by qualified specialists:

A. General;

B. Neurological;

C. Obstetric/gynecologic;

D. Ophthalmologic;

E. Oral or maxillofacial or head and neck;

F. Orthopedic;

G. Plastic, and

H. Urology

V. The Trauma Center Department(s), divisions(s), service(s) or section(s) shall include at least the following non-surgical specialties, which are staffed by qualified specialists who are available for consultation:

A. Internal medicine;

B. Pathology;

C. Psychiatry;

D. Cardiology;

E. Gastroenterology;

F. Infectious disease;

G. Hematology;

H. Nephrology;

I. Neurology;

J. Pathology; and

K. Pulmonary medicine

VI. The Level I trauma center shall have a basic or comprehensive emergency service which has special permits issue pursuant to Chapter 1, Division 5 of Title 22, and shall be staffed with qualified specialists in emergency medicine who are immediately available.

VII. The Trauma Center qualified surgical specialist (s) or specialty availability shall be as follows:

A. In-house and immediately available at all times:
    1. General surgeon capable of evaluating and treating adult and pediatric trauma patients shall be immediately available for trauma team activation and promptly available for consultation.

B. Requirement (A) above may be fulfilled by supervised senior residents as defined in the California Code of Regulation, Title 22, Division 9, Chapter 7, Section 100245 who are capable of assessing emergency situations in their respective specialties. When a senior resident is the responsible surgeon:
    1. The senior resident shall be able to provide the overall control and surgical leadership necessary for the care of the patient, including initiating surgical care;
    2. A staff attending trauma surgeon or staff attending surgeon with experience in trauma care shall be on-call and promptly available;
    3. A staff attending trauma surgeon or staff attending surgeon with experience in trauma care shall be advised of all trauma patient admission, participate in major therapeutic decisions, and be present in the emergency department for major resuscitations and in the operating room for all trauma operative procedures.

C. *Trauma surgeons shall also meet the following requirements:
    1. Participate in the management of at least fifty (50) trauma cases per year.
    2. Participate in trauma-related quality assurance programs at the trauma center.
    3. Participate in educational activities that reflect an interest and commitment to trauma care.

D. The Trauma center shall have on-call and promptly available the following surgical specialties:
    1. Cardiothoracic;
    2. Pediatrics;
    3. Neurologic;
    4. Obstetric/gynecologic;
    5. Oral or maxillofacial or head and neck;
    6. Orthopedic;
    7. Plastic;
    8. Urology; and
    9. Reimplantation/microsurgery capability. This surgical service may be provided through a written transfer agreement.

E. The Trauma center shall have available for consultation and established transfer agreements for adult and pediatric trauma patients requiring the following surgical services;
    1. Burns;
    2. Cardiothoracic;
    3. Pediatric;
    4. Reimplantation/microsurgery; and
    5. Spinal cord injury.

VIII. The Trauma Center surgical service shall have an operating suite that is available or being utilized for trauma patients that has:

A. An operating staff who are promptly available unless operating on trauma patients and back-up personnel who are promptly available;

B. Cardiopulmonary bypass equipment;

C. Operating microscope; and

D. Additional appropriate surgical equipment and supplies as determined by the trauma program medical director.

IX. The Trauma Center qualified non-surgical specialist (s) or specialty availability shall be as follows:

A. Emergency Medicine, in-house and immediately available at all times. The emergency service shall provide emergency medical services to adult and pediatric patients. The emergency service shall designate an emergency physician to be a member of the trauma team.
    1. This requirement may be fulfilled by supervised senior residents, as defined in the California Code of Regulation, Title 22, Division 9, Chapter 7, Section 100245, in emergency medicine, who are assigned to the emergency department and are serving in the same capacity.
    2. In such cases, the senior resident(s) shall be capable of assessing emergency situations in trauma patients and of providing initial resuscitation.
    3. The emergency service shall have appropriate adult and pediatric equipment and supplies approved by the director of emergency medicine in collaboration with the trauma program medical director.
    4. Emergency medicine physicians who are qualified specialists in emergency medicine and are board certified in emergency medicine shall are not required to complete an advanced trauma life support (ATLS) course.

5. *Emergency medicine physicians who are qualified specialists in emergency medicine, but are not board certified in emergency medicine shall be required to complete an advanced trauma life support (ATLS) course.
6. Current ATLS verification is required for all emergency medicine physicians who provide emergency trauma care and are qualified specialists in a specialty other than emergency medicine.

B. Anesthesiology shall be immediately available with a mechanism established to ensure that the anesthesiologist is in the operating room when the patient arrives.
    1. This requirement may be fulfilled by senior residents or certified registered nurse anesthetists who are capable of assessing emergent situations in trauma patients and of providing any indicated treatment and are supervised by the staff anesthesiologist. In such cases, the staff anesthesiologist on-call shall be advised about the patient, be promptly available at all times, and be present for all operations.

X. In addition to licensure requirements, trauma centers shall have the following service capabilities:

A. Radiology service.
    1. The radiological service shall have immediately available a radiological technician capable of performing plain film and computed tomography imaging.
    2. A radiological service shall have the following additional services promptly available: angiography and ultrasound.

B. Clinical laboratory service.
    1. A clinical laboratory service shall have a comprehensive blood bank or access to a community central blood bank; and clinical laboratory service immediately available.

XI. In addition to special permit licensing services, trauma centers shall have, pursuant of Title 22 of the California Code of Regulation, the following approved supplemental services:

A. Intensive Care Service (ICU) with a qualified specialist in-house and immediately available to care for trauma patients in the intensive care unit.
    1. The qualified specialist may be a resident with two (2) years of training who is supervised by the staff intensivist or attending surgeon who participate in all critical decision making; and
    2. The qualified specialist in (ii) above shall be a member of the trauma team.
    3. The ICU shall have appropriate equipment and supplies as determined by the physician responsible for the intensive care service and the trauma program medical director.

B. Burn Center.
    1. This service may be provided through written transfer agreement with a burn center.

C. Physical Therapy Service.
    1. Physical therapy services to include personnel training in physical therapy and equipped for acute care of the critically injured patient.

D. Rehabilitation Center.
    1. Rehabilitation services to include personnel trained in rehabilitation care and equipped for acute care of the critically injured patient. These services may be provided through a written transfer agreement with a rehabilitation center.

E. Respiratory care service.
    1. Respiratory care services to include personnel trained in respiratory therapy and equipped for acute care of the critically injured patient.

F. Hemodialysis.
    1. Acute hemodialysis capability.

G. Occupational Therapy Service.
    1. Occupational therapy services to include personnel trained in occupational therapy and equipped for acute care of the critically injured patient.

H. Speech Therapy Service.
    1. Speech therapy services to include personnel trained in speech therapy and equipped for acute care of the critically injured patient.

I. Social service.

XII. The trauma center shall have the following services or programs that do not require a license or special permit:

A. Pediatric service. In addition to the requirements of Division 5 of Title 22 of the California Code of Regulations, the pediatric service providing in-house pediatric trauma care shall have:
    1. A pediatric intensive care unit approved by the California State Department of Health Services' California Children's Services (CCS);
    2. OR a written transfer agreement with an approved pediatric intensive care unit;
    3. Hospitals without pediatric intensive care units shall establish and utilize written criteria for consultation and transfer of pediatric patients needing intensive care; and
    4. A multidisciplinary team to manage child abuse and neglect.

B. Acute spinal cord injury management capability. This service may be provided through a written transfer agreement with a rehabilitation center.

C. Protocol to identify potential organ donors as described in Division 7, Chapter 3.5 of the California Health and Safety Code.

D. An Outreach Program, to include:
   1. Capability to provide both telephone and on-site consultations with physicians in the community and outlying areas; and
   2. Trauma prevention education for the general public.

E. Written interfacility transfer agreements with referring and specialty hospitals. Patients may be transferred between and from trauma centers providing that:
   1. any transfer shall be, as determined by the trauma center surgeon of record, medically prudent; and
   2. in accordance with the San Francisco EMS Section interfacility transfer policies: #8021 - Critical Trauma Patient Transfer Guidelines, #8040 - Interfacility Transfers Standards, and #8041 - Interfacility Transfer Procedures.

F. Continuing education. Continuing education in trauma care shall be provided for:
   1. Staff physicians;
   2. Staff nurses;
   3. Staff allied health personnel;
   4. EMS personnel; and
   5. Other community physicians and health care personnel.

G. Trauma Research Program.

H. An Accreditation Council on Graduate Medical Education (ACGME) approved surgical residency program.

XIII. The Trauma Center shall have a Quality Improvement process to include structure, process, and outcome evaluations which focus on improvement efforts to identify root causes of problems, intervene to reduce or eliminate these causes, and take steps to correct the process. In addition, the process shall include:

A. A multidisciplinary trauma peer review committee that includes all members of the trauma team;

B. Participation in the trauma system data management system; this includes compliance with data collection and reporting standards as outlined in Section XI of this Trauma Plan and as outlined in EMS Section Policy #2040 - Quality Assurance In Trauma Care;

C. Participation in the EMS Section trauma evaluation committee through the San Francisco Trauma Audit Committee and the San Francisco Trauma Medical Audit Committee;

D. A written system in place for patients, parent of minor children who are parents, legal guardians(s) of children who are patients, and / or primary caretaker(s) of children who are patients to provide input and feedback to hospital staff regarding the care provided to the child; and

E. Following the applicable provision of Evidence Code Section 1157.7 to ensure confidentially.

XIV. The EMS Section shall re-verify the Level I Trauma Center designation every three years. The American College of Surgeons, as independent evaluators, shall participate along with the EMS Section, in the evaluation of SFGH's ability to meet the requirements of a Level I Trauma Center as delineated in the California Code of Regulation, Title 22, Division 9, Chapter 7, Sections 100236 – 100266 and in the San Francisco Trauma Plan.

XV. Within six months of adoption of the San Francisco Trauma Plan 2001, the EMS Section shall sign a written agreement with Trauma Center outlining the terms and conditions for participation in the San Francisco EMS System as a Level I Trauma Center. Designation of SFGH as a Level I Trauma Center is contingent upon the completion of this written agreement with the EMS Section.

XVI. The EMS Section shall charge the trauma center an annual fee for trauma center designation based on the cost of a 1.0 FTE EMS Specialist position (step 5).

XVII. *The Trauma Center shall abide by and conform to the City and County of San Francisco and State of California laws regarding the marketing and advertising of its services.

Level I Trauma Center Designation Process

The EMS Section, in conjunction with the American College of Surgeons (ACS), evaluates a hospital's ability to meet the Level I Trauma Center requirements as delineated in the California Code of Regulation, Title 22, Division 9, Chapter 7, Sections 100236 – 100266 and the San Francisco Trauma Plan.

The verification process consists of both an off-site evaluation and an on-site evaluation of a hospital on mutually agreed upon dates. The off-site evaluation consists of a review of a hospital's internal policies by the EMS Section. The internal policies must demonstrate compliance with Title 22 Level I Trauma Center requirements and EMS Section policies as outlined in the San Francisco Trauma Plan. The on-site evaluation consists of a site visit by the EMS Section medical director and Trauma Coordinator, and members of the ACS verification team. The ACS team provides the clinical expertise to assess trauma surgical care standards and practices. The site evaluation staff uses the ACS standardized evaluation tool as the evaluation methodology. The ACS submits their site review findings to the EMS Section Medical Director.

The EMS Section Medical Director designates a hospital as a Level I Trauma Center upon satisfactory completion of the following criteria: 1) the ACS Site Evaluation, 2) the EMS Section off-site evaluation, and 3) a written agreement between the EMS Section and a hospital for its provision of Level I Trauma Services. If any of these criteria are not met, the EMS Section Medical Director may elect to issue a conditional designation that will be followed within four months by another evaluation of the deficient area(s). Upon satisfactory completion of a second evaluation, the EMS Section will designate the hospital. If the second evaluation is unsatisfactory, the EMS Section Medical Director, in consultation with the Director of Health, may elect to either continue the conditional designation upon correction of the areas of deficiency or solicit Request for Proposals from other hospitals within the City and County of San Francisco.

POLICY MODIFICATIONS IN THE 2001 TRAUMA CARE SYSTEM PLAN

The following policy modifications will be addressed within the newly formed Trauma Audit Committee, according to the implementation schedule in Section VII:

1. Full review and update of all trauma system related policies by July, 2002;
2. Addition of Trauma Audit Committee and Trauma Medical Audit Committee to the Trauma System organization and management;
3. Development and maintenance of an EMS Trauma System Registry;
4. Trauma Center Quality Improvement process modifications in accordance with Title 22, Div. 9, Chp. 7, §100265 (including provision for written system of feedback for pediatric patients' families);
5. Additional requirement of trauma center Pediatric Service to have a multidisciplinary team to manage child abuse and neglect [§100259 (e) (1) (B)]
6. Deletion of policy for EMS Section oversight of trauma center marketing plans (1990 Trauma Care Plan, Section III, number 8 [p. 22]).

Further policy development will follow the implementation schedule in Section VII with the formation of the SF Trauma Audit Committee. Areas for policy development include:

1. Policies providing alternative sites for major trauma treatment in the event of SFGH capacity saturation ("Back-up" plan for trauma center);
2. Standardization of pediatric trauma care plans, transfer guidelines and mechanisms for transfer;
3. Incorporation of regional pediatric trauma centers into San Francisco trauma system design;
4. Emergency Air Medical Plan;
5. Interfacility transfer policy amendments [Title 22, Div. 9, Chp. 7, §100255(h), §100265, §100266] to include provisions for:
   a. Criteria for trauma patient transfers between regional trauma centers and SFGH and from SFGH to regional trauma centers and local community hospitals ;
   b. Written transfer agreements between community hospitals and SFGH: Community hospitals to have written criteria for consultation and transfer of patients needing a higher level of care [§100266(b)];
   c. Data collection from community hospitals who receive repatriated trauma patients;
   d. Participation in trauma system quality improvement activities from community hospitals that receive transferred (repatriated) trauma patients;
6. Trauma System Evaluation and Quality Improvement Plan; including data collection process, and maintenance of trauma system registry;
   a. Inclusion of all hospitals that receive trauma patients in trauma system data collection process [Title 22, Div. 9, Chp. 7, §100257];
   b. Participation of all hospitals that treat trauma patients in trauma system quality improvement [Title 22, Div. 9, Chp. 7, §100258(d), 100265];
7. Individual prehospital provider policies for early notification of trauma centers impending trauma patient arrival to be approved by EMS Section [§100254(f)];
8. Requirement of designated trauma center(s) and prehospital providers to adhere to all local and State laws governing advertising and marketing as related to the trauma system [§100255 (s)].

SECTION X—WRITTEN LOCAL APPROVAL [§100256 (10)]

Approval of the 1990 San Francisco Trauma System Plan was passed by a motion of the Health Commission on December 4, 1990. The San Francisco Health Commission is the governing body for the EMS Section of the Department of Public Health, and therefore, the San Francisco Trauma Care System Plan. This revision and update of the 1990 San Francisco Trauma Care System Plan was reviewed by the local San Francisco healthcare professional community during a seven week public comment period and submitted to the Health Commission for approval of the final draft in August, 2001. Following local approval, the plan is being submitted to the State of California EMS Authority for review of compliance with California Title 22 Trauma Care System regulations. Documentation is included in Appendix D.

SECTION XI—DATA COLLECTION [§100257]

INTRODUCTION

A system-wide trauma data reporting system is a goal of the 2001 Trauma Care System Plan. With valid and reliable data, the trauma system can approach important objectives for system improvement. A well-designed trauma registry can 1) evaluate the effectiveness of the trauma system in meeting the community's needs; 2) assist in assessing the effectiveness of trauma standards and injury prevention strategies; and 3) assess the extent of resources needed to adequately support and sustain the San Francisco Trauma Care System.

EXISTING DATA COLLECTION PROCESS

The EMS Section is charged with the administration and monitoring of the San Francisco trauma system. Data collection and analysis is a critical component in monitoring the system. Data collection from the EMS system is accomplished using the following data sources:

Trauma System Participant	Data source
Emergency Communications Department (police, fire and EMS; primary PSAP)	• Dispatch center audio sound files on critical trauma patients, and • Computer aided dispatch data
Field Providers	• Out of hospital patient care record data elements
San Francisco General Hospital Trauma Center	• SFGH Trauma Registry Data

These data are used to investigate unusual occurrence reports within the EMS system, which are analyzed on an individual basis and reported on the basis of trends. These data currently are not systematically entered into a central EMS Trauma Registry. There is no standardized set of data elements established for the EMS Trauma Registry, with the exception of those required of the Level I trauma center in EMS Section policy # 2040. The EMS Section Clinical Advisory Committee, a committee with representatives from the Trauma System, currently evaluates system trends and reviews system indicators as described in the Trauma Quality Assurance Policy (Appendix C: policy #2040) and as recommended by the American College of Surgeons.

2001 TRAUMA CARE SYSTM PLAN MODIFICATIONS in the DATA COLLECTION PROCESS

The Trauma Care System Plan 2001 provides for modifications in the EMS Section data collection process that will establish a valid and objective method for the collection of a defined set of data elements from trauma system participants, including [§100257(a)(1)]:

- Trauma Center Registry
- Prehospital care records

- Public safety records
- 911 dispatch records
- Non-trauma center emergency department records and hospital discharge summary
- Interhospital transfer records
- Autopsy findings
- Complaints from all sources

These data will be integrated into the EMS Section Trauma Registry and the State EMS Authority data management system in accordance with policies and procedures established by the San Francisco Trauma Audit Committee, under the direction of the EMS Section [§100257 (a)(2)], following the implementation schedule in Section VII.

All hospitals that receive trauma patients shall participate in the EMS Section data collection effort in accordance with policies and procedures established by the San Francisco Trauma Audit Committee [§100257(a)(3)]. The following data will be required with the inclusion of all hospitals that treat acutely injured patients, in accordance with California Title 22 Trauma Care System regulations §100257, §100258(b), (d) and §100266:

- Injured patient outcome data, to include:
  - Time of arrival and patient treatment in:
    - ED, and
    - Operating Room
  - Dates for:
    - Initial admission,
    - Intensive care, and
    - Discharge.
  - Discharge data, including:
    - Total hospital charges (aggregate dollars only),
    - Patient destination, and
- Discharge diagnosis

The prehospital data elements shall include at least those required on the EMT-II or EMT-P patient care record, as specified in Section 100129 of the EMT-II regulations and Section 100176 of the EMT-P regulations [§100257(b)].

The EMS Section shall provide periodic reports to all hospitals participating in the trauma system, in accordance with State Trauma Care System regulations §100257(a)(2), §100258(b).

SECTION XII—TRAUMA SYSTEM EVALUATION [§100258, §100265, §100266 (c)(d)]

INTRODUCTION

A trauma care system requires the ability to monitor its own performance over time and to assess its impact on trauma morbidity and mortality. This involves continual assessment of system operations, demonstration that the system is meeting stated goals, and documentation of system performance. Essential to the system quality management is the ability to measure compliance to standards, document system effectiveness, and to identify quality improvement opportunities [30]. To accomplish the goal of system review, the San Francisco Trauma Care System Plan 2001 outlines the development of a quality improvement plan for the trauma system.

EXISTING QUALITY IMPROVEMENT PROCESS

The San Francisco EMS Section is responsible for the trauma system quality improvement (QI) program. Current activity is conducted by the Clinical Advisory Committee, which incorporates prehospital and trauma center system stakeholders. Trauma system quality improvement relies on trauma center registry reporting and unusual occurrence reporting from the entire system. Unusual occurrences are investigated, an analysis of trends is conducted, and corrective measures are implemented. The EMS Section will use American College of Surgeon re-verification reports and trauma registry reporting to continuously evaluate the trauma center in accordance with the re-designation process described in Section IX.

Trauma Center Responsibilities

(§100265)
The Trauma Center will evaluate trauma care through a quality improvement process which shall include structure, process, and outcome evaluations which focus on improvement efforts to identify root causes of problems, intervene to reduce or eliminate these causes, and take steps to correct the process. In addition the process shall include:

1) A detailed audit of all trauma-related deaths, major complications and transfers (including interfacility transfer);
2) A multidisciplinary trauma peer review committee that includes all members of the trauma team;
3) Participation in the trauma system data management system;
4) Participation in the EMS Section Clinical Advisory Committee (which reviews all EMS cases, including trauma), and
5) The trauma center shall have a written system in place for patients, parents of minor children who are patients, legal guardian(s) of children who are patients, and/or primary caretaker(s) of children who are patients to provide input and feedback to hospital staff regarding the care provided to the child.

All procedures in this quality improvement process shall follow applicable provisions or Evidence Code Section 1157.7 to ensure confidentiality.

2001 PLAN MODIFICATIONS

The Trauma Plan 2001 proposes the development of the Trauma Audit Committee to guarantee participation from all trauma system stakeholders in the improvement of the trauma system QI

program. This audit committee will provide additional system oversight to the EMS Section and will be an important adjunct to system review and quality improvement activities. With improved system data analysis and regular peer review of trauma care by all disciplines, positive system changes will be encouraged and system vulnerabilities can be translated into corrective action to enhance overall performance of the trauma system.

Trauma Audit Committee Responsibilities

Responsibilities of the Trauma Audit Committee will include the following:

- Periodic review of the epidemiology of all traumatic deaths occurring in San Francisco and northern San Mateo County; identification of trends in mechanism, injury severity and demographics; collaboration with the Population Health and Prevention division of the Department of Public Health, using epidemiologic resources for injury surveillance.

- System-wide quality improvement activity involving communications providers, ambulance service providers, EMS Section staff, the medical examiner, trauma center and non-trauma center staff, rehabilitation providers and prevention research and program specialists.

- Development of system-wide policy and/or approaches to related issues such as injury surveillance, major trauma-related pre-hospital care, communications, trauma transfers, repatriation, and long-term outcomes;

- Public information and education about the trauma system [§100255(r)];

- Coordination of system-wide injury prevention and control activities, including injury surveillance, public education, interaction between various Department of Public Health and agencies, the conduct of pilot programs. The SF_TAC should also be involved in the formulation of public policy regarding major injury in San Francisco;

- The management of the Trauma Plan, including oversight responsibility for addressing system vulnerabilities outlined in the Trauma Plan;

- The Trauma Medical Audit Committee will be charged specifically with peer review of all injury deaths, major complications and interfacility transfers for critically injured patients within the San Francisco trauma system. SF_TMAC proceedings will be conducted in accordance with all local, state and federal statutes relating to privacy and confidentiality.

Purpose of Trauma Quality Improvement

The purpose of trauma system Quality Improvement (QI) is to measure, evaluate, and improve the process and effectiveness of care rendered by all phases and levels of trauma care from 911 dispatch through rehabilitation. A QI plan developed by the SF_TAC will establish lines of communication, authority, and accountability for monitoring aspects of care, and define standards to measure the quality and outcome of care. The objective of trauma system QI is to

assure that trauma care standards are met and that inappropriate variations in care are minimal. This is accomplished by implementing corrective actions or improvements when indicated and by modification of practice guidelines or the trauma plan when appropriate [41].

Structure of the QI process

The improved trauma system QI process will consist of internal and external monitoring and evaluation of care by all trauma care providers (prehospital and hospital), and the SF_TAC. Monitoring will be ongoing and systematic; problems will be identified and evaluated; and corrective strategies will be planned, implemented and documented. The effectiveness of corrective action will be evaluated through continuous reassessment as the QI cycle repeats itself.

Responsibilities

A mechanism for ongoing quality assessment will be established for each level of care. Review will be conducted by the communications providers, the ambulance service providers, the EMS Section, the trauma center and non-trauma centers and the Trauma Audit Committees. The QI activities conducted at each level will complement those performed by others and will include evaluation of:

1. Infrastructure such as system response, services, and utilization
2. Process such as treatments, assessment, and technique
3. Outcomes such as death, disability, and complications

Responsibility for communication of performance issues will be assigned within each trauma system element. Procedures to ensure confidentiality of the review findings will be in place and be strictly applied.

EMS Section Responsibilities

The EMS Section is responsible for the development and implementation of an ongoing evaluation of the trauma system [§100258(a)], which will be conducted with the SF_TAC. It is responsible for the development and maintenance of a process that collects data from EMS providers, the trauma center and community receiving hospitals on the evaluation of the trauma system, including but not limited to: [§100258(b)]

1) Trauma plan;
2) Trauma triage criteria;
3) Activation of trauma team; and
4) Notification of specialists

The EMS Section is responsible for periodic performance evaluation of the trauma system, which shall be conducted at least every two (2) years. Results of the trauma system evaluation shall be made available to system participants [§100258(c)].

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GLOSSARY

Basic Emergency Medical Service	The provision of emergency medical care in a specifically designated area of the hospital which is staffed and equipped at all times to provide prompt care for any patient presenting urgent medical problems (see Comprehensive Emergency Medical Service).
Blunt trauma	A broad term referring to any mechanism of injury that occurs without actual penetration of the body. Blunt trauma typically results from motor vehicle accidents, falls, or assaults with a blunt object.
Communications system	A collection of individual communication networks, a transmission system, relay stations, and control and base stations capable of interconnection and interoperation that are designed to form an integral whole. The individual components must serve a common purpose, be technically compatible, employ common procedures, respond to control, and operate in unison.
Comprehensive Emergency Medical Service	The provision of diagnostic and therapeutic services for unforeseen physical and mental disorders which, if not promptly treated, would lead to marked suffering, disability or death. The scope of services is comprehensive, with in-house capabilities for managing all medical situations on a definitive and continuing basis.
Designation	Formal recognition of hospitals as providers of specialized services to meet the needs of the severely injured patient; usually involves a contractual relationship and is based on adherence to standards.
Disaster	Any occurrence that causes damage, ecological destruction, loss of human lives, or deterioration of health and health services on a scale sufficient to warrant an extraordinary response from outside the affected community area.
Dispatch	Coordination of emergency resources in response to a specific event.
EMS	Emergency Medical Services

Emergency Medical Services System (EMS)	A system that provides for the arrangement of personnel, facilities, and equipment for the effective and coordinated delivery of health care services in appropriate geographical areas under emergency conditions.
Functional Recovery	A term used in trauma surgery literature to refer to the concept of full recovery after injury. It is an inclusive term, acknowledging that healing of a physical wound is one part of the complex process of recovery after injury. Other measures of functional recovery include return to mobility and activities of daily living, return to work, school or other social roles, and restoration of psycho-emotional well-being.
Inclusive Trauma Care System	A trauma care system that incorporates every health care facility in a community in a system in order to provide a continuum of services for all injured persons who require care in an acute care facility; in such a system, the injured patient's needs are matched to the appropriate hospital resources.
Injury	The result of an act that damages, harms, or hurts; unintentional or intentional damage to the body resulting from acute exposure to thermal, mechanical, electrical or chemical energy or from the absence of such essentials as heat or oxygen.
Injury Control	The scientific approach to injury that includes analysis, data acquisition, identification of problem injuries in high risk groups, option analysis and implementing and evaluating countermeasures.
Injury Prevention	Efforts to forestall or prevent events that might result in injuries.
Injury Rate	A statistical measure describing the number of injuries expected to occur in a defined number of people (usually 100,000) within a defined period (usually 1-year). Used as an expression of the relative risk of different injuries or groups.
Lead Agency	An organization that serves as the focal point for program development on the local, regional or State level.

Level I, II, III, IV Refers to the kinds of resources available in a trauma center, and the number of patients admitted yearly. These are categories that define national standards for trauma care in hospitals. They were developed, and continue to be recommended by the American College of Surgeons, and are used in California State Trauma Care Systems regulations. This glossary reference is provided as an overview for the reader of the San Francisco Trauma Plan. Not included in this glossary are the detailed codes provided by Title 22 Trauma Care Systems regulations.

A **Level I** trauma center has a full range of specialists and equipment available 24 hours a day, and admits a minimum required annual volume of severely injured patients. Additionally, a Level I center has a program of research, is a leader in trauma education and injury prevention and is a referral resource for communities in neighboring regions (community outreach).

A **Level II** trauma center in an urban region ideally works in collaboration with a Level I center. It provides comprehensive trauma care and supplements the clinical expertise of a Level I institution. It provides 24-hour availability of all essential specialties, personnel and equipment. Minimum volume requirements may depend on local conditions. These institutions are not required to have an ongoing program of research, or a surgical residency program.

A **Level III** trauma center does not have the full availability of specialists, but does have resources for the emergency resuscitation, surgery and intensive care of most trauma patients. A level III center has transfer agreements with level I and/or level II trauma centers that provide back-up resources for the care of exceptionally severe injuries.

A **Level IV** trauma center provides the stabilization and treatment of severely injured patients in remote areas where no alternative care is available.

Local EMSA A " Local Emergency Medical Services Agency" as defined by California Title 22 regulations. The local EMSA in San Francisco is the Emergency Medical Services Section of the Department of Public Health.

Major Trauma That subset of injuries that encompasses the patient with or at risk for the most severe or critical types of injury and therefore requires a systems approach in order to save life and limb.

Mechanism of Injury — The source of forces that produce mechanical deformations and physiologic responses that cause an anatomic lesion or functional change in humans.

Medical Control — Physician direction over prehospital activities to ensure efficient and proficient trauma triage, transportation, and care, as well as ongoing quality management.

Mortality — The proportion of deaths to population.

Non-trauma center — A "non-trauma center" is a community hospital that cares for injured patients who:
1) have relatively minor injuries that can be treated outside a specialty trauma facility (e.g., a single broken bone, or a single system injury that falls out of trauma triage criteria), or
2) have been transferred or "repatriated" from a trauma center after stabilization, for treatment in the healthcare system that contracts with the primary insurance carrier.

A non-trauma center is not an officially designated trauma receiving hospital, yet California State Trauma System regulations [California Title 22, Div. 9, Chp 7, § 100258 (c), (d)] mandate local EMSA evaluations of the Trauma System to ensure that trauma centers and other hospitals that treat trauma patients participate in the quality improvement process set forth in those regulations.

Overtriage — Directing patients to trauma centers when they do not need such specialized care. Overtriage occurs because of incorrect identification of patients as having severe injuries when retrospective analysis indicates minor injuries.

Penetrating trauma — A broad term referring to any mechanism of injury that causes a cut or piercing of skin. Penetrating injury typically results from gunshot or stab wounds.

Protocols — Standards for EMS practice in a variety of situations within the EMS system.

Quality Improvement — A method of evaluating and improving process of patient care which emphasizes a multidisciplinary approach to problem solving, and focuses not on individuals, but systems of patient care which might be the cause of variations.

Quality Management	A broad term which encompasses both quality assurance and quality improvement, describing a program of evaluating the quality of care using a variety of methodologies and techniques.
Receiving Hospital	A general acute care hospital with an Emergency Department that has the capacity to treat emergency patients (EMS Section policy #8000, II, A).
Regionalization	The identification of available resources within a given geographic area, and coordination of services to meet the needs of a specific group of patients. Referring to the concept of sharing trauma care resources with neighboring jurisdictions. For example, San Francisco County's trauma center is also designated as the trauma center for injured persons residing in northern San Mateo County.
Rehabilitation	Services that seek to return a trauma patient to the fullest physical, psychological, social, vocational, and educational level of functioning of which he or she is capable, consistent with physiological or anatomical impairments and environmental limitations.
Response Time (Response Interval)	The time lapse between when an emergency response unit is dispatched and arrives at the scene of the emergency.
Risk Factor	A characteristic that has been statistically demonstrated to be associated with (although not necessarily the direct cause of) a particular injury. Risk factors can be used for targeting preventative efforts at groups who may be particularly in danger of injury.
Service Area (catchment area)	That geographic area defined by the local EMS agency in its trauma care system plan as the area served by a designated trauma center.
Specialty Care Facility	An acute care facility that provides specialized services and specially trained personnel to care for a specific portion of the injured population, such as pediatric, burn injury, or spinal cord injury patients.
Surveillance	The ongoing and systematic collection, analysis, and interpretation of health data in the process of describing and monitoring a health event.

Suspension of Total Diversion	When 4 or more receiving hospitals are on "total diversion", the EMS Section may determine that the situation may result in a danger to the public health and safety (EMS Section policy #8010, VI). The EMS Section may suspend "total diversion" and require all receiving hospitals to accept both critical and non-critical patients.
Total Diversion	When a receiving hospital Emergency Department determines, through pre-established criteria, that it is unable to provide care to additional ambulance patients, (EMS Section policy #8010, II, A) this is communicated to the EMS system and ambulance traffic is temporarily diverted from this facility.
Trauma/Traumatic Injury	A term derived from the Greek for "wound". The definition used in this document refers to any physical injury that requires (or would have required, precluding death) surgical specialists to consult, observe or perform surgery in order to optimize the recovery.
Trauma Care System	An organized approach to treating patients with acute traumatic injuries; it provides dedicated (available 24 hours a day) personnel, facilities, and equipment for effective and coordinated trauma care in an appropriate geographical region.
Trauma Care Systems Planning & Development Act of 1990	The law that amended the Public Health Service Act to add Title XII—Trauma Programs. The purpose of the legislation was to assist State governments in developing, implementing and improving regional systems of trauma care, and to fund research and demonstration projects to improve rural EMS and trauma. Continuing funding was not appropriated by Congress; in 1995, the Act was not reauthorized.
Trauma Center	A specialized hospital facility distinguished by the immediate availability of specialized surgeons, physician specialists, anesthesiologists, nurses, and resuscitation and life support equipment on a 24-hour basis to care for severely injured patients or those at risk for severe injury.
Trauma Registry	A collection of data on patient who receive hospital care for certain types of injuries. Such data are primarily designed to ensure quality trauma care and outcomes in individual institutions and trauma systems, but have the secondary purpose of providing useful data for the surveillance of injury morbidity and mortality.

Trauma Team	The multidisciplinary group of professionals who have been designated to collectively render care for trauma patients at a designated trauma center.
Triage	The process of sorting injured patients on the basis of the actual or perceived degree of injury and assigning them to the most effective and efficient regional care resources, in order to insure optimal care and the best chance of survival.
Triage Criteria	Measures or methods of assessing the severity of a person's injuries that are used for patient evaluation, especially in the prehospital setting, and that use anatomic and physiologic considerations and mechanism of injury.
Uncompensated Care	Care for which no reimbursement is made.
Undertriage	Directing fewer patients to trauma centers than is warranted because of incorrect identification of patients as having minor injuries when retrospective analysis indicates severe injuries.

Greater Bay Area Designated Trauma Centers

February 2001

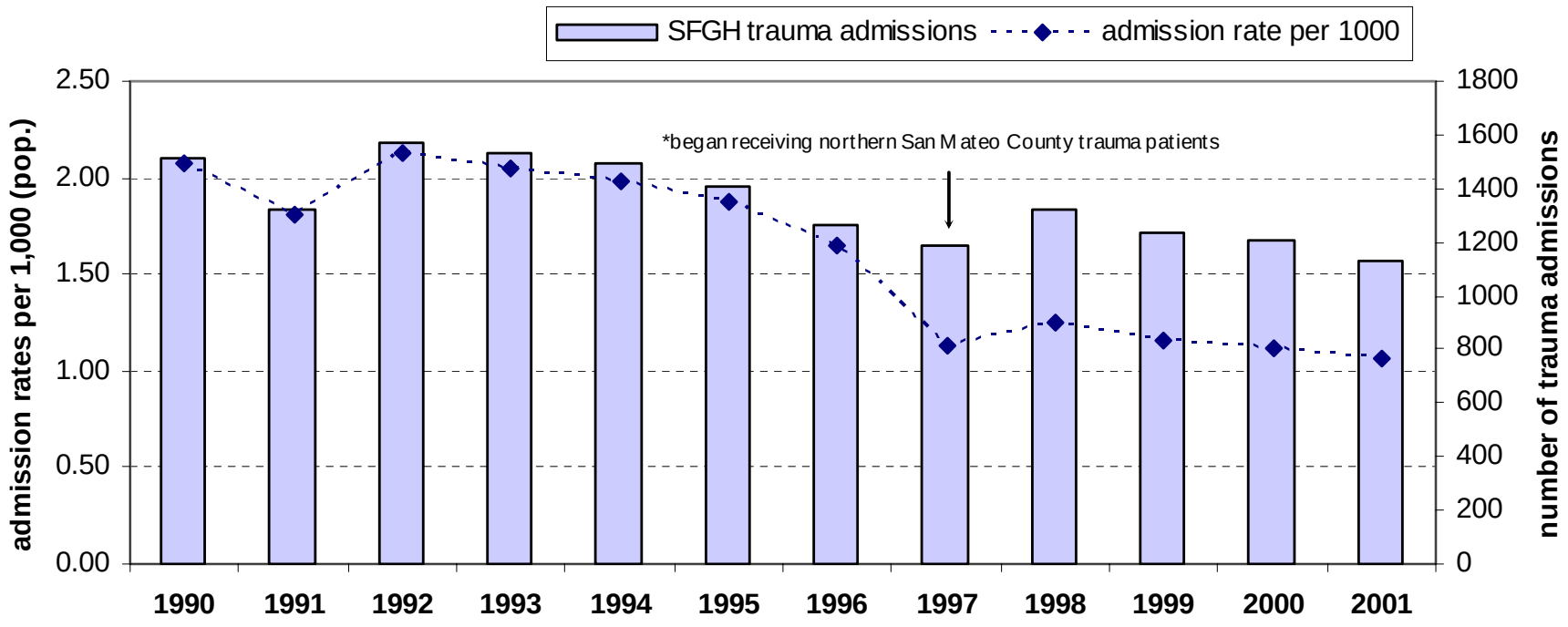
DESIGNATED TRAUMA CENTERS IN THE GREATER SAN FRANCISCO BAY REGION—February, 2001

COUNTY	HOSPITAL	LEVEL I	LEVEL II	LEVEL III	Emergency Department Approved for Trauma (EDAT)	BURN CENTER	PEDIATRIC CENTER	SPINAL CORD CENTER	FLIGHT TIME INTERVAL TO/FROM SFGH
San Francisco	San Francisco General	X							NA
Alameda	Oakland Children's		X			NO BURNS ACCEPTED	X PEDIATRIC ONLY		8 min.
Alameda	Eden Hospital		X						13 min.
Alameda	Highland Alameda Community Hospital		X						No helipad
Santa Clara	Stanford Medical Center	X							12 min.
Santa Clara	Santa Clara Valley Medical Center	X				X		X	20 min.
Santa Clara	San Jose Hospital		X						20 min.

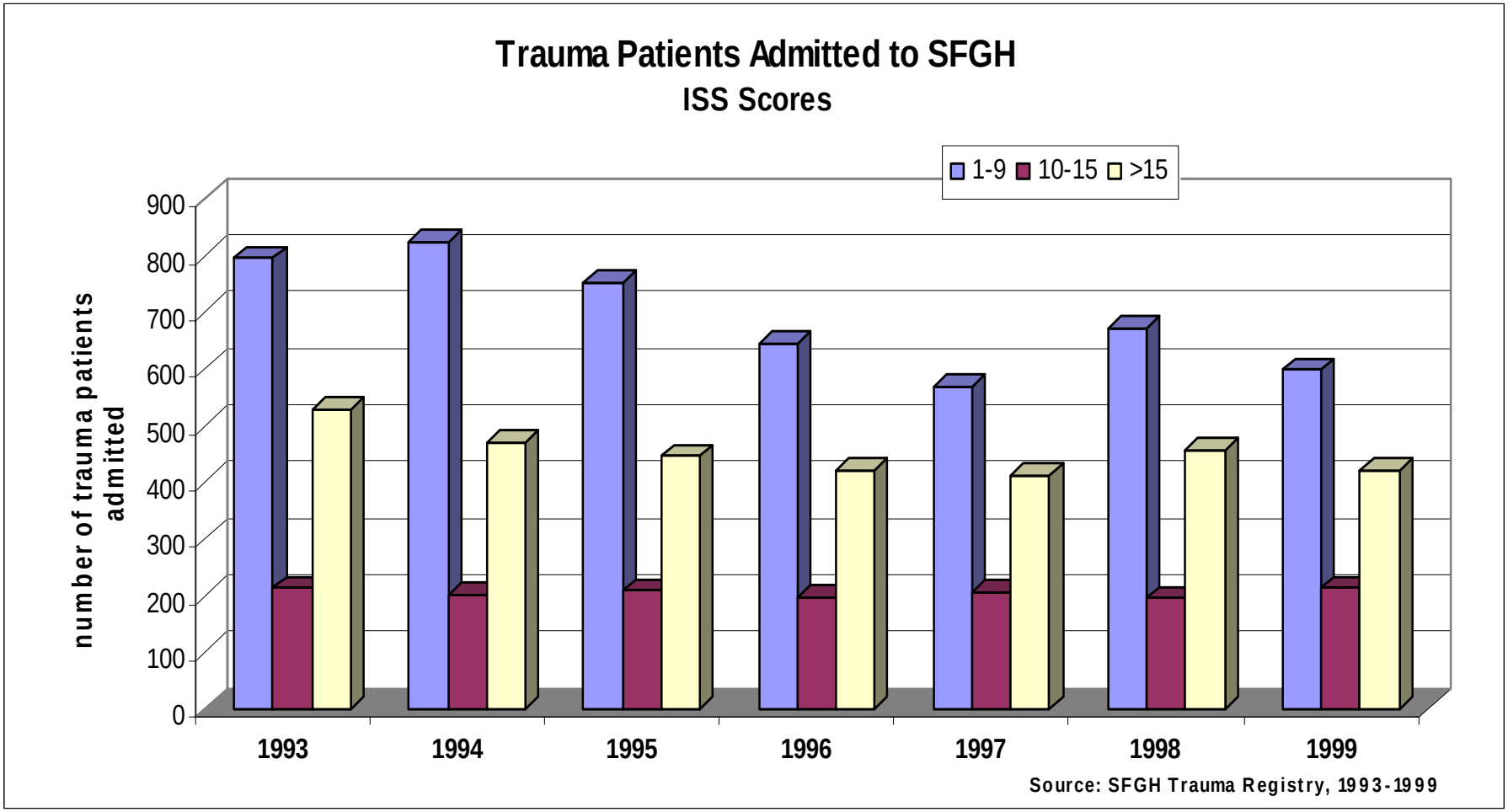
COUNTY	HOSPITAL	LEVEL I	LEVEL II	LEVEL III	Emergency Dept. Approved for Trauma (EDAT)	BURN CENTER	PEDIATRIC CENTER	SPINAL CORD CENTER	FLIGHT TIME INTERVAL TO/FROM SFGH
Contra Costa	John Muir		X						13 min.
Marin	Marin General Hospital			X					No Helipad
Marin	Kaiser San Rafael				X				No Helipad
Sonoma	Santa Rosa Memorial Hospital		X						25 min.
Sacramento	UC Davis	X							35 min.

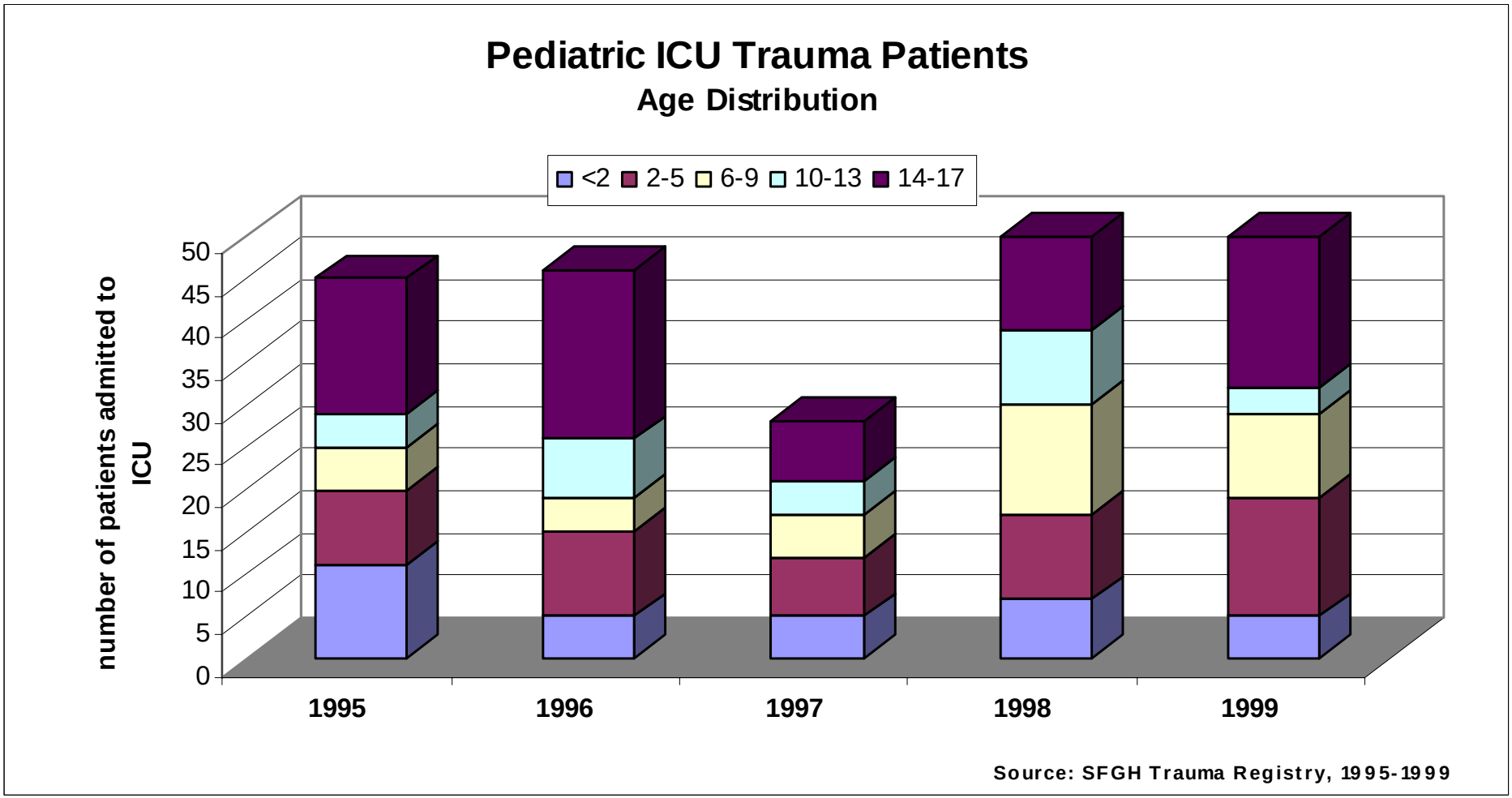
APPENDIX A—STATISTICS

SFGH Admission Rates 1990-2001



Source: SFGH Trauma Program Registry, 1990-2001


Trauma Patients Admitted to SFGH
ISS Scores
1-9
10-15
>15
number of trauma patients admitted
900
800
700
600
500
400
300
200
100
0
1993
1994
1995
1996
1997
1998
1999
Source: SFGH Trauma Registry, 1993-1999


Pediatric ICU Trauma Patients
Age Distribution
<2
2-5
6-9
10-13
14-17
number of patients admitted to ICU
50
45
40
35
30
25
20
15
10
5
0
1995
1996
1997
1998
1999
Source: SFGH Trauma Registry, 1995-1999

APPENDIX B—SAN FRANCISCO EMS SECTION TRAUMA POLICIES

APPENDIX C—SAN MATEO COUNTY EMS SECTION POLICIES

APPENDIX D—DOCUMENTATION OF LOCAL APPROVAL