

Stroke System Recommendations, Implementation, and Performance Data

Table 1: Task Force Recommendations and Status of Implementation		
	Recommendation from Task Force	Implementation Status
1.	<ul style="list-style-type: none"> • <i>Modify existing stroke identification and treatment policies.</i> • <i>Age limitation of 18 years or older</i> • <i>Blood glucose check are to be added to the existing Stroke Treatment Protocol</i> • <i>Paramedic training</i> 	<ul style="list-style-type: none"> • Prehospital protocols modified and training conducted in partnership with the National Stroke Association. • Santa Clara County was designated a Premier Prehospital Stroke Education Site by the National Strike Association (NSA). • EMS providers train yearly.
2	<ul style="list-style-type: none"> • <i>Adopt a transport policy to redirect ambulances to Stroke Centers.</i> • <i>Develop a provisional designation policy to allow other qualified hospitals to receive redirected patients until the Joint Commission designation can be obtained.</i> 	<ul style="list-style-type: none"> • Field identified stroke patients are taken directly to Primary Stroke Centers (PSC) • A 1 year provisional designation policy allowed 5 (five) more hospitals the opportunity to obtain PSC certification.
3	<ul style="list-style-type: none"> • <i>The implementation plan should include provisions to improve data collection and to evaluate system impacts.</i> 	<ul style="list-style-type: none"> • All EMS provider agencies and Primary Stroke Centers regularly provide data to the EMS agency.
4	<ul style="list-style-type: none"> • <i>Adopt a Quality Assurance Process that evaluates pre-hospital and hospital outcomes.</i> • <i>Enter into contracts with participating hospitals to formalize data reporting American Stroke Association “Get with the Guidelines” data elements will be used as the reporting format.</i> 	<ul style="list-style-type: none"> • A QA program has been implemented and has been acknowledged by the State EMS Agency. • The Stroke Audit Committee meets quarterly • Each PSC has entered into contracts with the EMS agency and each is reporting the equivalent of the “Get with the Guidelines” data elements.
5	<ul style="list-style-type: none"> • <i>The LEMSA should continue to evaluate the development of comprehensive stroke centers as well as other new developments in stroke care.</i> 	<ul style="list-style-type: none"> • The EMS Agency continues to monitor developments in stroke care including comprehensive stroke center services.

Primary Stroke Centers:

There are 8 (eight) Primary Stroke Centers certified by the Joint Commission for Accreditation of Healthcare Organizations in Santa Clara County (Table 2).

This represents about 20% of all 48 Stroke Centers in California and remains the largest concentration in any other county. Five (5) of the eight hospitals attained certification while they were provisionally designated by the EMS agency, a factor EMS believes led to their successful designation.

Table 2: Santa Clara County Primary Stroke Centers
Good Samaritan Hospital (GSH)
El Camino Hospital (ECH)
Kaiser San Jose Hospital (KST)
Kaiser Santa Clara Hospital (KST)
O’Connor Hospital (OCH)
Regional Medical Center (RSJ)
Santa Clara Valley Medical Center (VMC)
Stanford Medical Center (SUH)

Stroke Patient Distribution and Mode of Transport:

In the 24-month period since the implementation of the Stroke System in March 2006 through March 2008, eight stroke centers have taken care of 6454 stroke patients of which 3267 (51%) were transported by EMS. (Tables 3, 4, 5). Unfortunately this is comparable to national statistics that have shown that stroke patients call 911 about 40%

of the time ² thus potentially delaying or making them ineligible for treatment. Since EMS patients are much more likely to arrive at the correct hospital and are much more likely to arrive more quickly there is much work to be done in improving public education.

Table 3: Q2-Q4 2006

Primary Stroke Center	ECH	GSH	KSC	KST	OCH	RSJ	SUH*	VMC	Totals
Stroke Type *									
Ischemic	228	220	185	213	191	225	261	161	1684
Hemorrhagic	78	76	30	77	39	67	296	39	702
TIA	126	85	74	76	73	109	99	98	740
Mode of Arrival *									
Ambulance	177	253	181	223	161	266	184	106	1551
Non-Ambulance	121	130	112	128	162	137	472	192	1454
% of Strokes to each PSC	13.8	12.2	9.2	11.7	9.7	12.8	21.0	9.5	100.0

Table 4: Q1-Q4 2007

Primary Stroke Center	ECH	GSH	KSC	KST	OCH	RSJ	SUH*	VMC	Totals
Stroke Type *									
Ischemic	249	196	202	183	151	245	267	187	1575
Hemorrhagic	59	58	48	85	57	121	289	40	717
TIA	68	51	97	69	57	96	129	81	609
Mode of Arrival *									
Ambulance	153	204	220	185	137	292	127	123	1379
Non-Ambulance	223	103	137	153	128	170	385	175	1407
% of Strokes to each PSC	12.2	9.9	11.2	10.9	8.6	15.0	22.2	10.0	100.0

Table 5: Q1 2008

Primary Stroke Center	ECH	GSH	KSC	KST	OCH	RSJ	SUH*	VMC	Totals
Stroke Type *									
Ischemic	33	39	63	51	21	63	98	46	414
Hemorrhagic	14	10	7	21	4	23	46	8	133
TIA	26	12	32	17	4	17	48	32	188
Mode of Arrival *									
Ambulance	41	22	35	56	23	70	53	37	337
Non-Ambulance	32	26	68	31	15	33	76	45	326
% of Strokes to each PSC	9.9	8.3	13.9	12.1	3.9	14.0	26.1	11.7	100.0

*Total # of patients each category

There is considerable variance for how many stroke patients are taken to each hospital. This is also apparent when the ratio of EMS stroke patients as compared to all EMS patients is analyzed. (Table 6). The reasons are multi-factorial but are probably due to geography (RSJ is the only hospital on the east side of the valley), proximity to other stroke centers, and the regional incidence of stroke patients. (Figure 1)

Table 6: Ambulance distribution of All patients compared to distribution of Stroke patients
March 2006 - October 2008

Ambulance Distribution	ECH	GSH	KSC	KST	OCH	RSJ	SUH*	VMC	Totals
Total (all patients)	18098	14797	19562	19087	14747	27165	5271	34777	153504
(%)	11.8	9.6	12.7	12.4	9.6	17.7	3.4	22.7	100.0
Total (stroke)	371	479	436	464	336	628	364	266	3282
(%)	11.3	14.6	13.3	14.1	10.2	19.1	11.1	8.1	100.0

*SUH Data is incomplete

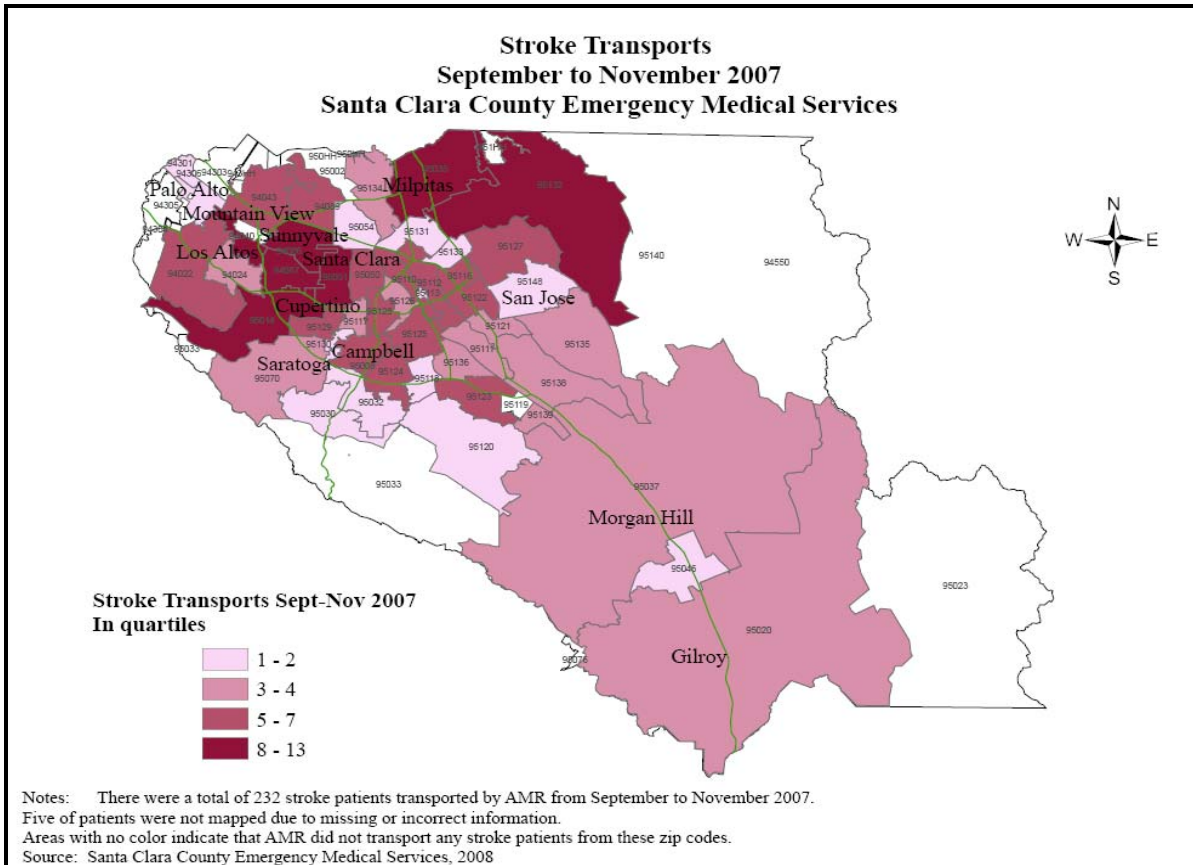


Figure 1. Regional Incidence of Stroke Patients in Santa Clara County

Paramedic Performance

The appropriate disposition of stroke patients depends on a reliable clinical triage tool, on adequate training, and accurate assessment by paramedics. Under-recognition of stroke symptoms may result in stroke patients not being taken to appropriate destinations. On the other hand, a tendency to over-call patients as having strokes who do not have strokes can

EMS Stroke Protocol
Check Blood Glucose
Cincinnati Stroke Scale +
Symptoms <6 hours in duration
Stroke alert called and patient transported to a PSC

result in delays to care and excessive use of resources. Our post hoc analysis - performed on an ongoing basis as part of our Quality Improvement Plan - is based on a review of paramedic documentation data. It shows an impressive degree of compliance with the criteria of the Stroke Protocol to triage a patient to a Certified Stroke Center vs. a non-stroke center facility ranging from 88-96%.

Table 7: Accuracy of Paramedic Assessment

	9/07	10/07	11/07	12/07	1/08	2/08	3/08	4/08
Total Stroke Transports	42	49	56	66	72	93	88	76
Appropriate Stroke Triage	40	43	46	60	64	88	79	73
Stroke Alert not called*	2	6	10	6	8	5	9	3
Percent correct	95%	88%	82%	91%	88%	95%	90%	96%

*100% of these patients were transported to a PSC.

Table 8 shows the treatments provided stroke patients at our Stroke Centers. Based on the number of stroke patients that are seen at these centers one would expect higher numbers of treated patients. Despite our best efforts, many patients are ineligible for many of these treatments because they arrive too late to benefit from them or have other contraindications. Fully half of all stroke patients fail to call 911 which is their single best chance of getting the appropriate treatment in a timely manner. Outreach and public education programs to create public awareness of the need for rapid response to stroke symptoms are planned by all the PSCs.

Table 8: Treatment of Stroke 2006 -2007

Intravenous tPa	211
Other methods (Merci, Penumbra, IA tPA, Factor VII)	67

Conclusion:

Stroke is a deadly, disabling and devastating illness. Our area hospitals have made a giant investment in time, equipment and personnel to meet national stroke center standards. The Santa Clara County EMS Agency has implemented a Comprehensive Stroke Program that ensures that every acute stroke patient who calls 911 will get to one of these stroke centers and have the best hope for recovery. However much work still remains when one-half of all patients who suffer from a stroke either fail to call for 911 quickly, fail to call 911 at all, and end up at the wrong place at the wrong time. Continued efforts are needed to expand public health awareness.