

VSTORM Annual report
Volume 2: Detailed data
1st July 2001–30th June 2002

Prepared by Monash University: Victorian State Trauma Registry
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About this report

This is the second volume of the first annual report from the Victorian State Trauma Registry. Over ensuing years, the Victorian State Trauma Registry will provide valuable information for the monitoring of the performance of the State's trauma system. Data collected during the first year, which is summarised in this report, provides the baseline against which such monitoring evaluations will be made.

This report is structured into two volumes. Volume One describes the Registry and its activities and provides summary baseline data to describe the Victorian State Trauma System. Key indicators of system performance are presented and the profile of Victorian trauma patients described. Most of the data in this volume is presented across the whole trauma system and corresponds to patient level data. When the data is segregated across the trauma service levels, this is done according to information from either the first or definitive hospital of care, as appropriate. A glossary of terms is given as Appendix 1 to this volume. Limitations of the present data are also highlighted in this volume. Volume Two provides additional data presentations for readers who are interested in further tabulations of the Registry data. Many of these tabulations break down the data according to trauma service level on the basis of either the first or definitive hospital of care, as appropriate.

Throughout these two volumes, a * in a table cell indicates a count of one to five cases (either patients or episodes of care). The actual numbers within these cells are not provided to ensure that full privacy of individuals is maintained, in accordance with privacy requirements.

Major trauma numbers

All data in this section split by trauma service level corresponds to the definitive hospital of care. As data is not available from the definitive hospital of care for all patients, the number of patients in these tables total 1321 (and not 1367).

Major trauma patients

The median number of major trauma patients each week over the 12-month period was 26 (range: 6- 38).

Reason for inclusion in the Registry

Table 1: Reason for patient inclusion in major trauma data (decreasing hierarchical order across the table from left to right)

Trauma Service Level	n	In-hospital death	ISS > 15	ICU >24 hours requiring mechanical ventilation	Urgent surgery
		%	%	%	%
Major Trauma Service	1092	14.8	70.0	6.8	8.4
Metropolitan Trauma Service	146	12.3	76.0	6.8	4.9
Metropolitan Primary Care Service	0	-	-	-	-
Regional Trauma Service	62	8.1	80.6	9.7	*
Regional Urgent Care Service	21	47.6	47.6	*	0.0
Regional Primary Care Service	0	-	-	-	-
Total	1321	14.8	70.8	6.9	7.5

Episodes of care

Table 2: Total number of major trauma care episodes, ICU admissions and in-hospital deaths

Trauma Service Level	Total n	Number of ICU admissions (irrespective of LOS)	Deaths n
Major Trauma Service	1115	595	162
Metropolitan Trauma Service	243	75	24
Metropolitan Primary Care Service	20	0	2
Regional Trauma Service	185	40	20
Regional Urgent Care Service	104	11	18
Regional Primary Care Service	9	0	1
Total	1675	721	227

*Note:
There is some multiple counting in this table as 299 patients had multiple hospital episodes reported; 290 patients with 2 episodes and 9 patients with 3 episodes.*

Table 3: Number of major trauma patients, ICU admissions and in-hospital deaths – hospital providing the first hospital care

Trauma Service Level	Number of ICU admissions (irrespective of LOS)		Deaths
	Total		
Major Trauma Service	695	353	113
Metropolitan Trauma Service	205	58	22
Metropolitan Primary Care Service	20	0	2
Regional Trauma Service	148	29	19
Regional Urgent Care Service	98	9	18
Regional Primary Care Service	9	0	1
Total	1175	449	175

Note:

*192 missing first hospital care episodes
(largely due to a lack of ethics approvals)*

Table 4: Number of major trauma patients, ICU admissions and in-hospital deaths – hospital providing the definitive care

Trauma Service Level	Number of ICU admissions (irrespective of LOS)		Deaths n
	Total		
Major Trauma Service	1092	588	162
Metropolitan Trauma Service	146	69	18
Metropolitan Primary Care Service	0	-	-
Regional Trauma Service	62	29	5
Regional Urgent Care Service	21	9	10
Regional Primary Care Service	0	-	-
Total	1321	695	195

Note:

*46 missing definitive hospital care episodes
(largely due to a lack of ethics approvals)*

Demographic profile of major trauma cases

All data in this section split by trauma service level corresponds to the definitive hospital of care. As data is not available from the definitive hospital of care for all patients, the number of patients in these tables total 1321 (and not 1367).

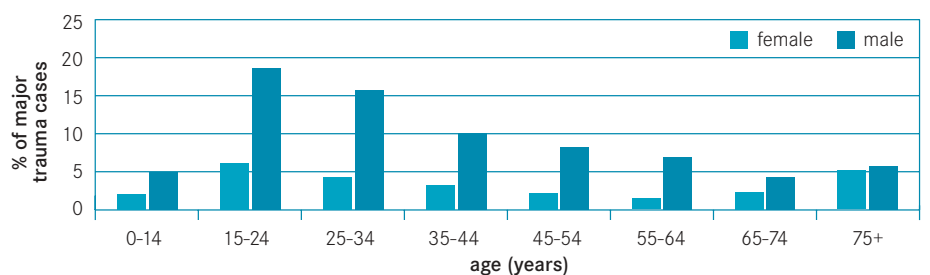
Table 5: Age (in years) of major trauma patients

Trauma Service Level	n	0-14	15-24	25-34	35-44	45-54	55-64	65-74	75 +	Total
MTS	1092	8.3	24.8	19.5	12.7	11.5	7.0	6.1	10.1	100
MeTS	146	0.7	23.2	19.3	21.2	8.9	11.6	8.2	6.9	100
MPCS	0	-	-	-	-	-	-	-	-	100
RTS	62	1.6	21.0	19.4	11.3	12.9	14.5	8.1	11.2	100
RUCS	21	4.8	19.0	19.0	0	9.5	9.5	9.5	26.7	100
RPCS	0	-	-	-	-	-	-	-	-	100
Total	1321	7.1	24.4	19.5	13.4	11.3	7.9	6.5	9.9	100

Table 6: Gender distribution of major trauma patients

Trauma Service Level	n	Males %	Females %
Major Trauma Service	1092	73.4	26.6
Metropolitan Trauma Service	146	76.7	23.3
Metropolitan Primary Care Service	0	-	-
Regional Trauma Service	62	64.5	35.5
Regional Urgent Care Service	21	61.9	38.1
Regional Primary Care Service	0	*	*
Total	1321	73.1	26.9

Figure 1. Overall age/gender distribution of all major trauma patients



Injury event details

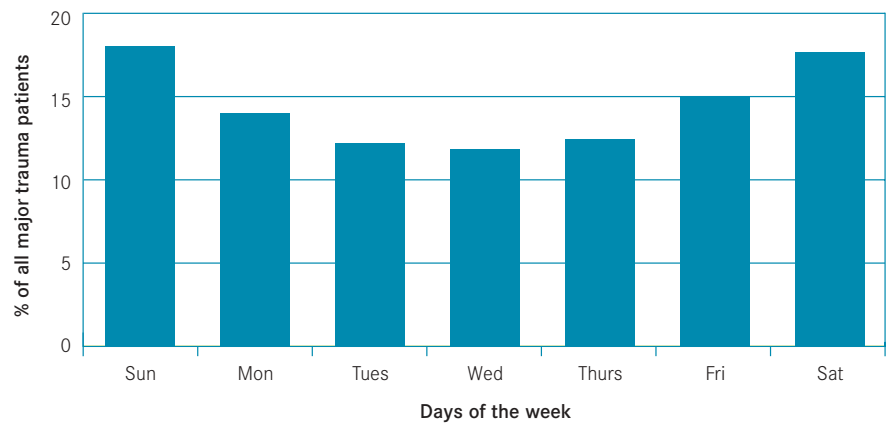
Time and day of injury

Table 7: Time of injury for major trauma patients (definitive hospital)

Trauma Service Level	12am- before 8am	8am- before 4pm	4pm- before 12am	Total %	Missing n	
	n	%	%			
Major Trauma Service	955	21.0	38.3	40.7	100	137
Metropolitan Trauma Service	109	23.9	36.7	39.4	100	37
Metropolitan Primary Care Service	0	-	-	-	-	-
Regional Trauma Service	51	15.7	41.2	43.1	100	11
Regional Urgent Care Service	18	22.2	33.3	44.5	100	3
Regional Primary Care Service	0	-	-	-	-	-
Total	1133	21.1	38.2	40.7	100	188

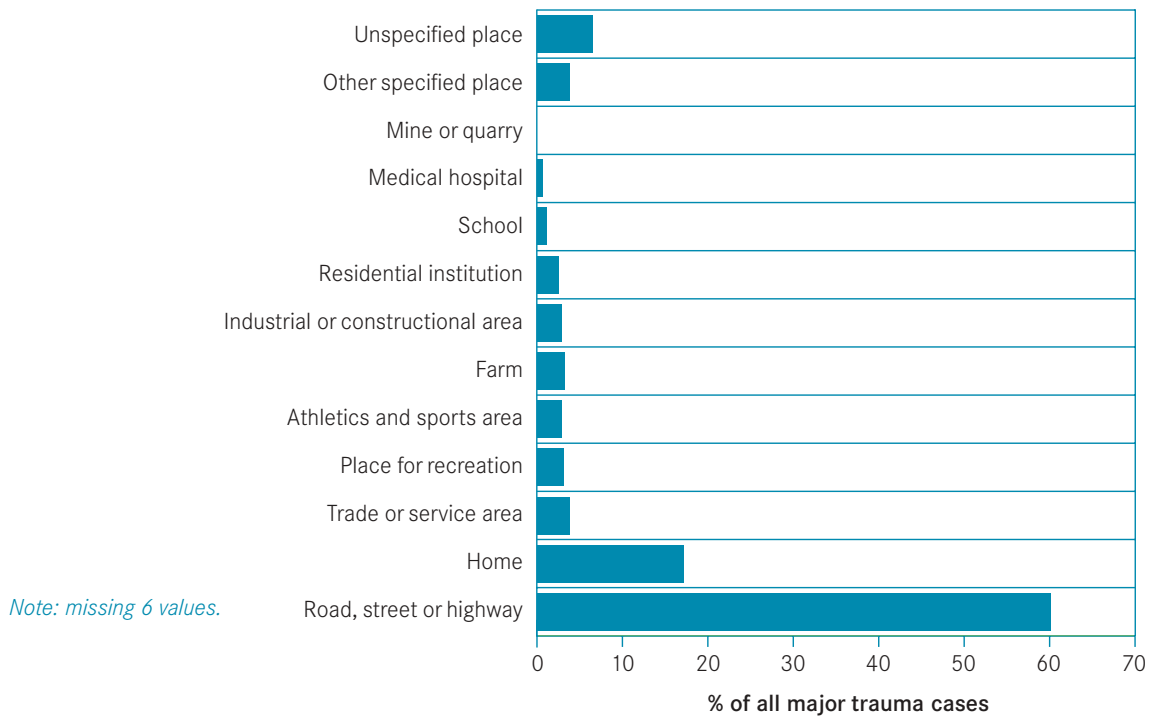
Note: 188 values missing.

Figure 2. Day of the week of injury



Cause and location

Figure 3. Distribution of the places of injury occurrence in major trauma patients (n= 1361)



The “Other specified places” category includes patients where a location was given as a specific street address or suburb/locality name but the type of place was not specified. The “Unspecified place” category has been used to indicate the patients for who the type of place of injury was not specified.

Note:
* indicates five or fewer patients.

Table 8: Place of injury for major trauma patients treated at each level of the trauma service of the definitive hospital of care (n= 1,321)

Place description where the trauma occurred	Major Trauma Service n	Metro-politan Trauma Service n	Metro-politan Primary Care Service n	Regional Trauma Service n	Regional Urgent Care Service n	Regional Primary Care Service n
Road, street, or highway	682	73	0	32	8	0
Home	154	32	0	17	7	0
Industrial or constructional area	14	11	0	0	0	0
Trade or service area	33	*	0	*	0	0
Farm	21	0	0	*	*	0
Place for recreation	27	*	0	*	0	0
Residential institution	20	*	0	*	0	0
Athletics and sports area	15	*	0	*	*	0
Medical hospital	*	0	0	*	0	0
School	*	*	0	0	0	0
Mine or quarry	*	0	0	0	0	0
Other specified place	30	*	0	*	*	0
Unspecified place/missing	86	13	0	*	*	0
Total	1092	146	0	62	21	0

Figure 4. Overall mechanism of injury in major trauma patients (all patients, n=1,367)

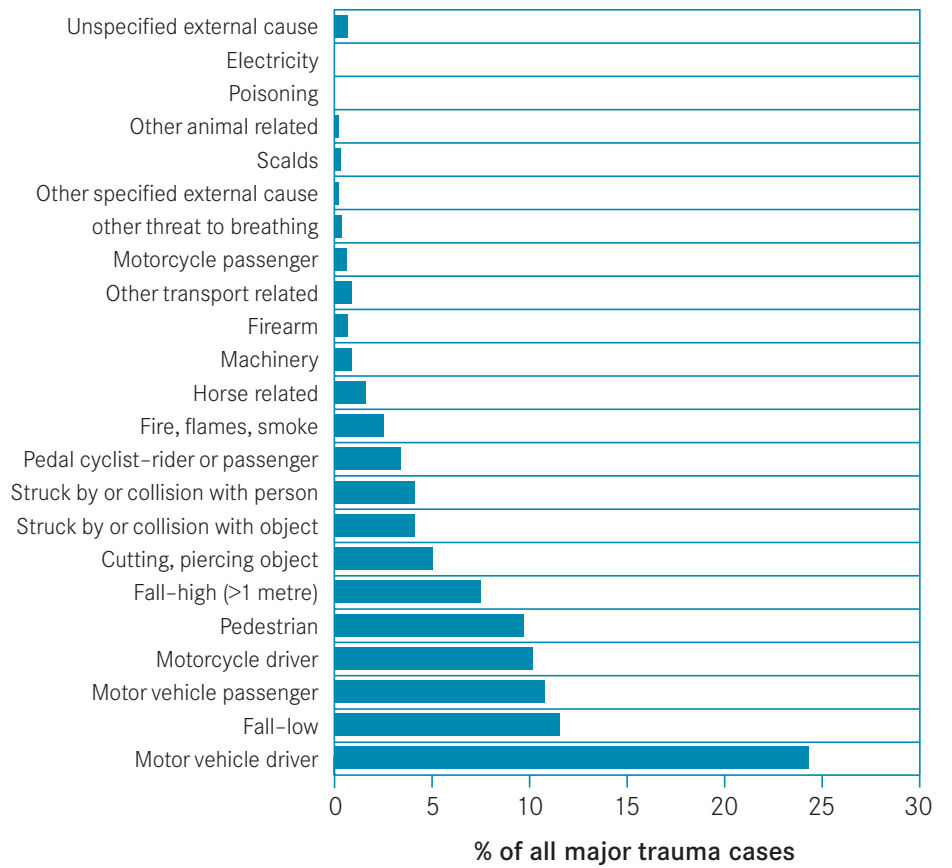


Table 9: Mechanism of injury in major trauma patient according to trauma service level of the definitive hospital of care (n=1,321)

Mechanism of injury	Major Trauma Service n	Metro-politan Trauma Service n	Metro-politan Primary Care Service n	Regional Trauma Service n	Regional Urgent Care Service n	Regional Primary Care Service n
Motor vehicle driver	272	21	0	19	2	0
Fall-low	123	14	0	6	2	0
Pedestrian	118	11	0	*	*	0
Motor vehicle passenger	126	15	0	6	*	0
Motorcycle driver	104	16	0	9	3	0
Fall-high (>1 metre)	78	20	0	5	*	0
Cutting, piercing object	57	9	0	*	*	0
Struck by or collision with object	39	5	0	*	*	0
Struck by or collision with person	35	8	0	*	*	0
Pedal cyclist-rider or passenger	31	*	0	*	0	0
Fire, flames, smoke	29	*	0	0	*	0
Horse related	15	*	0	*	0	0
Machinery	10	*	0	0	0	0
Other transport related circumstance	9	*	0	0	0	0
Other animal related	*	0	0	0	0	0
Firearm	6	0	0	0	*	0
Motorcycle passenger	6	0	0	0	*	0
Scalds	*	0	0	0	0	0
Poisoning	*	0	0	0	0	0
Other specified cause	*	*	0	0	0	0
Other threat to breathing	*	0	0	0	0	0
Electricity	*	*	0	0	0	0
Unspecified external cause/missing	21	12	0	0	*	0
Total	1092	146	0	62	21	0

Note:
* indicates five or fewer patients.

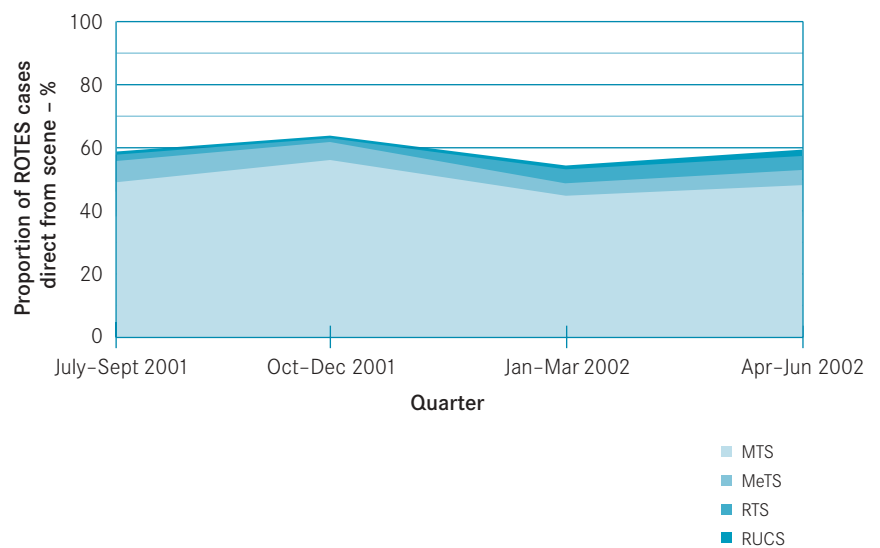
TAC-compensable cases

Table 10: Proportion of major trauma patient that were TAC compensable according to the hospital of definitive care

Trauma Service Level	major trauma patients		Missing
	n*	% TAC patients*	
Major Trauma Service	1011	59.6	81
Metropolitan Trauma Service	134	50.7	12
Metropolitan Primary Care Service	0	-	-
Regional Trauma Service	61	49.2	1
Regional Urgent Care Service	21	38.1	0
Regional Primary Care Service	0	-	-
Total	1227	57.4	94

Note:
* excludes patients of unknown compensable fund and missing values (n=94).

Figure 5. Trends in the proportion of TAC-compensable patients over the 12 month period (according to the hospital of definitive care)



Note:
excludes patients of unknown compensable fund and missing values (n=94)

Injury Intent

Table 11: Intent of the injury in major trauma patients according to the trauma service level of the definitive hospital of care (n=1,321)

	Major Trauma Service	Metro-politan Trauma Service	Metro-politan Primary Care Service	Regional Trauma Service	Regional Urgent Care Service	Regional Primary Care Service
Human Intent	n	n	n	n	n	n
Unintentional	911	112	0	54	15	0
Intentional self harm	35	6	0	0	0	0
Maltreatment, assault by partner	7	*	0	*	*	0
Child neglect, maltreatment	1	0	0	0	0	0
Other assault (not otherwise specified)	47	10	0	*	*	0
Other specified intent	9	0	0	*	0	0
Intent cannot be determined	39	*	0	0	*	0
Intent not specified/missing	43	13	0	*	*	0
Total	1092	146	0	62	21	0

Note:
* indicates five or fewer patients.

Figure 6. Injury intent in major trauma patients (n=1,367)

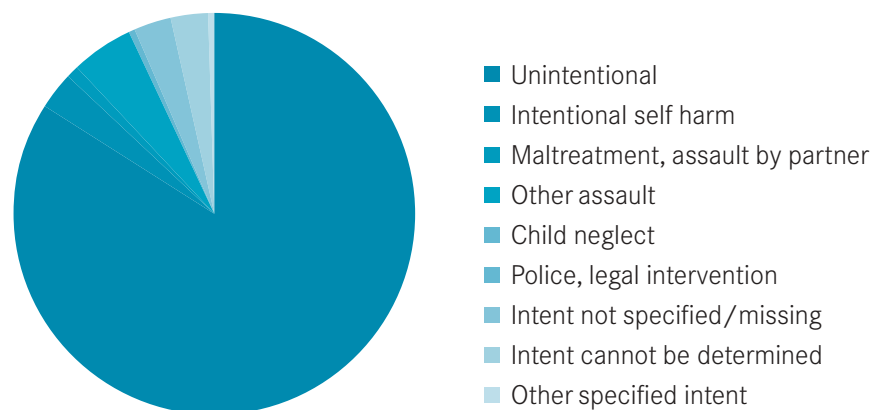
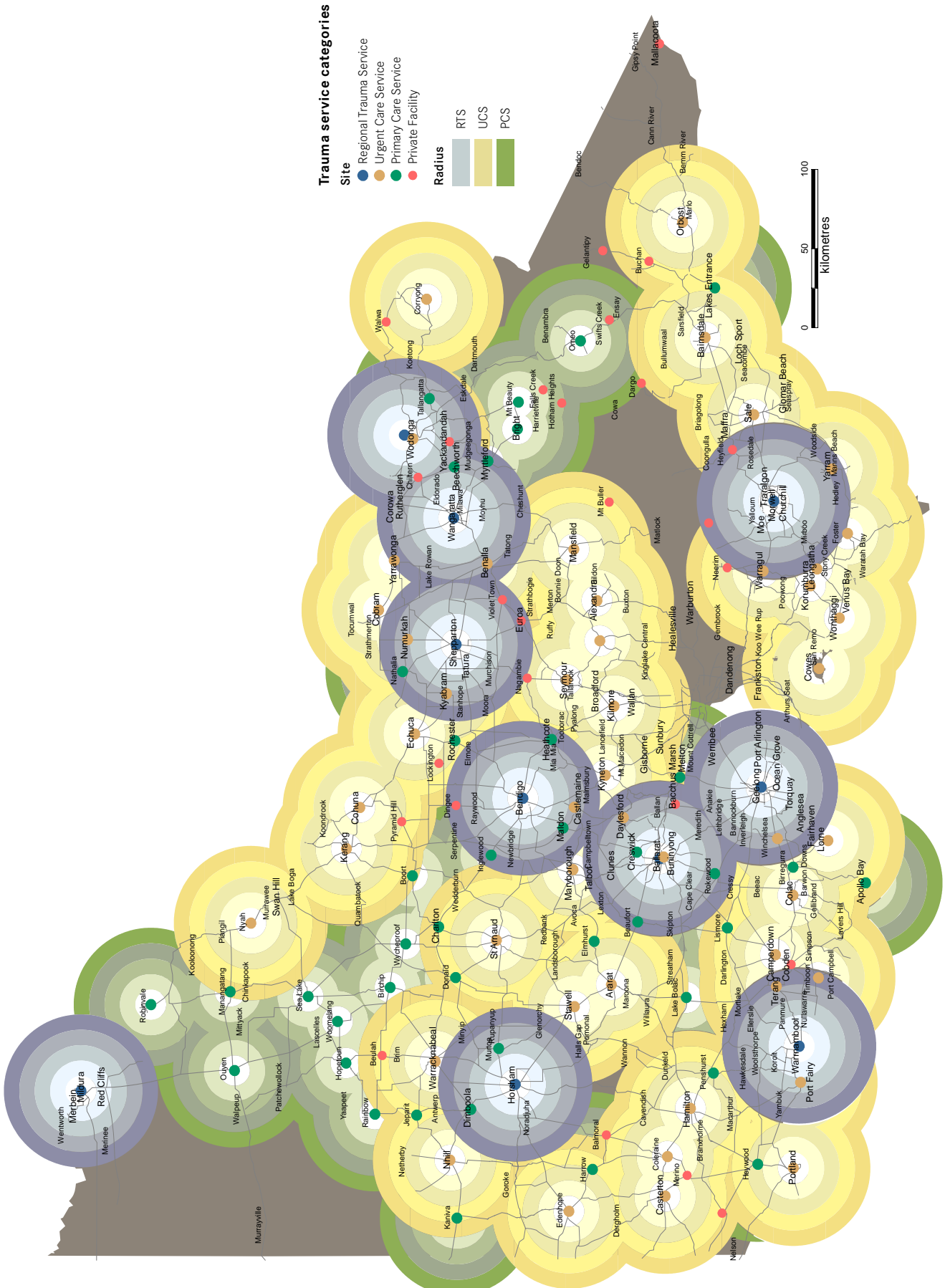


Figure 7. The radial distances from all health facilities designated as a Trauma Service in rural Victoria.

Each of the trauma service levels is indicated with a different colour.



Injury details

All data in this section is as recorded at the first hospital of treatment, or the hospital of definitive care, as specified.

Type of trauma

Table 12: Type of injury sustained by major trauma patients

Trauma Service Level	Total n	Blunt Trauma n=1170 %	Penetrating n=88 %	Burn n=40 %	Missing n
Major Trauma Service	1083	89.9	6.6	3.3	9
Metropolitan Trauma Service	132#	90.2	8.3	*	14
Metropolitan Primary Care Service	0	-	-	-	-
Regional Trauma Service	62	95.2	*	0	0
Regional Urgent Care Service	20	85.0	*	*	*
Regional Primary Care Service	0	-	-	-	-
Total	1298	90.1	6.8	3.1	24

Note: * indicates five or fewer patients.
 # One patient experienced both a penetrating and burn type of injury. 24 missing patients.

Multiple injuries

Figure 8. Median number of injuries per patient according to the trauma service level at the hospital of definitive care

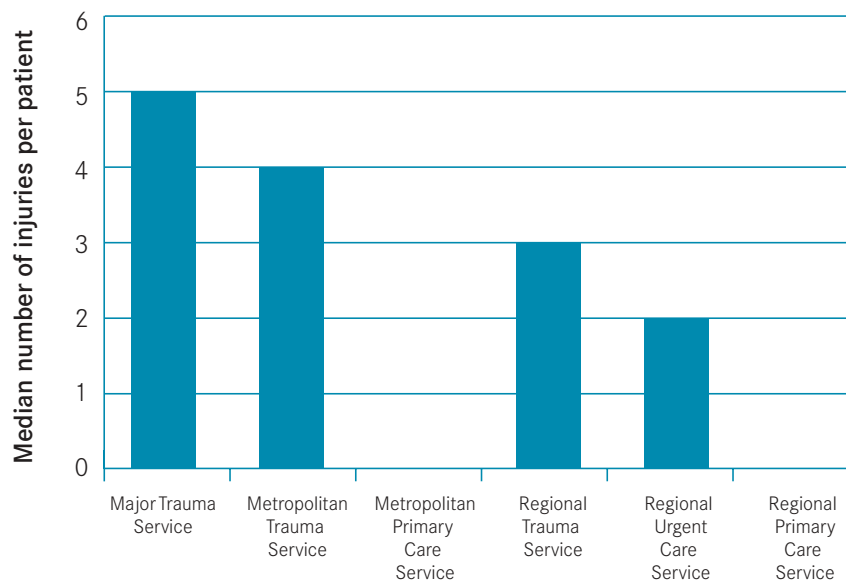


Table 13: Distribution of body regions injured in major trauma patients at the hospital of definitive care

% of injuries treated at each trauma service level							
ISS Body Region	Total	Major Trauma Service	Metro-politan Trauma Service	Metro-politan Primary Care Service	Regional Trauma Service	Regional Urgent Care Service	Regional Primary Care Service
	n=7734 %	n=6876 %	n=612 %	n=0 %	n=206 %	n=40 %	n=0 %
Head/neck	31.5	32.0	28.3	-	24.3	35.0	-
Face	8.9	9.1	7.7	-	6.8	*	-
Chest	17.7	16.6	27.0	-	27.2	25.0	-
Abdomen/pelvis	9.6	9.1	14.5	-	11.1	10.0	-
Extremity	21.2	21.2	18.8	-	25.2	20.0	-
External	11.1	12.0	3.7	-	5.4	2.5	-
Total	100	100	100	-	100	100	-

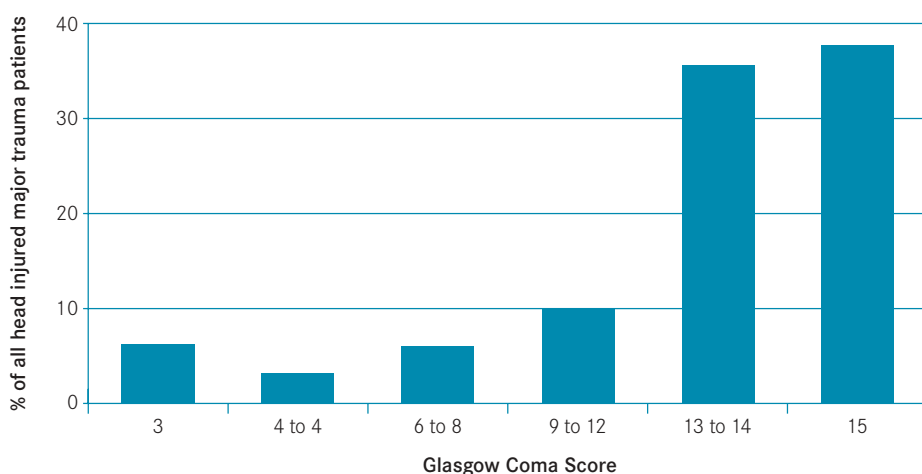
Glasgow Coma Score

Table 14: Distribution of the Glasgow Coma Score for all major trauma patients on arrival from scene at an emergency department (n=802)

Trauma Service Level	n	GCS						Total %
		3 %	4-5 %	6-8 %	9-12 %	13-14 %	15 %	
Major Trauma Service	493	6.7	2.6	4.3	7.1	32.0	47.3	100
Metropolitan Trauma Service	139	*	*	5.0	10.8	24.5	54.0	100
Metropolitan Primary Care Service	9	0.0	0.0	0.0	*	0.0	77.8	100
Regional Trauma Service	103	7.8	4.9	6.8	13.6	26.2	40.8	100
Regional Urgent Care Service	57	*	0.0	*	14.0	31.6	49.1	100
Regional Primary Care Service	*	0.0	0.0	0.0	*	0.0	0.0	100
Total	802	6.0	2.6	4.5	9.4	29.6	48.0	100

Note: if no GCS was recorded at the emergency department, or the patient was intubated or sedated on arrival, the patient's valid pre-hospital GCS value was used. 71 missing patients.

Figure 9. The Glasgow Coma Score for all head injured major trauma patients on arrival from scene at an emergency department (n=407)



Note:
if no GCS was recorded at the emergency department, or the patient was intubated or sedated on arrival, the patient's valid pre-hospital GCS value was used.
93 unknown patients.

Table 15: Distribution of the Glasgow Coma Score for all head injured major trauma patients on arrival from scene at an emergency department (n=407)

Trauma Service Level	n	GCS						Total %
		3 %	4-5 %	6-8 %	9-12 %	13-14 %	15 %	
Major Trauma Service	289	7.6	3.8	6.9	10.0	37.4	34.3	100
Metropolitan Trauma Service	73	*	*	*	8.2	23.3	52.1	100
Metropolitan Primary Care Service	*	0.0	0.0	0.0	*	0.0	75.0	100
Regional Trauma Service	31	0.0	*	*	19.4	38.7	32.3	100
Regional Urgent Care Service	10	0.0	0.0	*	*	*	*	100
Regional Primary Care Service	0	-	-	-	-	-	-	-
Total	407	6.4	3.7	6.9	11.1	34.4	37.5	100

Note:
if no GCS was recorded at the emergency department, or the patient was intubated or sedated on arrival, the patient's valid pre-hospital GCS value was used. Of the 500 head injured patients from scene, there were 93 patients with an unknown GCS.

Injury Severity (AIS and ISS levels)

Figure 10. Distribution of AIS scores for all injuries in major trauma patients (n=7706)

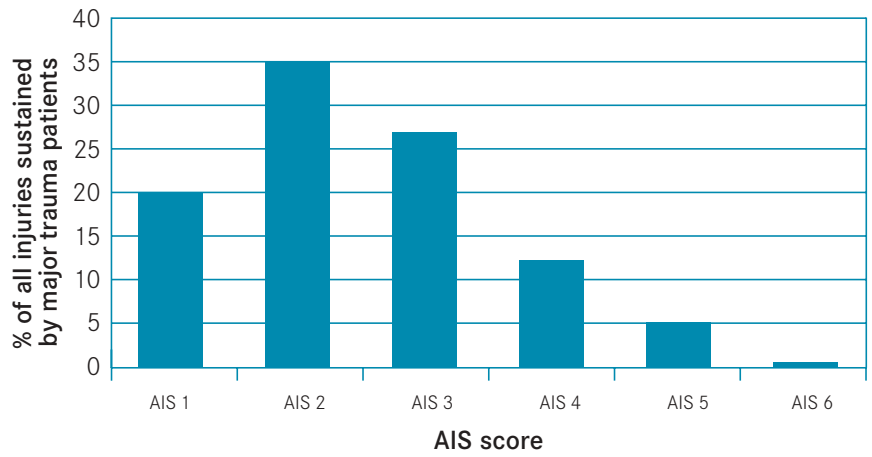
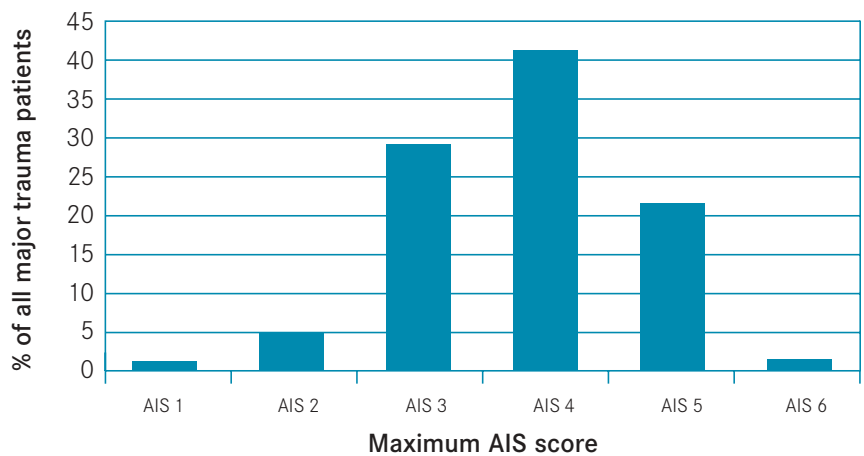


Figure 11. Distribution of maximum AIS scores for each major trauma patient (n=1,292)



Note: 29 missing patients

Figure 12. Distribution of maximum AIS scores for each major trauma patient (n=1,292)

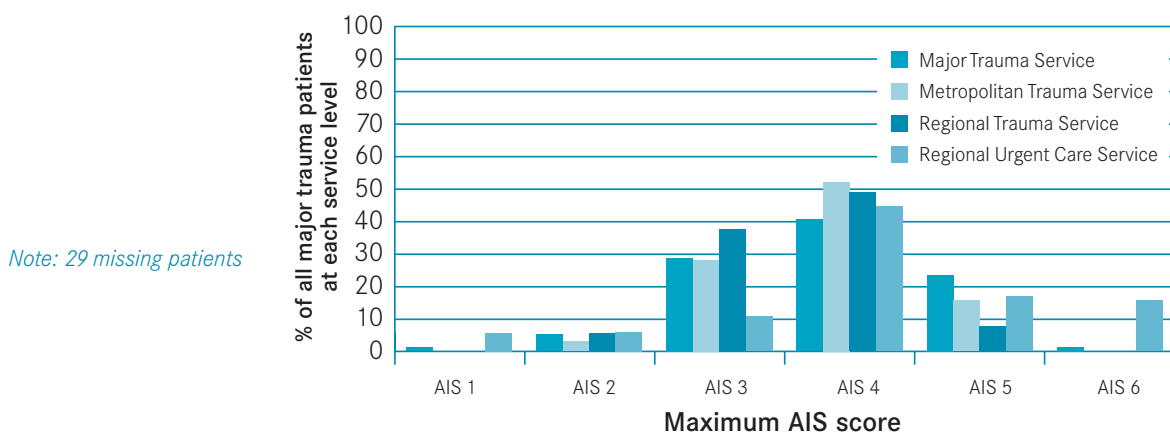


Table 16: Distribution of AIS scores for all injuries in major trauma patients receiving definitive treatment at a Major Trauma Service (n=6857 injuries)

Body region	n	% of all injuries					
		AIS1 %	AIS2 %	AIS3 %	AIS4 %	AIS5 %	AIS6 %
Head or neck	2190	125	445	823	547	246	*
Face	624	247	313	63	*	-	-
Chest	1134	84	279	437	253	77	*
Abdomen or pelvis	625	45	361	128	70	21	-
Extremities	1460	177	847	400	28	8	-
External	824	710	75	12	9	15	*

Table 17: Distribution of AIS scores for all injuries in major trauma patients receiving definitive treatment at a Metropolitan Trauma Service (n=603 injuries)

Body region	n	% of all injuries					
		AIS1 %	AIS2 %	AIS3 %	AIS4 %	AIS5 %	AIS6 %
Head or neck	167	8	60	41	48	10	-
Face	47	28	16	3	-	-	-
Chest	163	10	45	64	33	11	-
Abdomen or pelvis	89	8	39	22	15	*	-
Extremities	114	16	69	24	*	-	-
External	23	18	*	-	-	-	-

Table 18: Distribution of AIS scores for all injuries in major trauma patients receiving definitive treatment at a Regional Trauma Service (n=206 injuries)

Body region	n	% of all injuries					
		AIS1 %	AIS2 %	AIS3 %	AIS4 %	AIS5 %	AIS6 %
Head or neck	50	7	9	17	13	*	-
Face	14	7	7	-	-	-	-
Chest	57	*	15	23	14	-	-
Abdomen or pelvis	22	*	8	7	*	*	-
Extremities	52	8	32	11	*	-	-
External	11	9	*	-	-	-	-

Table 19: Distribution of AIS scores for all injuries in major trauma patients receiving definitive treatment at a Regional Urgent Care Service (n=40 injuries)

Body region	n	% of all injuries					
		AIS1 %	AIS2 %	AIS3 %	AIS4 %	AIS5 %	AIS6 %
Head or neck	14	*	*	*	*	*	*
Face	3	*	*	*	-	-	-
Chest	10	*	*	*	*	*	*
Abdomen or pelvis	4	-	-	*	*	-	-
Extremities	8	6	*	*	-	-	-
External	1	-	-	-	-	*	-

Table 20: Distribution of maximum AIS scores for each major trauma patient receiving definitive treatment at a Major Trauma Service (n=1076)

Body region	n	Maximum AIS for each body region					
		AIS1 %	AIS2 %	AIS3 %	AIS4 %	AIS5 %	AIS6 %
Head or neck	592	1	25	124	265	174	3
Face	12	-	2	10	-	-	-
Chest	286	3	10	103	115	51	*
Abdomen or pelvis	70	3	8	18	29	12	-
Extremities	87	-	8	56	18	5	-
External	29	*	*	*	6	14	*

Table 21: Distribution of maximum AIS scores for each major trauma patient receiving definitive treatment at a Metropolitan Trauma Service (n=138)

Body region	Maximum AIS for each body region						
	n	AIS1 %	AIS2 %	AIS3 %	AIS4 %	AIS5 %	AIS6 %
Head or neck	55	-	*	10	36	8	-
Face	*	-	-	*	-	-	-
Chest	50	-	*	16	23	10	-
Abdomen or pelvis	20	-	*	6	9	*	-
Extremities	11	-	*	*	*	-	-
External	0	-	-	-	-	-	-

Table 22: Distribution of maximum AIS scores for each major trauma patient receiving definitive treatment at a Regional Trauma Service (n=60)

Body region	Maximum AIS for each body region						
	n	AIS1 %	AIS2 %	AIS3 %	AIS4 %	AIS5 %	AIS6 %
Head or neck	23	-	*	7	11	*	-
Face	*	-	*	-	-	-	-
Chest	24	-	*	10	12	-	-
Abdomen or pelvis	8	-	-	*	*	*	-
Extremities	*	-	-	*	*	-	-
External	0	-	-	-	-	-	-

Table 23: Distribution of maximum AIS scores for each major trauma patient receiving definitive treatment at a Regional Urgent Care Service (n=18)

Body region	Maximum AIS for each body region						
		AIS 1	AIS 2	AIS 3	AIS 4	AIS 5	AIS 6
	n	%	%	%	%	%	%
Head or neck	8	-	*	*	*	*	*
Face	0	-	-	-	-	-	-
Chest	8	*	-	*	*	*	*
Abdomen or pelvis	*	-	-	-	*	-	-
Extremities	0	-	-	-	-	-	-
External	*	-	-	-	-	*	-

Table 24: Injury Severity Score for all major trauma patients

Trauma Service Level	n	%	Median (range)	Inter-quartile Range
Major Trauma Service	1086	82.6	21 (1-75)	16 - 29
Metropolitan Trauma Service	139	11.1	18 (4 - 45)	16 - 25
Metropolitan Primary Care Service	0	0.0	-	-
Regional Trauma Service	59	4.7	17 (4 - 34)	16 - 20
Regional Urgent Care Service	18	1.6	19.5 (1 - 75)	16 - 25
Regional Primary Care Service	0	0.0	-	-
Total	1302	100.0	20 (1 - 75)	16 - 27

Note: missing 19 values.

Revised Trauma Score

Table 25:
Revised Trauma Score (weighted) for all major trauma patients

Trauma Service Level	n	Median	Range
Major Trauma Service	923	7.84	1.89-7.84
Metropolitan Trauma Service	134	7.33	3.22-7.84
Metropolitan Primary Care Service	0	-	-
Regional Trauma Service	50	7.84	5.03-7.84
Regional Urgent Care Service	14	7.60	2.34-7.84
Regional Primary Care Service	0	-	-
Total	1121	7.70	1.89-7.84

Pre-hospital care and quality indicators

Additional tables summarizing the pre-hospital phase data are given in this section. The number of patients for which all episode of care information was available in the VSTORM database limits the number of cases presented in this section.

Pre-hospital transit times

Table 26: Total pre-hospital time (in minutes) between receipt of the ambulance call until time of arrival at first receiving hospital according to type of ambulance service – non entrapped patients

Ambulance Service	n	Missing entrapment	Median (Range)	IQ Range	% > 1 hour
MAS	347	14	42 (12 – 210)	30 – 53	15.0
RAV	67	10	43 (10 – 267)	28.5 – 75.5	77.6
AAV	72	3	89 (12 – 209)	71.7 – 124	87.5
Total	486	27	45 (10 – 267)	32 – 65.3	28.5

Table 27: Total pre-hospital time (in minutes) between receipt of the ambulance call until time of arrival at first receiving hospital according to type of ambulance service – entrapped patients

Ambulance Service	n	Missing entrapment	Median (Range)	IQ Range	% > 1 hour
MAS	58	14	48 (9 – 95)	40 – 58	20.7
RAV	16	10	52 (19 – 131)	33 – 78	37.5
AAV	66	3	90 (46 – 312)	75 – 115	87.9
Total	140	27	65 (9 – 312)	38 – 92	54.3

Quality assurance indicators

Table 28: Median time at scene (in minutes)

Ambulance Service		n	Median	Range	Inter-quartile Range
MAS	Entrapped	55	20	6-68	15-28
	non-entrapped	351	15	1-67	11-22
RAV	Entrapped	19	32	1-103	20-44
	non-entrapped	78	16	4-74	13-27
AAV	Entrapped	93	40	2-155	56-66
	non-entrapped	106	26.5	7-467	12-24
Total	Entrapped	167	30	1-155	18-45
	non-entrapped	535	16	1-467	11-23

Table 29: Number of patients with a time at scene of more than 20 minutes (non-entrapment patients with blunt injuries only)

Ambulance Service	Number of non-entrapment blunt injury cases	Number of blunt injury cases with missing entrapment status	Number of cases with a time at scene available	% of cases with a time at scene of >20 minutes
MAS	326	18	312	29.5
RAV	85	10	63	33.3
AAV	126	3	104	67.3
Total	537	31	479	38.2

Note: only includes blunt injury patients for whom the time at scene could be calculated (n=479)

Table 30: Number of patients with a time at scene of more than 10 minutes (non-entrapment patients with penetrating injuries AND systolic blood pressure <100 mm/Hg only)

Ambulance Service	Number of non-entrapped penetrating injury cases	Number of penetrating injury cases with missing entrapment status	Number of non-entrapped penetrating injury cases with BP <100 mmHg on arrival at scene	Number of these cases with scene at time available...	and scene time >10 minutes
MAS	38	2	16	15	4
RAV	11	0	9	6	2
AAV	8	1	2	2	0
Total	57	3	27	23	6

Note: only includes penetrating injury cases for which time at scene could be calculated (n=23)

Table 31: Number of patients with a GCS < 9 at scene and no endotracheal tube administered at scene

Ambulance Service	n	GCS available	Number of patients with a GCS < 9	Number of patients with a GCS < 9 and no endotracheal tube administered at scene
MAS	274	162	56	34
RAV	49	46	8	6
AAV	177	67	51	13
Total	500	275	115	53

Table 32: Number of head injured patients with Glasgow Coma Score < 9 and an O2 saturation < 90%

Ambulance Service	Number of head injured cases	Number of head injured with GCS available	Number of head injured cases with a GCS <9	Number of head injured with O2 sat available	Number of head injured cases with GCS <9 and O2 sat available	Number of these cases with a O2 sat < 90% after 10 mins at scene
MAS	354	197	65	28	15	4
RAV	76	59	10	20	3	0
AAV	221	75	55	23	14	5
Other	29	2	1	2	1	0
Missing	302	27	10	12	3	2
Total	982	377	141	85	36	11

Table 33: Number of head injured patients with Glasgow Coma Score < 9 with a systolic blood pressure of less than 100mmHg after 10 minutes at scene

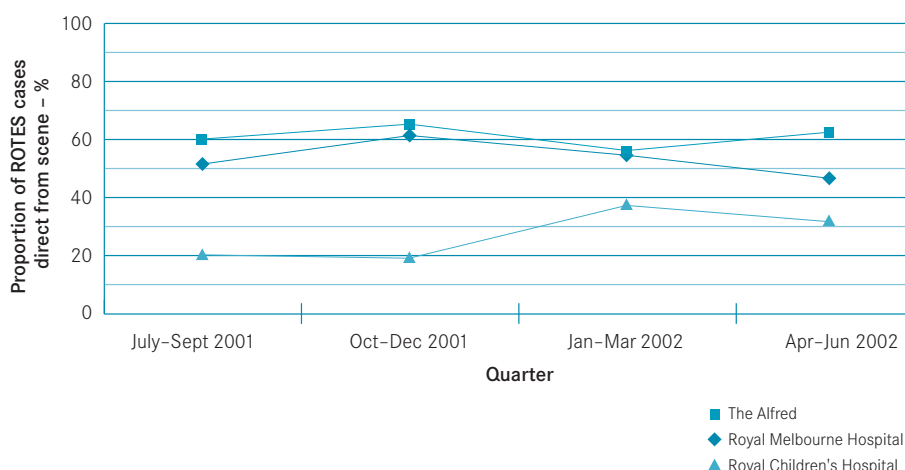
Ambulance Service	Number of head injured cases	Number of head injured with GCS available	Number of head injured cases with a GCS <9	Number of head injured with BP available	Number of head injured cases with GCS <9 and BP available	Number of these cases with a systolic BP < 100mmHg after 10 mins at scene
MAS	354	197	65	105	44	16
RAV	76	59	10	37	5	2
AAV	221	75	55	60	45	14
Other	29	2	1	2	1	0
Missing	302	27	10	9	2	1
Total	982	377	141	213	97	33

Transit and transfer information and system performance

Additional tables summarizing the transit and transfer phase data are given in this section. Data presenting the trauma service level of the patient’s first hospital of care and hospital providing their definitive treatment are for transfer cases with full information available.

Direct admissions to Major Trauma Services

Figure 13. Trends in the proportion of all direct from scene admissions to each Major Trauma Service hospital



Mode of transport

Table 34: Transport mode of arrival for major trauma

Trauma Service Level	Source	Mode of Transport					Not documented /missing %	Total %
		n	MAS %	RAV %	Air %	Other %		
To a Major Trauma Service	Direct	636	46.9	0.6	36.5	1.7	14.3	100.0
	Referral	419	32.7	5.0	37.7	4.3	20.3	100.0
	Other	59	30.5	-	33.9	8.5	27.1	100.0
To a Metropolitan Trauma Service	Direct	185	85.9	1.1	0.5	11.4	1.1	100.0
	Referral	25	36.0	20.0	24.0	16.0	4.0	100.0
	Other	22	54.5	9.2	0.0	36.3	-	100.0

Trauma Service Level	Source	n	Mode of Transport					Not documented /missing %	Total %
			MAS %	RAV %	Air %	Other %			
To a Metropolitan Primary Care Service	Direct	10	100.0	-	-	-	-	-	100.0
	Referral	0	-	-	-	-	-	-	-
	Other	10	40.0	-	-	60.0	-	-	100.0
To a Regional Trauma Service	Direct	131	1.5	80.1	9.2	6.9	2.3	-	100.0
	Referral	32	-	78.1	-	3.1	18.8	-	100.0
	Other	20	-	65.0	5.0	30.0	-	-	100.0
To a Regional Urgent Care Service	Direct	89	-	79.8	11.2	9.0	-	-	100.0
	Referral	4	-	50.0	25.0	-	25.0	-	100.0
	Other	10	-	20.0	-	70.0	10.0	-	100.0
To a Primary Care Service	Direct	8	-	50.0	-	37.5	12.5	-	100.0
	Referral	0	-	-	-	-	-	-	-
	Other	1	-	100.0	-	-	-	-	100.0

Transfers across the system

Figure 14. Overall gender and age distribution for all major trauma first transfers only

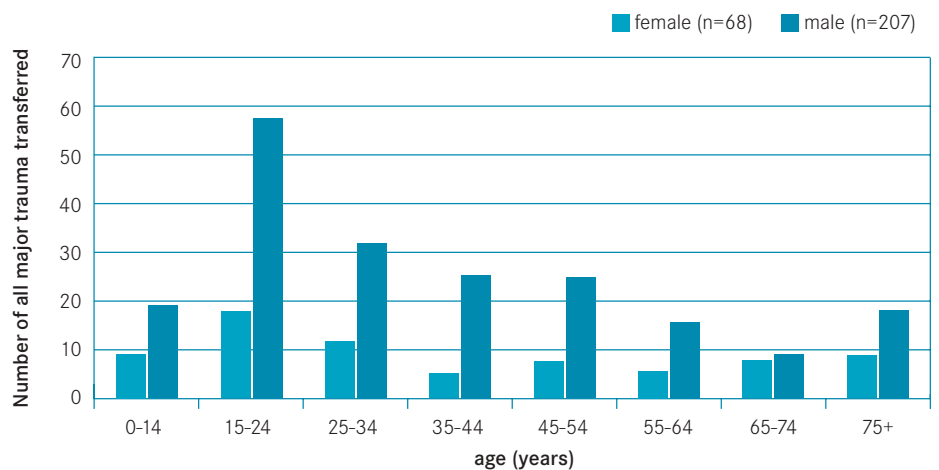
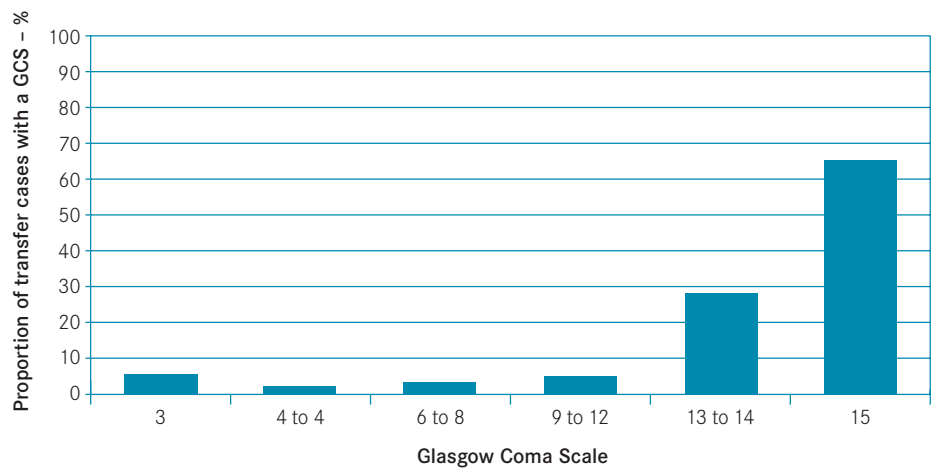


Figure 15. The GCS in major trauma patients on arrival in an emergency department at a receiving hospital



Note:
includes all transferred patients, not only initial transfers. Excludes intubated and sedated patients (n=174), and patients with no GCS recorded (n=50)

Table 35: Distribution of the Glasgow Coma Score for all referred major trauma patients on arrival at an emergency department

Trauma Service Level	3	4-5	6-8	9-12	13-14	15	Illegitimate GCS	GCS not recorded
	n	n	n	n	n	n	n	n
Major Trauma Service	12	1	3	6	59	137	169	32
Metropolitan Trauma Service	-	-	-	-	2	11	3	9
Metropolitan Primary Care Service	-	-	-	-	-	-	-	-
Regional Trauma Service	-	-	-	2	7	14	2	7
Regional Urgent Care Service	-	-	-	-	1	1	0	2
Regional Primary Care Service	-	-	-	-	-	-	-	-

Note:
includes all transferred patients, not only initial transfers. Excludes illegitimate (intubated and sedated) patients (n=174), and patients with no GCS recorded (n=50)

Table 36: Origin of transfers to the Major Trauma Services

Note: the 'other' refers to a hospital or health service that is not part of Victoria's trauma system. These include interstate and overseas hospital, rehabilitation centres, Royal Dental hospital, Royal Women's Hospital etc.

Origin of transfer	To the Alfred Hospital n=241 %	To the Royal Melbourne Hospital n=111 %	To the Royal Children's Hospital n=71 %
Major Trauma Service	0.8	0.9	2.8
Metropolitan Trauma Service	33.2	45.0	33.8
Metropolitan Primary Care Service	8.3	5.4	21.1
Regional Trauma Service	31.1	22.5	21.1
Regional Urgent Care Service	22.1	16.3	19.8
Regional Primary Care Service	0.8	1.8	-
Other	3.7	8.1	1.4
Total	100.0	100.0	100.0

Specialist transfers

Table 37: Injury severity and probability of survival for paediatric patients (<16 years) transferred (first treating hospital)

Trauma Service Level	ISS level	Number	TRISS probability of survival	
			<50%	>50%
Major Trauma Service	ISS>15	2	1	1
	ISS<15	1	1	1
Metropolitan Trauma Service	ISS>15	10	9	9
	ISS<15	1	1	1
Metropolitan Primary Care Service	ISS>15	3	1	1
	ISS<15	0	-	-
Regional Trauma Service	ISS>15	11	10	10
	ISS<15	0	-	-
Regional Urgent Care Service	ISS>15	12	10	10
	ISS<15	0	-	-
Regional Primary Care Service	ISS>15	0	-	-
	ISS<15	0	-	-

Table 38: Transfer of neurotrauma patients (n=210) across the trauma service

First hospital of care	Definitive hospital of care					
	MTS	MeTS	MPCS	RTS	RUCS	RPCS
MTS	2	4	-	-	-	-
MeTS	53	6	-	-	-	-
MPCS	14	-	-	-	-	-
RTS	70	4	-	-	-	-
RUCS	48	3	-	2	-	-
RPCS	4	-	-	-	-	-

Table 39: Transfer of spinal cord trauma patients (n=21)

First hospital of care	Definitive hospital of care					
	MTS	MeTS	MPCS	RTS	RUCS	RPCS
MTS	-	5	-	-	-	-
MeTS	2	4	-	-	-	-
MPCS	0	-	-	-	-	-
RTS	5	3	-	-	-	-
RUCS	1	-	-	-	-	-
RPCS	1	-	-	-	-	-

Table 40: Transfer of spinal cord trauma patients with neurological injury (n=18)

First hospital of care	Definitive hospital of care					
	MTS	MeTS	MPCS	RTS	RUCS	RPCS
MTS	-	4	-	-	-	-
MeTS	2	3	-	-	-	-
MPCS	0	-	-	-	-	-
RTS	5	2	-	-	-	-
RUCS	1	-	-	-	-	-
RPCS	1	-	-	-	-	-

Hospital systems performance

Emergency department quality indicators

Table 41: Number of major trauma patients with a Glasgow Coma Score of <9 at emergency presentation who were not intubated in an emergency department

Trauma Service Level	Number of patients with legitimate GCS<9			
	GCS<9	Legitimate GCS<9	Total	Not intubated
Major Trauma Service	401	95	75	32
Metropolitan Trauma Service	35	20	15	2
Metropolitan Primary Care Service	1	1	1	1
Regional Trauma Service	30	21	17	3
Regional Urgent Care Service	16	8	6	1
Regional Primary Care Service	1	1	1	1
Total	484	146	115	40

*Note:
legitimate GCS – without intervention,
such as intubation and sedation.*

The length of time from arrival at an emergency department until a CT head scan was performed for head injured patients exceeded 2 hours in the following:

- 156 patients (27.1%) treated at the *Major Trauma Services*. The median time for these 156 patients was 3.2 hours, with a range of 2.0 to 21.6 hours.
- 47 patients (32.4%) treated at a *Metropolitan Trauma Service* had a delay until a CT head scan of >2 hours, with a median time delay of 2.9 hours, and a range of 2.0 to 12.9 hours.
- Five patients (50.0%) receiving treatment at a *Metropolitan Primary Care Service* did not receive a CT head scan until after 2 hours of admission, with a median time delay of 4.1 hours, and a range of 2.6 to 6.5 hours.
- 19 patients (19.0%) at a *Regional Trauma Service* had a delay until a CT head scan of >2 hours, with a median time delay of 3.3 hours, and a range of 2.0 to 4.7 hours.
- Three patients at a *Regional Urgent Care Service* (10.3%) had a delay until a CT head scan of >2 hours, with a median time delay of 2.5 Hours, and a range of 2.2 to 2.8 hours.

Outcome measures

This section describes the outcomes associated with each trauma patient. Measures include the amount of time patients spent in the trauma system, and injury severity measures at discharge. Unless otherwise stated, the data presented in this section relates to the hospital that provided definitive treatment.

Length of stay

Table 42: Length of Stay (hours) in a Trauma Service prior to transfer to a Major Trauma Service

Trauma Service Level		Earlier Treating Hospitals		
		n	Median (Range)	IQ Range
Major Trauma Service	ISS>15	1	9	-
	ISS<15	1	5	-
Metropolitan Trauma Service	ISS>15	66	4.0 (1 - 52)	3 - 6
	ISS<15	6	6.5 (1 - 35)	2.5 - 22.5
Metropolitan Primary Care Service	ISS>15	13	5 (1 - 21)	3 - 7
	ISS<15	2	6.5 (4 - 9)	5.3 - 7.8
Regional Trauma Service	ISS>15	59	5 (1 - 115)	3 - 7
	ISS<15	5	6 (1 - 19)	6 - 10
Regional Urgent Care Service	ISS>15	38	4 (0 - 22)	2 - 6
	ISS<15	7	4 (1 - 17)	2.5 - 4.5
Regional Primary Care Service	ISS>15	2	1	-
	ISS<15	0	-	-
Total	ISS>15	179	4 (0 - 115)	2 - 7
	ISS<15	21	5 (1 - 35)	3 - 9

Table 43: Length of stay (days) at definitive treating hospital

Trauma Service Level		Definitive Treating Hospital		
		n*	Median (Range)	IQ Range
Major Trauma Service	ISS>15	794	9.5 (0.2 - 158)	5 - 18.8
	ISS<15	170	7.5 (1 - 128)	4 - 13
Metropolitan Trauma Service	ISS>15	112	7 (0.1 - 310)	4 - 15
	ISS<15	19	9 (1 - 26)	6 - 16
Metropolitan Primary Care Service	ISS>15	0	-	-
	ISS<15	0	-	-
Regional Trauma Service	ISS>15	48	8 (1 - 54)	5 - 11
	ISS<15	12	9 (1 - 32)	8 - 15
Regional Urgent Care Service	ISS>15	17	1 (0.2 - 38)	1 - 9
	ISS<15	*	*	*
Regional Primary Care Service	ISS>15	0	-	-
	ISS<15	0	-	-
Total	ISS>15	971	9 (0.2 - 310)	4 - 17.5
	ISS<15	205	8 (0.7 - 128)	4 - 13

Note:
Missing data for 145 cases of known survivors at discharge

Table 44: Injury severity in patients admitted to an Intensive Care Unit at a definitive treating hospital

Trauma Service Level	ICU LOS (days)			ISS		
	n	Median	Range	n	Median	Range
Major Trauma Service	588	4	(0.3 - 59)	585	25	(1 - 75)
Metropolitan Trauma Service	69	4	(1 - 24)	66	21	(4 - 45)
Metropolitan Primary Care Service	0	-	-	0	-	-
Regional Trauma Service	29	2	(0.1 - 153)	28	18	(4 - 34)
Regional Urgent Care Service	9	2	(1 - 7)	8	16	(8 - 22)
Regional Primary Care Service	0	-	-	-	-	-
Total	695	4	(0.1 - 153)	687	24	(1 - 75)

Note:
This table excludes cases admitted to an ICU for which the length of ICU stay was unknown and those who were not admitted to an ICU (n=625)

Note:

Missing data for 803 (71.3%) of known alive patients at discharge ($n = 1,126$). This data item was not available for 803 surviving patients (71.3%) because a) the data was not recorded for some patients; b) the Registry had not captured all discharges from hospital during July 2001 – June 2002; or c) the patient had not been discharged from hospital during July 2001 – June 2002.

Neurological status at discharge

Table 45: Number of all major trauma patients with a Glasgow Coma Score >9 on discharge from service providing definitive treatment

Trauma Service Level	Total patients with a known discharge (excluding deaths) and a known discharge GCS	Patients with GCS >9 on discharge	n%	Missing discharge GCS
Major Trauma Service	237	206	86.9	693
Metropolitan Trauma Service	67	67	100	61
Metropolitan Primary Care Service	0	0	-	-
Regional Trauma Service	17	17	100	40
Regional Urgent Care Service	2	2	100	9
Total	383	292	76.3	803

Functionality status at discharge

Table 46: A Modified Functional Measure (FM) for all major trauma patients on discharge from service providing definitive treatment

Trauma Service Level	n	Median FM	Range FM	% of cases with a FM of 3-6	% of cases with a FM of 7-9	% of cases with a FM of 10-11	% of cases with a FM of 12
Major Trauma Service	86	12	(3 – 12)	3.5	8.1	19.8	68.6
Metropolitan Trauma Service	102	11	(4 – 12)	1.0	3.9	49.0	46.1
Regional Trauma Service	45	12	(3 – 12)	6.7	6.7	35.6	51.1
Regional Urgent Care Service	11	11	(9 – 12)	0.0	18.2	36.4	45.5
Total	244	12	(3 – 12)	2.9	7.8	35.8	53.5

Note:

Missing data for 882 (78.3%) of known alive patients at discharge ($n = 1,126$)

Survival status

Table 47: Survival outcome for all major trauma patients (definitive treating hospital only)

Trauma Service Level	ISS level	Number of deaths	% who died	Number of survivors	% who survived
Major Trauma Service	ISS>15	138	15.3	764	84.7
	ISS<15	24	12.6	166	87.4
Metropolitan Trauma Service	ISS>15	14	11.2	111	88.8
	ISS<15	4	19.0	17	81.0
Metropolitan Primary Care Service	ISS>15	0	-	0	-
	ISS<15	0	-	0	-
Regional Trauma Service	ISS>15	0	0.0	50	100.0
	ISS<15	5	41.7	7	58.3
Regional Urgent Care Service	ISS>15	7	41.2	10	58.8
	ISS<15	3	75.0	1	25.0
Regional Primary Care Service	ISS>15	0	-	0	-
	ISS<15	0	-	0	-

Deaths

Table 48: Deaths according to TRISS predicted probability of survival

Trauma Service Level	ISS	Total deaths		Deaths for patients with a predicted probability of survival of:							
		Total with a level	Total with a TRISS	<25%		>25%		>50%		>75%	
				n	%	n	%	n	%	n	%
Major Trauma Service	ISS>15	138	82	22	26.8	60	73.1	43	52.4	26	31.7
	ISS<15	24	16	0	-	16	100.0	16	100.0	16	100.0
Metropolitan Trauma Service	ISS>15	14	12	2	16.7	10	83.3	5	41.7	4	33.3
	ISS<15	4	1	0	-	1	100.0	1	100.0	1	100.0
Metropolitan Primary Care Service	ISS>15	0	0	-	-	-	-	-	-	-	-
	ISS<15	0	0	-	-	-	-	-	-	-	-
Regional Trauma Service	ISS>15	0	0	0	-	0	-	0	-	0	-
	ISS<15	5	3	0	-	3	100.0	3	100.0	3	100.0
Regional Urgent Care Service	ISS>15	7	4	2	50.0	2	50.0	2	50.0	2	50.0
	ISS<15	3	1	0	-	1	100.0	1	100.0	1	100.0
Regional Primary Care Service	ISS>15	0	0	-	-	-	-	-	-	-	-
	ISS<15	0	0	-	-	-	-	-	-	-	-
Total	ISS>15	159	98	26	26.5	72	73.5	50	51.0	32	32.6
	ISS<15	36	21	0	-	21	100.0	21	100.0	21	100.0

Note:
TRISS was not available for 76 death patients.

Deaths amongst cases not transferred

Table 49: Number of patients not transferred to a Major Trauma Service and subsequently died (n=33)

Trauma Service Level	Median Age (year)	Median ISS	TRISS probability of survival			
			Total n	<50% n	>50% n	
Metropolitan Trauma Service	18	57.5	26	13	7	6
Metropolitan Primary Care Service	0	-	-	-	-	-
Regional Trauma Service	5	81	9	3	0	3
Regional Urgent Care Service	10	40.5	25	5	2	3
Total	33	57	25	21	9	12

Appendix 1

Victorian hospitals/health services not contributing to the registry July 2001–June 2002

The Victorian State Trauma Registry aims to provide full coverage of all major trauma patients across all hospitals/health services that provide trauma care in this State. However, before patients from any hospital or healthcare service can be included in the Registry, full ethics committee approval is required. This has proven to be a lengthy process and a number of hospitals/health care services had not granted ethics approval in time for the first year of Registry operation. The table below lists these hospitals.

Trauma Service Level	Hospital
Metropolitan Trauma Service	Box Hill Hospital
	Maroondah Hospital
	St. Vincent's Hospital
Metropolitan Primary Care Service	Mayne Health - Knox Private Hospital
	The Angliss Health Services
	The Mercy Hospital, Werribee
Regional Trauma Service and Urgent Care Primary Service	
Barwon South West	Heywood Rural Health
Loddon Mallee	Dingee Bush Nursing Centre
	Lockington and District Bush Nursing Centre
	Maldon & District Health & Community Care
	Mt Alexander Hospital
Gippsland	Dargo Bush Nursing Centre
	Gippsland Southern Health Service
	Heyfield Bush Nursing Hospital
	Lakes Entrance Community Health Centre
	Mt Baw Baw Medical Centre
	Omeo District Hospital
	Orbost Regional Health
	Wonthaggi District Hospital
Grampians	Edenhope and District Memorial Hospital
	Stawell Regional Health
	West Wimmera Health Service, Nhill
	Woomelang & District Bush Nursing Centre

Regional Trauma Service and Urgent Care Primary Service continued.

Hume	Albury Base Hospital
	Alexandra District Hospital
	Chiltern & District Bush Nursing Hospital
	Kilmore and District Hospital
	Nagambie Bush Nursing Hospital
	Mt Buller Medical Centre
	Nathalia District Hospital
	The Beechworth Hospital
	Violet Town Bush Nursing Centre
	Yackandandah Bush Nursing Hospital
	Yea and District Memorial Hospital

Appendix 2–Data usage completeness

The following figures indicate the proportion of ‘usable data’ for each data field captured on the Registry used in this report. ‘Usable data’ refers to, for example, a yes or no entered for scene entrapment. ‘Usable data’ does not include missing data on the Registry and data that was not documented in the source data (e.g. medical records).

Table 50: TRISS Components

Age	99.9%	Type of Injury	94.9%
ISS	82.2%		
ED Respiratory Rate	74.9%	Pre-hospital Respiratory Rate	43.9%
ED Systolic Blood Pressure	82.6%	Pre-hospital Systolic Blood Pressure	42.1%
ED GCS – Eye Opening	75.6%	Pre-hospital GCS – Eye Opening	46.0%
ED GCS – Verbal Response	75.5%	Pre-hospital GCS – Verbal Response	45.9%
ED GCS – Motor Response	75.5%	Pre-hospital GCS – Motor Response	45.9%
ED GCS – Qualifier	74.7%	Pre-hospital GCS – Qualifier	44.2%

Table 51: Injury Details

Cause	94.6%	Type	94.9%
Location	84.6%	Date	100%
Intent	93.4%	Time	77.3%
Activity	54.3%	Postcode	73.0%
Entrapment	76.6%		

Table 52: Outcome Details

Discharge to	91.7%	FM at discharge	31.0%
LOS (at each hospital)	82.5%	GCS at discharge	26.5%

Table 53: Ambulance Pre-hospital Times

Call Received	23.4%	Depart Location	23.5%
At Location	25.5%	Arrive Hospital	22.4%
At Patient	23.6%		

