PURPOSE AND NEED

In August 2001, with the approval of the San Francisco Trauma Care System Plan revision, the San Francisco Health Commission resolved that “a thorough, objective evaluation of the need for and feasibility of consistently available air medical access at the San Francisco General Hospital” be performed.\(^1\) The 2001 Trauma Care System Plan defined Trauma System vulnerabilities related to the lack of air medical access to the Trauma Center at San Francisco General Hospital (SFGH).

BASIS FOR THE STUDY

As was discussed in the preceding chapter, 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.\(^2\)

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.\(^3\) Though further work with sophisticated study designs is needed to draw unequivocal 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.\(^4\)

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This translates into nationwide annual estimates of approximately 20,000 to 25,000 lives saved.\(^5\)

The goal of a trauma care system is to reduce injury-related death, disability, and associated costs by organizing specialized personnel and resources so that the right patient gets to the right place in the right amount of time. Preventable mortality studies indicate delays in appropriate care are the predominant cause of preventable injury deaths.\(^6\) The requirement to rapidly and safely transport patients to a specialized facility designed to treat severe injuries stimulated the development of helicopter-based medical transport programs in the United States in the early 1970's.\(^7\) As early as 1976, federal guidelines for Emergency Medical Systems transportation (from the Department of Health, Education and Welfare, Division of EMS) included the use of air ambulances.\(^8\)

Today, access to medical centers by air transport (air medical access) is considered a standard-of-care component of regional trauma systems throughout the

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United States,\(^9\) because the most severely injured patients require faster and higher levels of definitive trauma care if their chances of survival are to be maximized. Medical helicopters are equipped with medical supplies, nurses/paramedics (sometimes physicians) and are used to transport critically ill and injured patients. These helicopters can respond directly to places where people are seriously injured (i.e., car crashes, recreation sites, etc.,) and can quickly transport patients to appropriate medical facilities or from one facility to another when lifesaving medical care is necessary.

Inspired by successful helicopter evacuations of injured soldiers in Vietnam, E.V. Kuhlman of St. Anthony’s Hospital in Denver, Colorado combined forces with others sharing his vision and developed the first hospital-based helicopter program in the United States.\(^{10}\) In the five years to follow the start up of the St. Anthony’s program four other hospitals started their own aeromedical helicopter service. Viewed by many as passing fads the programs’ success soon made even the most optimistic promoters appear shortsighted. The far-reaching transport capabilities of the helicopters were increasing the catchment areas of their hospitals. The helicopter programs were filling beds with patients on a routine basis. These patients were often better insured, and the additional volume helped to enhance programs and professional skill maintenance. It was not long before the spread of aeromedical programs increased at an astonishing rate.\(^{11}\)

Ten years after the first patients were transported by St. Anthony’s hospital, nearly 100,000 patients were evacuated in 1982. By the end of 2001, a total of 2.75 million patients had been transported by EMS helicopters.


\(^{11}\) Norton, 1997. op. cit.
since the first flights in 1972\textsuperscript{12} and the annual numbers of patients flown continue to increase by an average of 3 percent per year over the last decade.\textsuperscript{13} Yet San Francisco is the only one of the top 25 United States cities that has no air medical access to its only designated trauma center.

**Bay Area and San Francisco Trauma Care**

**Bay Area Trauma Centers and Air Medical Access**

Within the 9 Bay Area counties there are 11 designated trauma centers of various levels. Seven of these trauma centers have helipads and receive trauma patients from within their immediate catchment areas and from neighboring regions. Table 2.1 lists these centers, their levels, specialties and flight intervals to/from San Francisco General Hospital.

Though dozens of trauma patients are flown from San Francisco to neighboring trauma centers every year (see Appendix B), these regional trauma centers are not routinely used for treatment of injuries in San Francisco. The majority of those who suffer severe injuries (~1200 per year) are treated at San Francisco General Hospital. There is no formal agency or standard communication system that links all the Bay Area Trauma Centers for daily operations. Thus, there is no regional Bay Area Trauma System.

In the event of a large-scale disaster affecting San Francisco, trauma cases would be prioritized and distributed regionally using computer and 800 mHz radio links to determine bed availability. Further treatment capacity would be obtained from the Regional Disaster Medical and Health Coordinators, and may include State assets, such as the Disaster Medical Assistance Teams, or Federal assets such as the National Disaster Medical System network of medical transport and receiving hospitals. Medical helicopters would play a crucial role in patient distribution on regional and statewide levels.


**TABLE 2-1 — DESIGNATED TRAUMA CENTERS IN THE GREATER SAN FRANCISCO BAY REGION**

*See Appendix A—Glossary for definitions of Trauma Center Levels I-IV.

<table>
<thead>
<tr>
<th>COUNTY</th>
<th>HOSPITAL</th>
<th>LEVEL I</th>
<th>LEVEL II</th>
<th>LEVEL III</th>
<th>Emergency Department Approved for Trauma (EDAT)</th>
<th>BURN CENTER</th>
<th>PEDIATRIC CENTER</th>
<th>SPINAL CORD CENTER</th>
<th>FLIGHT TIME INTERVAL TO/FROM SFGH</th>
</tr>
</thead>
<tbody>
<tr>
<td>San Francisco</td>
<td>San Francisco General</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>NA</td>
</tr>
<tr>
<td>Alameda</td>
<td>Oakland Children's</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8 min.</td>
</tr>
<tr>
<td>Alameda</td>
<td>Eden Hospital</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>13 min.</td>
</tr>
<tr>
<td>Alameda</td>
<td>Highland Alameda Community Hospital</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No helipad</td>
</tr>
<tr>
<td>Santa Clara</td>
<td>Stanford Medical Center</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>12 min.</td>
</tr>
<tr>
<td>Santa Clara</td>
<td>Santa Clara Valley Medical Center</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>20 min.</td>
</tr>
<tr>
<td>Santa Clara</td>
<td>San Jose Hospital</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>20 min.</td>
</tr>
<tr>
<td>Contra Costa</td>
<td>John Muir</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>13 min.</td>
</tr>
<tr>
<td>Marin</td>
<td>Marin General Hospital</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No Helipad</td>
</tr>
<tr>
<td>Marin</td>
<td>Kaiser San Rafael</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No Helipad</td>
</tr>
<tr>
<td>Sonoma</td>
<td>Santa Rosa Memorial Hospital</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>25 min.</td>
</tr>
<tr>
<td>Sacramento</td>
<td>UC Davis</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>35 min.</td>
</tr>
</tbody>
</table>
On a local level the San Francisco EMS Agency (SF EMS Section, Dept. Public Health) coordinates inter-county disaster trauma services through its San Francisco Bay Area Medical Mutual Aid Policy No. 5040, and the Multi-Casualty Incident Plans No.’s 5010, 5015, 5020. The Bridge Response Policy No. 8050 and Inter-County Response and Transport Policy No. 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. Currently, bridge traffic accidents that require air transport are flown away from San Francisco to trauma centers with helipads in Alameda, Contra Costa and Santa Clara counties.

Each of the Bay Area trauma centers are identified as a designated trauma receiving facility within an Emergency Medical System specific to each county and overseen by a local State-authorized EMS Agency. These agencies are governed by the local County Health Departments, or through a regional Joint Powers agreement among several county governments. Pre-hospital emergency medical providers and trauma centers have communications links, standard guidelines and evaluation systems promulgated by the EMS agency of their county/region. Air ambulance providers follow the policies and procedures established by local EMS agencies and are authorized under separate agreements to transport patients within and between the jurisdictions of the 9 counties.

**San Francisco Trauma Care System**

The City and County of 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 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 Trauma Care System Plan was updated recently and extensively
revised in compliance with revisions in the State of California Title XXII Trauma Care Systems regulations. The San Francisco Health Commission and the California State Emergency Medical Services Authority approved the revisions in 2001. Critical vulnerabilities are described in this Plan, including lack of air medical access for the City and County of San Francisco. By approving the 2001 Plan, both the San Francisco Health Commission and the State EMS Authority endorsed development of air medical access in San Francisco. The Health Commission also unanimously approved a resolution that directed a Needs Assessment and Feasibility Study for a helipad at the San Francisco General Hospital Trauma Center (Resolution no. 1401).

Evolution of Trauma Care in San Francisco and the Role of San Francisco General Hospital Trauma Center

The Emergency Department of San Francisco General Hospital was a separate physical facility (Mission Emergency) until it was incorporated into the construction of the Hospital in 1915. Since that time it has provided immediate definitive emergent care for all critically injured patients in the City and County of San Francisco. It remained administratively separate until 1955, when it was fully incorporated into San Francisco General Hospital. Until 1966, it was the only fully staffed 24-hour emergency service in San Francisco and thus has a long tradition for providing emergency treatment.14

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 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 publicly funded acute care resources were consolidated in 1983, when all of the Public Health Emergency Hospitals were closed, with the exception of Mission/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 the Level I Trauma Center in 1991, after verification by the American College of Surgeons.

Through the 1990’s San Francisco General Hospital’s Trauma Center has continued to develop its programs in acute care, rehabilitation, functional recovery and injury prevention. 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.

SFGH remains the sole Trauma Center in San Francisco today, and retains Level I designation. It is also the designated Level I Trauma Center for northern San Mateo County residents, by agreement with the San Mateo County EMS Agency.
THE SAN FRANCISCO TRAUMA CARE SYSTEM ENVIRONMENT

San Francisco’s geography and demographics have unique characteristics related 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 percent from 15,000/sq. mi. to 17,000/sq.mi. 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.

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. The diverse San Francisco resident population base of 793,600, with 270,820 persons from northern San Mateo County brings the Trauma System base population to 1.1 million. The numbers of San Francisco visitors and commuters bring the total catchment population to an estimated 1.4 to 1.6 million.


17 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.

18 State of California, Department of Finance, 2002, op. cit.

19 Purvis, C., “County to County Commuting in the San Francisco Bay Area, 1960-2020; 1960-1990 Decennial Census, and MTC Forecasts"
CHAPTER 2  PURPOSE AND NEED

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 are 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.20 With an aging population, declining penetrating injury rates, and a relatively stable population, the single Level I Trauma Center, integrated with pre-hospital 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.

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 support the patient’s return 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

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PATIENT PROFILE: J. J. STIVERS

In the early afternoon of November 16, 2000, Jeffrey “J.J.” Stivers was moving some large construction equipment when he became pinned between the blade of a bulldozer and a flatbed truck. The force was enough to nearly amputate both of J.J.’s legs. When the fire department arrived at the scene, they were surprised to find the patient was one of their own. J.J. Stivers was a long time member of the local volunteer fire department.

His fire department friends, along with the local ambulance crew stabilized J.J. and prepared him for air medical transport to the regional trauma center. When the REACH air ambulance arrived, the Flight Nurse and Flight Paramedic found J.J. ready for transport, but complaining of significant pain in both his legs, which were nearly amputated just above the knees. The rapid intervention and speedy air transport had J.J. to the trauma center less than one hour after the accident.

Upon arrival at the trauma center the trauma team evaluated him. Unfortunately, it was necessary to surgically complete the amputations. After twelve days in the hospital, J.J. was transferred to a rehabilitation center for continued treatment.

Although traumatic, J.J.’s story demonstrates how the EMS system works in providing excellent care in all manner of emergencies.

Gary McCalla, MD, Medical Director Reach Air Ambulance in “REACH Rivets,” Spring 2001

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continuation of activities directly related to patient care.

CURRENT AIR MEDICAL ACCESS SYSTEM

There is no direct air access to a hospital in San Francisco—there are no hospital helipads. There is a single FAA approved facility provided for San Francisco public safety agencies and EMS helicopters at the Hunters Point Naval Shipyard. This poorly lighted, remote facility located on an EPA Superfund site serves an average of five non-trauma critical patients per week who are transported to San Francisco from the Bay Area, Northern and Central California, and Nevada for specialty care at UCSF, RK Davies-CPMC or St. Francis Hospital.21

Patients must be loaded into a ground ambulance on arrival at this facility and taken to their destination hospital on a bumpy ride over railroad tracks and roads in disrepair into the north of Market Street area of the City. This transfer to ground ambulances entails added delays and risk of medical device/equipment failure enroute.

Trauma Care System standards of rapid transport to definitive treatment rule out the possibility of using a remote aircraft landing facility that will entail delays in arrival to the Trauma Center; therefore SFGH does not receive trauma patients transported by air.

EMS Aircraft providers are authorized by the San Francisco EMS Section of the Department of Public Health to transport patients to and from the City. The EMS Section “EMS Aircraft Utilization Policy” (policy No. 8070) defines the scope and manner with which the EMS/Trauma System will use EMS aircraft for emergency transport of critically ill and injured patients and provides for coordinated air medical operations with ground responders and hospital resources. Provisions are made in this policy for air ambulances to respond to San Francisco for unusual events such as multiple-casualty incidents (e.g., school shooting, large train accident) or cliff rescues.

When such occurrences require the use of EMS aircraft, patients are flown to neighboring Trauma Centers because there is no helipad at SFGH. Proximal Trauma Centers with helipads include Level II Centers in Contra Costa County (John Muir Medical Center) and Alameda County (Eden Memorial Hospital) and a Level I Trauma Center at Stanford University Hospital (see Table 2.1 above and Figure 2-1). According to data from Santa Clara County EMS Agency, an average of 3 patients per year are flown from San Francisco to a trauma center in Santa Clara County—likely from cliff/island/bridge or water rescue locations. Figure 2-2 shows the potential air medical catchment area for SFGH with a helipad.

**STRENGTHS AND VULNERABILITIES OF THE TRAUMA CARE SYSTEM**

Coincident with this needs and feasibility study, a trauma care system consulting firm, Bishop and Associates, was contracted to evaluate San Francisco’s trauma system during the Fall, 2002. The consulting team evaluated the 2001 Trauma Care System Plan and facilitated a daylong strategic planning session with San Francisco Trauma System stakeholders. These professionals represented San Francisco community hospitals, pre-hospital care providers, San Francisco Emergency Communications administration and the SFGH Trauma Center. The findings and recommendations from this evaluation corroborate those in the 2001 Trauma Care System Plan, and those related to air medical access are summarized below.

**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 SFGH as one of the nation’s leading trauma centers. These characteristics and the relatively high volume of trauma patients treated there, qualify SFGH to be a Level I Trauma Center. As such, the facility meets the highest standards promulgated by the American College of Surgeons and the State of California.
Fig. 2-1  Trauma Air Medical Catchment Areas
Without Proposed SFGH Helipad
Fig. 2-2  Trauma Air Medical Catchment Areas
With Proposed SFGH Helipad

Level I Trauma Centers (With Helipad)
- SCVMC-Santa Clara Valley Medical Center
- SMC-Stanford Medical Center
- SFGH-San Francisco General Hospital

Level II Pediatric Trauma Centers (With Helipad)
- OCH-Oakland Childrens Hospital

Level II Trauma Centers (With Helipad)
- EMC-Eden Medical Center
- JMMC-John Muir Medical Center
- SJMC-San Jose Medical Center
- SRMH-Santa Rosa Memorial Hospital

Level II Trauma Centers (Without Helipad)
- HGH-Highland General Hospital
SFGH admits approximately 1,200 trauma patients per year, thus meeting the volume criterion set by the State of California for Level I Trauma Center designation. Should an additional trauma center exist in San Francisco, this yearly volume of 1,200 patients would be divided between two trauma centers. Such an arrangement would threaten the ability of SFGH to retain its Level I designation. A minimum volume of patients is required for the hospital staff to retain superior skills in patient management, to sustain a trauma surgery residency program, and to conduct trauma research—all of which are requirements for Level I designation.

**Capacity Saturation**

While this patient volume, on average, is sufficient to 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. There is no other designated facility in San Francisco that is qualified to care for severely injured patients. While the UCSF Medical Center and 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.22

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. 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.23 Ground transportation routes to the south are more varied, yet these are also increasingly congested.

As noted above, a public safety helipad at Hunters Point Shipyard is available on an emergency basis, but poor access conditions and additional transport time via ground to the trauma center adds risk to trauma patients. Non-trauma critical patients are transported to other specialty care hospitals in San Francisco from the Hunters Point helipad, from a helipad at Seton Medical Center in Daly City and from the San Francisco International airport. Each facility is remote from destination hospitals; additionally,

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22 Corry, M. “Response Interval from Call to Trauma Center Arrival.” 2003, EMS Section, City and County of San Francisco Dept. of Public Health: San Francisco.


23 As a measure of urban traffic congestion, the Texas Transportation Institute examined traffic patterns in 75 urban areas of the United States. In 2000, 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.
weather patterns (fog at SFO and Seton), air traffic patterns (at SFO) and poor lighting and road conditions (Hunters Point) further complicate air medical transport from these locations.

**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. Since September 11, 2001, the nation has been on alert for further terrorist activity and San Francisco landmarks have frequently been listed as targets. San Franciscans are also very familiar with the threats of natural disasters such as earthquakes and fires.

**Pediatric Trauma**

Another vulnerability of the trauma system in San Francisco stems from the fact that the pediatric population is proportionately small. The 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. For example, a three-month-old infant with crush injuries to the head and chest requires a higher level of expertise from multiple trauma care providers than does an eight-year-old with a single injury to the spleen. The younger, more severely injured patients (roughly two to four per year at SFGH) require a higher level of trauma care in a designated pediatric trauma center.

Oakland Children’s Hospital is a designated Level II Pediatric Trauma Center in Alameda County. It serves as a Bay Area and Northern California pediatric trauma referral center. The helicopter flight time interval from SFGH to Oakland Children’s is 8 minutes. Lucille Packard Children’s (LPC) Hospital at Stanford University Medical Center is also a regional pediatric referral center. Though Stanford University Hospital is a verified Level I Trauma Center, LPC
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San Francisco General Hospital Air Medical Access Needs and Feasibility Study

does not have separate verification/designation status as a pediatric trauma center. Flight time interval from SFGH to LPC is 12 minutes.

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. These include parts of Marin and San Mateo Counties. An additional 8 injury survivors were airlifted from the Golden Gate National Recreation Area in San Francisco and southern Marin last year (see Appendix B), and flown to regional trauma centers. Five of these eight trauma patients were San Francisco residents. 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. The Santa Clara County EMS Agency reports an average of 3 patients per year must be flown from San Francisco County to a Trauma Center in Santa Clara County. San Francisco residents make up 4 percent of Stanford Medical Center’s annual trauma air transports—that is, on average, four San Francisco residents per year are taken by air to this Santa Clara County facility. These helicopter flights are from offshore, island, or water rescues in San Francisco or southern Marin County.

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

LETTER OF THANKS TO CALSTAR:

“…Trevor had fallen 35-40 (nearly vertical) feet from a smooth rock ledge above and had come to rest about 66 feet from where he fell. It was very late in the afternoon and he had suffered severe trauma. We were unsure of his injuries but were preparing for the realization that we would probably be spending a very long night on a steep rock slope.

Through incredible quick action your helicopter was able to find our location and navigate into position where (the paramedics) were able to descend, evaluate Trevor, strap him into a basket and fly him away to an awaiting med-evac helicopter…”

Thomas Hagen
September 2, 2002

25 Ibid.
27 Panem, M. “Air Transport Report--San Francisco County.” 2003, Stanford University Medical Center: Stanford, California
TRAUMA SYSTEM NEEDS RELATED TO AIR MEDICAL ACCESS

Consistently Available Trauma Resources

There is a lack of resources that will guarantee optimal care of victims of major injuries in the event that San Francisco General Hospital becomes incapacitated, or saturated with critical patients. Similarly, the trauma system lacks the resources for ensuring that in the event of a multiple-casualty incident, patients will be transported to the appropriate facilities in an optimal manner. During such an event some patients will not have access to a trauma center. In the event of SFGH incapacity due to an unforeseen circumstance, major trauma victims in San Francisco do not have timely access to another trauma center.

Comprehensive Pediatric Trauma Care

There is a lack of resources 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 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. The following vulnerabilities have been identified by trauma and EMS professionals as having a profound effect on the San Francisco trauma system of care:

- the isolating geography
- increasing traffic congestion
- population density
The following are excerpted from meeting minutes of the Citizen’s Heliport Study Committee from 1985-1986:

“Emergency medical transport is a legitimate issue that deserves proper consideration.”

Father Peter Sammon, Potrero Hill Heliport Committee representative

“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 Heliport Committee representative

“Time marches on. The need for medical and emergency uses for a helicopter are clear.”

John Kirby-Miller, Chamber of Commerce

In light of these vulnerabilities to the San Francisco trauma system, there is a need to evaluate alternatives to ground transportation for critical trauma patients in San Francisco and its neighboring regions.

PREVIOUS AIR MEDICAL ACCESS STUDIES IN SAN FRANCISCO

Medical Use vs. Commercial Use

While considerable effort and discussion have been devoted to the subject of helicopter utilization in San Francisco over the past thirty 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 uses 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.28

The Vertiport Study

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\textsuperscript{29} referenced the advisory committee for this study, and indicated “almost unanimous agreement on the crucial medical services of helicopters…”

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 (i.e., public use), not just EMS use.

**The McKesson Report**

A decade prior to the “Vertiport Study” conducted by the Port Commission, a privately funded study was conducted to examine the feasibility of developing a Bay Area “air ambulance system”. An extensive examination of regional demographics and emergency healthcare utilization patterns was used to project the viability of an air ambulance service for the Bay Area, which would serve trauma and critically ill patients. This study was conducted in the early 1980’s, prior to the era of healthcare reform, when there was fierce competition among hospitals to generate and expand specialty care programs and fill an abundance of empty hospital beds.\textsuperscript{30} The results of the study launched “CALSTAR”—a nonprofit air


ambulance company based in the East Bay that continues to serve the Bay Area and Northern California region. While the “Mckesson Report” proposed air ambulance services for San Francisco, it did not specifically examine the feasibility of helipad development for hospitals. It recommended “proximate access” from a helipad to a hospital for trauma patients, but listed remote landing sites for transportation of non-trauma patients.31

FINDINGS AND CONCLUSIONS

This report, directed by the San Francisco Health Commission, is the first to be conducted solely to investigate the need for and feasibility of constructing a medical helipad at San Francisco General Hospital. 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.32

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, its university medical center, and the specialty services of 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.

The next chapter of this report discusses the benefits of air medical access to SFGH to the City and County of San Francisco, and to the people of the City. These benefits include the fact that the rapid, safe

transport of severely injured patients directly to definitive treatment has been demonstrated in a number of preventable trauma mortality studies.\textsuperscript{33} These benefits include the mitigation of the Trauma Care System vulnerabilities, and financial support of the trauma center. Helicopters provide rapid, advanced medical transportation in an urban region where traffic congestion, population density and infrastructure failure (inaccessible roads/bridges) can preclude timely arrival at a Trauma Center via ground routes.