Chapter 3 Pre-hospital Care

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EXECUTIVE SUMMARY

- There has been an increase in the number of patients transported by the medical retrieval team to Liverpool Hospital between 1995 and 1999. The number however remains small compared to those brought by the ambulance service.
- The number of patients who bypass other hospitals to come to Liverpool Hospital has remained static at approximately 40% during the 5 years.
- The number of prehospital intubations for trauma patients on an annual basis is small.
- The use of M.A.S.T. suits in penetrating trauma has almost disappeared.
- There is an increasing use of M.A.S.T. suit in blunt trauma in 1999.
- Stratified for injury severity score, M.A.S.T. suit prolongs scene time.
- The time elapsed during intrahospital trauma transfer is predominantly taken up by the time at referring hospital.

MODE OF ARRIVAL

Helipad on roof of Liverpool Hospital with view of original hospital in background

Ambulance entrance to Liverpool Hospital on a busy day.

PREHOSPITAL TRIAGE OF TRAUMA FOR ADULTS AND CHILDREN (PROTOCOL 4)

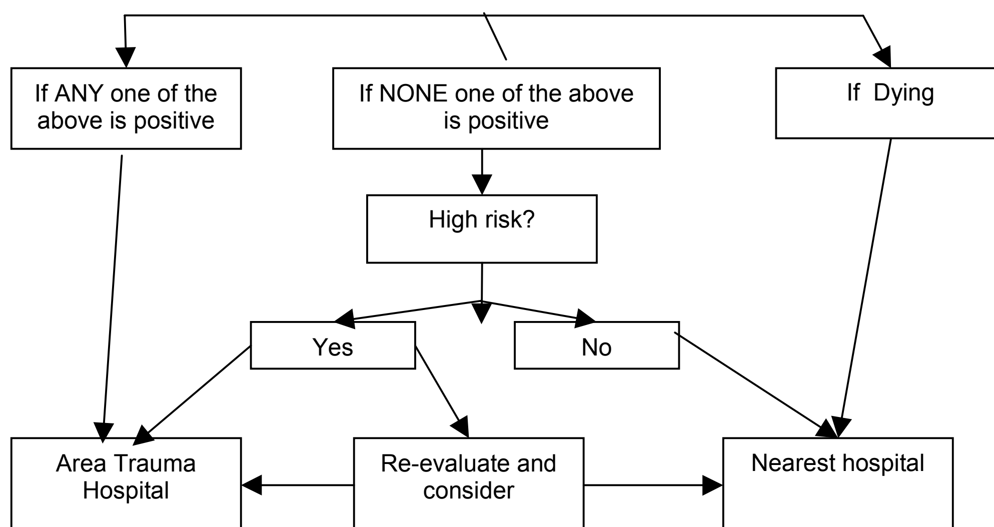
Protocols give guidance to ambulance officers on where to take patients, depending on their observations and conclusions on severity of injury. They also give guidance for instances where immediate transport is not possible, such as when a patient is trapped in a crashed vehicle. Minimum standards for transport of the critically ill have been set by the Australian and the New Zealand College of Anaesthetics and Australasian College for Emergency Medicine (1992, p23).

VITAL SIGNS

1. Respiratory distress – rate <10 or >30/cyanosis
2. Systolic blood pressure <90 or no palpable radial pulse in children
3. Requires at least "shake and shout" to arouse or falling level of consciousness in children.

INJURIES

1. Serious trauma to any body region
2. Burns partial or full thickness >20% in adults or >10% in children



Ambulance Protocol 4 (a*dapted from; "Protocols, Pharmacologies, General Notes" Ambulance Service of NSW Jan 1994)* relates to pre-hospital triage of trauma for adults and children, and outlines the following considerations when deciding which hospital to deliver patient:

If an ambulance officer considers a critically ill patient will not survive the time of transport to an Area Trauma Hospital, the patient should be taken to the nearest hospital en route for urgent resuscitation.

1. If a patient has both a serious injury (complaint types are specified in protocol) ***and*** the time from early assessment to arrival at hospital is expected to be greater than 1 hour, contact co-ordination centre early after initial assessment of the situation and receive advice regarding availability of paramedic or medical response team.
2. If the patient is apparently not seriously injured but has been involved in a mechanism of injury which is high risk, then the officers should re-evaluate the situation and decide at their own discretion whether to take the patient to an Major Trauma Service or nearest hospital.

Definition of Serious Injury

Penetrating injury of: Head, Neck, Chest, Abdomen, Perineum or Back
Head region: 1 or 2 dilated pupils, open head injury or severe facial injury
Chest region: Subcutaneous emphysema or major flail segment
Abdomen: Distension or Rigidity
Spinal: Weakness or Sensory loss
Limb: Vascular injury with ischaemia of limb, Amputation,
Crush injury of limb or trunk, or bilateral femur fractures

High Risk Situations

1. Vehicular crash >60km/hour
2. Major deformation of vehicle
3. Fatal injury in same vehicle
4. Fall from height >5metres
5. Patient ejected from vehicle
6. Child cyclist/pedestrian hit by vehicle>30km/hour
7. Injuries to multiple body regions

Approved by Dr Ross Wilson 1st November, 1993
Chairman, Medical Advisory Committee Ambulance Service of NSW

Ambulance Transport Decision Codes

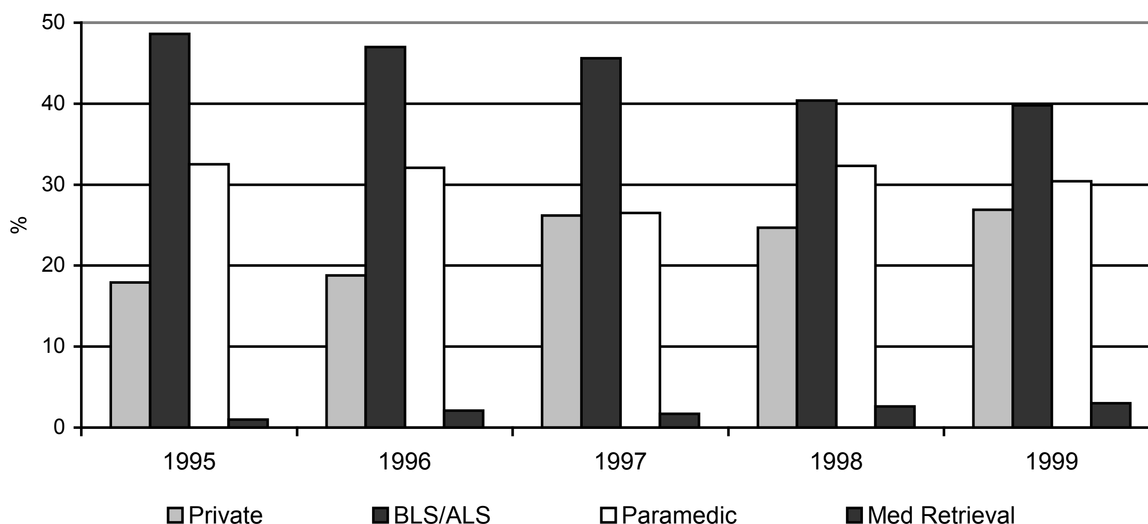
Pre-Hospital Transport Decision Code refers to the ambulance criteria (as defined by the Department of Health) by which ambulance officers decides to which hospital the patient should be transported:

The codes are:
1 Minor Injury is minor and nearest hospital is an Urban Trauma Service (e.g. Camden)
2 Minor Injury is minor and nearest hospital is a Major Trauma Service (ie Liverpool)
3 Minor Injury is minor but MTS has restricted service so bypass to Urban Trauma Service
4 Serious Injury is serious, bypass nearer Urban take patient to Major Trauma Service
5 Serious Injury is serious and Major Trauma Service is nearest
6 Serious Injury is serious Major Trauma Service is closed eg disaster (very rare)
7 Dying To nearest hospital (e.g. airway obstruction)

The term "serious" is used in the pre-hospital setting to identify the potential for serious injury in a patient based on mechanism of injury, history or vital signs at scene. It should not be confused with a "serious" injury based on Injury Severity Score of 16 or more. Similarly the term "minor" in pre-hospital setting is not related to the Minor or Major category injuries in the Trauma Registry.

Mode of Arrival

Of the 6,654 major category admissions to hospitals in SWSAHS, 4903 (73.7%) had prehospital care from ambulance officers (Basic Life Support, Advanced Life Support or Paramedics) or Medical Retrieval Team (either by road or helicopter). 3162 (83.3%) of patients with major injuries from trauma that were delivered to Liverpool Hospital received pre-hospital care.



Level of Training of Attending Officer
Level 1 Probationer
Level 2 Basic Life Support
Level 3 Basic Life Support
Level 4 Advance Life Support
Level 5 Paramedic

Pre-hospital Transport Decisions

3,051 of the patients admitted to Liverpool Hospital had pre-hospital intervention. The tables below represent the mode of transport to hospital and whether they were came directly to Liverpool Hospital or were transfers from another hospital. Also for the 2,788 patients receiving pre-hospital care, we show the decision the ambulance officers made regarding which hospital to take the patients. Please note that for 30 patients the transport decision code was not documented.

Mode of Transport for Trauma Admissions to Liverpool Hospital

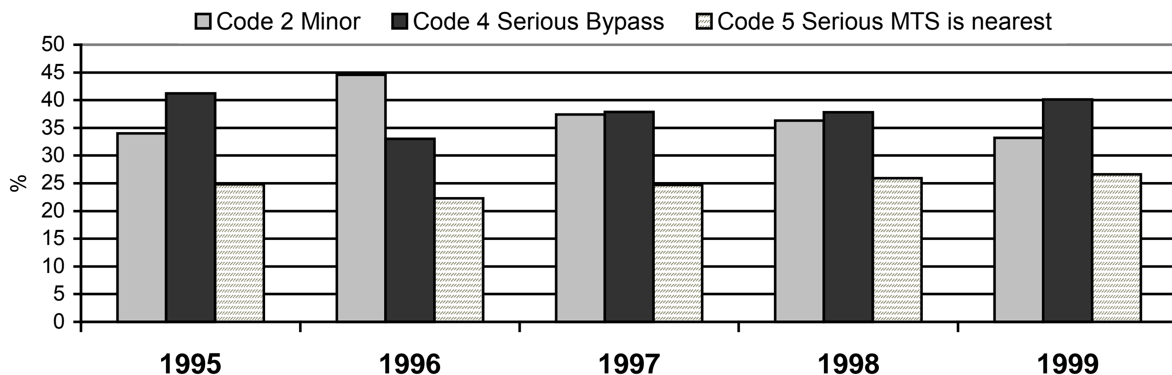
Mode of Transport	Direct		From SWSAHS		From Other AHS		Total	
	N	%	N	%	N	%	N	%
Private	438	*13.3*	11	*2.7*	4	*5.1*	453	*11.9*
Ambulance BLS/ALS	1270	*38.4*	233	*56.8*	18	*22.8*	1521	*40.1*
Paramedic Ambulance	1480	*44.8*	77	*18.8*	5	*6.3*	1562	*41.2*
Medical Retrieval	38	*1.1*	69	*16.8*	30	*38.0*	137	*3.6*
Other	79	*2.4*	20	*4.9*	22	*27.8*	121	*3.2*
Total	**3305**	*100*	**410**	*100*	**79**	*100*	**3794**	*100*

Of the 3,305 patients admitted to Liverpool Hospital directly (not transferred from another hospital), 2758 (84.4%) were transported by ambulance. The transport decision by the attending officers for these patients is available for 2758 of these patients.

Transport Decision Codes for All Patients Brought Directly to Liverpool Hospital

Year	1995		1996		1997		1998		1999		Total	
Code 2 - Minor MTS is nearest	160	*34.0*	254	*44.6*	209	*37.4*	222	*36.3*	182	*33.2*	1,027	*37.2*
Code 4 - Serious Bypass to MTS	194	*41.2*	188	*33.0*	212	*37.9*	231	*37.8*	220	*40.1*	1,045	*37.9*
Code 5 -Serious MTS is nearest	117	*24.8*	127	*22.3*	138	*24.7*	158	*25.9*	146	*26.6*	686	*24.9*
Total	471	*100*	569	*100*	559	*100*	611	*100*	548	*100*	2,758	*100*

Transport Decision Codes: Direct to Liverpool Hospital



Pre-hospital Cardio-Pulmonary Resuscitation

During the 5 years from 1995 to 1999, 49 patients received cardio-pulmonary resuscitation during the pre-hospital phase. Only 2 of these patients survived the remaining 47 died. One of the survivors was a 20 year old man who suffered cardiac arrest following electrocution and the other was a 41 years old man who sustained a small ventriculo-septal defect from a stab wound to the chest.

Ambulance Transport Decision for Patients Receiving CPR

Decision Code	1995	1996	1997	1998	1999	Total
Code 4 - Bypass	2	4	4	2	1	13
Code 5 - serious Liverpool is nearest	3	8	7	3	1	22
Code 7 Dying to nearest hospital	2	4	1	2	5	14
Total	7	16	12	7	7	49

Predominant Injury Body Region for Patients administered CPR in Pre-Hospital Setting

	Highest Score for Body Region of Injury			
Body Region	**4 Severe**	**5 Critical**	**6 Maximum**	**Total**
Head	2	12	5	19
Thorax	2	8	3	13
Abdomen and Pelvic	0	4	1	5
Spine	0	2	2	4
Head & other	1	2	0	3
Head & spine	0	1	0	1
Lower Extremity	2	0	0	2
External,burns,other	0	0	2	2
Total	7	29	13	49

Age group and Outcome of Patients Receiving CPR Pre -hospital

Age Group of Patient	Survived	Died	Total
1 to 9	0	7	7
10 to 19	0	8	9
20 to 29	1	14	15
30 to 39	0	6	6
40 to 49	1	4	5
50 to 59	0	2	2
60 to 69	0	0	0
70+	0	5	5
Total	2	47	49

Airway Intervention for Patients Receiving CPR Pre -hospital

YEAR	1995	1996	1997	1998	1999	Total
Oxygen	1	1	0	0	0	2
Guedell	0	2	1	0	0	3
Bagged	1	5	3	2	1	12
ETT*	5	8	8	5	6	32
Total	7	16	12	7	7	49

Pre-hospital Airway Control

YEAR	1995	%	1996	%	1997	%	1998	%	1999	%
Oxygen	583	*76.6*	580	*71.3*	639	*65.1*	646	*59.8*	604	*58.4*
Guedell	8	*1.1*	9	*1.2*	13	*1.2*	15	*1.3*	7	*0.7*
Bagged	25	*3.3*	35	*4.6*	24	*2.4*	31	*3*	28	*2.8*
ETT*	15	*2*	11	*1.5*	19	*1.9*	11	*1*	13	*1.3*
Nil	80	*10.5*	132	*16.2*	233	*23.8*	253	*23.4*	164	*15.9*
Not Doc	50	*6.6*	42	*5.2*	54	*5.5*	124	*11.5*	217	*21*
Total	761	*100*	812	*100*	981	*100*	1080	*100*	1034	*100*

ETT* refers to patients who were intubated either with Endotracheal tube or Nasotracheal tube.

4,669 patients received pre-hospital care and were transported to the SWSAHS hospitals.
The following table shows the level of skills of the attending officer for the 268 patients who had airway intervention more intensive than oxygen only.

Level of Training for Attending Officer for Patients with Airway Intervention

Pre-hospital Care	Guedel	%	Bag/Mask	%	ETT	%	Total
Basic Life Support	7	*13.5*	18	*12.6*	0	*0*	25
Advanced Life Support	14	*26.9*	14	*9.8*	0	*0*	28
Paramedic	31	*59.6*	111	*77.6*	57	*82.6*	199
Medical Officer	0	*0*	0	*0*	12	*17.4*	12
Total	52	*100*	143	*100*	69	*100*	264

Age Groups of Patients Receiving Airway Intervention

Age groups	Guedel	%	Bag Mask	%	ETT	%	Total	%
<10	3	*13.6*	12	*54.5*	7	*31.8*	22	*100*
10 to 19	9	*19.2*	29	*61.7*	9	*19.2*	47	*100*
20 to 29	17	*19.5*	46	*52.9*	23	*26.4*	87	*100*
30 to 39	6	*15.4*	22	*56.4*	11	*28.2*	39	*100*
40 to 59	9	*19.2*	24	*51.1*	11	*23.4*	47	*100*
60 to 91	8	*30.8*	10	*38.5*	8	*30.7*	26	*100*
Total	52	*19.7*	143	*54.2*	69	*26.2*	264	*100*

Personnel Performing Endotracheal Intubation

Year	1995	%	1996	%	1997	%	1998	%	1999	%	Total
Paramedic	14	*93.3*	11	*100*	16	*84.2*	6	*54.5*	10	*76.9*	57
Doctor MRT	1	*6.7*	0	*0*	3	*15.8*	5	*45.5*	3	*23.1*	12
Total	15	*100*	11	*100*	19	*100*	11	*100*	13	*100*	69

Pre-hospital Fluid administration Major Category Injuries 1995 – 1999

Number of Patients Receiving Intravenous Fluid in Pre-hospital Setting

Year	1995	%	1996	%	1997	%	1998	%	1999	%	Total
< 500mL	63	*25.8*	50	*24.2*	53	*25.1*	72	*26.6*	59	*26*	297
≥ 500mL	181	*74.2*	157	*75.8*	158	*74.9*	199	*73.4*	168	*74*	863
Total	244	*100*	207	*100*	211	*100*	271	*100*	227	*100*	1160

Level of Training for Attending Officer Administering IV Fluid to Patients

Year	1995	%	1996	%	1997	%	1998	%	1999	%	Total	%
Basic BLS	11	*4.5*	3	*1.5*	3	*1.4*	5	*1.8*	6	*2.6*	28	*2.4*
Advanced ALS	57	*23.4*	56	*27.1*	49	*23.2*	49	*18.0*	29	*12.8*	240	*20.7*
Paramedic	174	*71.3*	148	*71.5*	148	*70.1*	201	*74.2*	166	*73.1*	837	*72.2*
Medical MRT	2	*0.82*	0	*0*	5	*2.4*	15	*5.5*	11	*4.8*	33	*2.8*
Not documented	0	*0*	0	*0*	6	*2.8*	1	*0.4*	15	*6.6*	22	*1.9*
Total	244	*100*	207	*100*	211	*100*	271	*100*	227	*100*	1160	*100*

Volume of Fluid Administered Pre-hospital to Hypotensive and Normotensive Patients

The following tables represent volume of fluid administered for blunt and penetrating trauma where there was a recorded blood pressure. 589 patients were hypotensive at scene (Systolic BP <100) according to first recorded observation of ambulance officers. Of these 406 (68.9%) had intravenous cannula inserted and fluid administered. 709 patients were normotensive (had Systolic BP >=100) and had IV cannula inserted. The tables below represent firstly the patients who were hypotensive with blunt or penetrating trauma and then normotensive patients with blunt or penetrating trauma and their intravenous fluid volume administered.

Hypotensive Patients Following Blunt Trauma: Intravenous Fluid Volume Administered

Blunt trauma	1995	%	1996	%	1997	%	1998	%	1999	%	Total	%
<500 mL	14	*12.4*	10	*12*	10	*10.8*	13	*13*	9	10.1	56	*11.7*
≥500 mL	67	*59.3*	48	*57.8*	49	*52.7*	60	*60*	39	43.8	263	*55*
No cannula	32	*28.3*	25	*30.1*	34	*36.6*	27	*27*	41	46.1	159	*33.3*
Total	113	*100*	83	*100*	93	*100*	100	*100*	89	*100*	478	*100*

Hypotensive Patients Following Penetrating Trauma: IV Fluid Volume Administered

Penetrating	1995	%	1996	%	1997	%	1998	%	1999	%	Total	%
<500 mL	0	*0*	1	*4.2*	2	*8*	1	*4.3*	1	5.3	5	*4.5*
≥500 mL	15	*75*	19	*79.2*	18	*72*	20	*87*	10	52.6	82	*73.9*
No cannula	5	*25*	4	*16.7*	5	*20*	2	*8.7*	8	42.1	24	*21.6*
Total	20	*100*	24	*100*	25	*100*	23	*100*	19	100	111	*100*

Normotensive Patients Following Blunt Trauma: Intravenous Fluid Volume Administered

Blunt	1995	%	1996	%	1997	%	1998	%	1999	%	Total	%
<500 mL	40	*32.3*	34	*33.3*	36	*33*	49	*33.8*	43	30.1	202	*32.4*
≥500 mL	84	*67.7*	68	*66.7*	73	*67*	96	*66.2*	100	69.9	421	*67.6*
Total	124	*100*	102	*100*	109	*100*	145	*100*	143	100	623	*100*

Normotensive Patients Following Penetrating Trauma: IV Fluid Volume Administered

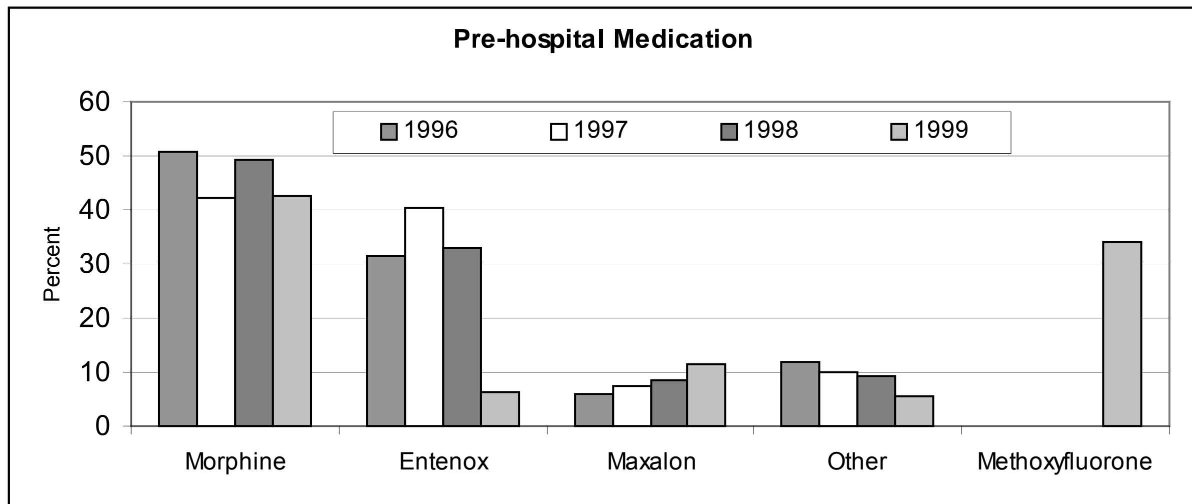
Penetrating	1995	%	1996	%	1997	%	1998	%	1999	%	Total	%
<500 mL	6	*35.3*	5	*21.7*	4	*25*	7	*30.4*	1	14.3	23	*26.7*
≥500 mL	11	*64.7*	18	*78.3*	12	*75*	16	*69.6*	6	85.7	63	*73.3*
Total	17	*100*	23	*100*	16	*100*	23	*100*	7	100	86	*100*

Administration of Medication in Pre-hospital Setting

Type of Drug Administered Pre-hospital to Patients Delivered to SWSAHS Hospitals

Drug	1995	(%)	1996	(%)	1997	(%)	1998	(%)	1999	(%)	Total	(%)
Nil Given	44	5.8	446	55.7	669	69.3	680	64.5	566	56.3	2405	52.5
Morphine	9	1.2	105	13.1	117	12.1	189	17.9	177	17.6	597	13
Entenox	5	0.7	61	7.6	107	11.1	113	10.7	24	2.4	310	6.8
Maxalon	2	0.3	11	1.4	19	2.0	28	2.7	43	4.3	103	2.2
Methoxyfluorone	n/a	*	n/a	*	n/a	*	n/a	*	136	13.5	136	2.9
Other	0	0.0	21	2.6	27	2.8	30	2.8	21	2.1	99	2.7
No documented	697	92.1	157	19.6	26	2.7	14	1.3	38	3.8	932	20.3
Total	757	100	801	100	965	100	1054	100	1005	100	4582	100

1995* This information was not collected for patients admitted during 1995 and beginning of 1996.



Methoxyfluorone is an inhalation analgesia that came into use as a substitute for Entenox in 1999

Insertion of Intercostal Thoracocentesis in Pre-hospital Setting

During the period 1995 to 1999, 12 patients required insertion of an intercostal thoracocentesis in the pre-hospital setting. 10 of these were inserted by paramedic ambulance officers and 2 by medical officers in the field. All the patients requiring this intervention were seriously injured (ISS range 16 to 75) and only four ultimately survived.

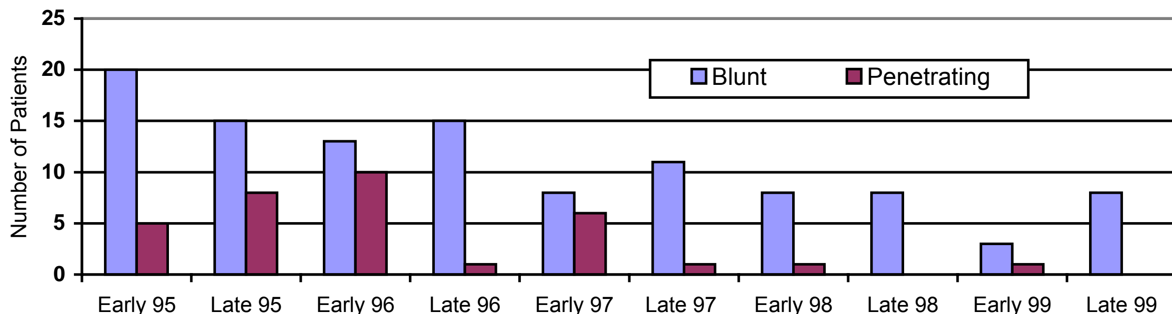
Military Anti Shock Trouser Device (MAST)

Military Anti Shock Trouser (MAST) is an inflatable device that has been used for splinting lower limb fractures or for increasing blood pressure. Use of this device is very limited and is decreasing. In October 1996 the Medical Advisory Committee of NSW Ambulance Service advised changes to the ambulance protocol concerning use of MAST. Since March 1997 protocols reflect that MAST is contraindicated for penetrating torso injuries and ruptured diaphragm.

MAST Device Application for Different Injury Severity

Injury Severity	Blunt		Penetrating		
ISS	Not inflated	Inflated	Not inflated	Inflated	Total
1 - 4	6	2	2	3	13
5 - 8	7	1	2	0	10
9 - 15	28	16	5	6	55
16-24	8	3	3	4	18
25-49	17	8	1	7	33
50-74	4	5	0	0	9
75	0	4	0	0	4
Total	70	39	13	20	142

Six Month Trends and Type of Trauma in Use of MAST Device



Less Serious Injuries: MAST and Time at Scene by Ambulance Officers

ISS 1 to 15	# 20 mins	%	≥ 20 mins	%	Total	%
MAST not applied	2260	*64.8*	1149	*33.0*	3409	*97.8*
Applied not inflated	25	*0.7*	25	*0.7*	50	*1.4*
Inflated	10	*0.3*	18	*0.5*	28	*0.8*
Total	2295	*65.8*	1192	*34.2*	3487	*100*

More Serious Injuries: MAST and Time at Scene by Ambulance Officers

ISS 16 to 75	# 20 mins	%	≥ 20 mins	%	Total	%
MAST not applied	549	*60.9*	288	*32.0*	837	*92.9*
Applied not inflated	10	*1.1*	23	*2.6*	33	*3.7*
Inflated	14	*1.6*	17	*1.9*	31	*3.4*
Total	573	*63.6*	328	*36.4*	901	*100*

Liverpool Hospital Serious Injuries

Cases Delivered by Primary Road Ambulance from Within Urban Area

Number of Cases with ISS ≥16

Trauma Triage Category	1995	%	1996	%	1997	%	1998	%	1999	%
Minor - Codes 1 to 3	15	*13*	35	*22.3*	24	*14.3*	23	*15.5*	18	*12.1*
Serious - Code 4 (Bypass)	55	*47.8*	62	*39.5*	81	*48.2*	62	*41.9*	70	*47*
Serious - Code 5 (MTS nearest)	44	*38.3*	58	*36.9*	58	*34.5*	61	*41.2*	51	*34.2*
Serious - Code 6	0	*0*	0	*0*	0	*0*	0	*0*	0	*0*
Serious - Code 7	0	*0*	1	*0.6*	0	*0*	0	*0*	0	*0*
Not known - form missing	0	*0*	0	*0*	3	*1.8*	1	*0.7*	7	*4.7*
Not recorded on the form	1	*0.9*	1	*0.6*	2	*1.2*	1	*0.7*	3	*2.0*
Total	**115**	*100*	**157**	*100*	**168**	*100*	**148**	*100*	**149**	*100*

Over the 5 years the number of serious injuries that were transported to Liverpool by primary road ambulance increased from 115 in 1995 to 168 in 1997 and then decreased to 148 in 1998 with similar numbers in 1999.

The following table demonstrates an increase in the number of inter-hospital transfers into Liverpool Hospital of serious injuries.

Origin and Mode of Transport for Serious Injuries to Liverpool hospital

Mode of Transport **Number of Cases with ISS≥16**

Mode of Arrival	1995	%	1996	%	1997	%	1998	%	1999	%
Primary Road Ambulance	115	*75.7*	156	*79.6*	167	*81.1*	148	*72.5*	149	*68.3*
Direct Helicopter	1	*0.7*	0	*0.0*	4	*1.9*	6	*2.9*	5	*2.3*
Transfer from urban hospital	16	*10.5*	22	*11.2*	15	*7.3*	22	*10.8*	36	*16.5*
from another MTS	2	*1.3*	2	*1.0*	0	*0.0*	5	*2.5*	5	*2.3*
from outside Sydney metro	10	*6.6*	5	*2.6*	10	*4.9*	11	*5.4*	7	*3.2*
Private transport (car etc.)	8	*5.3*	10	*5.1*	9	*4.4*	12	*5.9*	12	*5.5*
Not known	0	*0.0*	1	*0.5*	1	*0.5*	0	*0.0*	4	*1.8*
Total	**152**	*100*	**196**	*100*	**206**	*100*	**204**	*100*	**218**	*100*

SWSAHS Inter-hospital Transfers to Liverpool Hospital

There were 384 adult patients (aged 14 years and older) admitted to Liverpool Hospital following inter-hospital transfer from another hospital within SWSAHS during the 5-year period. This represents 4.2% of all trauma admissions to Liverpool Hospital. The inter-hospital transfers were conducted either by a medical retrieval team (eg NRMA CareFlight or Westpac Lifesaver Rescue Helicopter), by paramedics or by general duty ambulances according to the referral hospital physicians' judgement. A small number of patients were transported by private vehicle as it was felt no specialised transport was necessary. After arrival in Emergency Department at Liverpool Hospital 73 (19.1%) went to operating theatre, 75 (19.5%) to ICU, 227 (59.1%) to ward, 8 were transferred to a hospital in another area, and 2 patients died in ED.

Time (Elapsed) and Level of Officer at Each Phase of Care for Inter-hospital Transfers

Time (in minutes) Mean ∀sd	General Duty Ambulance		Paramedic Ambulance		Medical Retrieval		Private		Total	
Total Pre-hospital time	16	*∀9*	17	*∀10*	20	*∀19*	N/a	*	15	*∀95*
At Referring Hospital	330	*∀246*	254	*∀245*	250	*∀212*	397	*∀406*	306	*∀256*
Transport time	37	*∀20*	38	*∀31*	32	*∀13*	51	*∀48*	57	*∀130*
Total Time to Liverpool	435	*∀275*	325	*∀234*	283	*∀165*	*	*	373	*∀252*

Mode of Transport from Referring Hospital: Patient demographics *(values means ∀ sd)*

Transport n=384	General Duty Ambulance	%	Paramedic Ambulance	%	Medical Retrieval Team	%	Private	%	Total	%
Males	166	*75.8*	51	*72.9*	52	*76.5*	19	*70.4*	288	*75.0*
Females	53	*24.2*	19	*27.1*	16	*23.5*	8	*29.6*	96	*25.0*
Age years (mean ∀sd)	40.6	*∀ 20.9*	37.6	*∀ 21.7*	35.5	*∀ 18.9*	33.2	*∀ 20.4*	38.7	*∀ 20.8*
ISS (mean ∀sd)	10.5	*∀ 6.8*	14.4	*∀ 8.3*	20.5	*∀ 12.6*	11.7	*∀ 7.1*	13.0	*∀9.1*

Mode of Transport from Referring Hospital: Mechanism of Injury

Mechanism	General Duty Ambulance		Paramedic Ambulance		Medical Retrieval Team		Private		Total	
n=384	N	%	N	%	N	%	N	%	N	%
Road Trauma	68	*30.1*	29	*41.4*	23	*33.8*	7	*22.6*	127	*33.1*
Interpersonal Violence	45	*20.8*	20	*28.5*	16	*23.5*	3	*9.7*	84	*21.9*
Falls	73	*33.8*	14	*20.0*	20	*29.4*	11	*35.4*	118	*30.7*
Other	33	*15.3*	7	*10.0*	9	*13.2*	6	*22.2*	55	*14.3*

Interventions at Referring Hospital Prior to Transfer to Liverpool Hospital

Intervention	n=384	%
Intubation	57	*14.8*
Chest Tube Insertion	11	*2.9*
Fluids administered ≥ 1500ml	45	*11.7*
Blood administration	9	*2.3*

Patients with Altered Physiological Status At Referring Hospital Prior to Transfer

Transport	General Duty Ambulance		Paramedic Ambulance		Medical Retrieval		Private		Total	
	N	%	N	%	N	%	N	%	N	%
Respiratory Rate <10 or >29	4	*1.0*	10	*2.6*	10	*2.6*	0	*0.0*	24	*6.3*

BP Systolic <90mmHg	5	*1.3*	1	*0.3*	3	*0.8*	0	*0.0*	9	*2.3*
GCS ≤ 8	2	*0.5*	8	*.21*	23	*6.0*	0	*0.0*	33	*8.6*