

ARV

Adult Retrieval Victoria

Annual Review 2010-11



Adult critical care advice and bed access
Retrieval of critical adult patients
Victorian paediatric and adult major trauma advice and referral

MAJOR TRAUMA ACTIVATION

For patients meeting major trauma criteria initiate early consultation with ARV.



VITAL SIGNS

	Adult	Child (< 16yrs)
Respiratory rate	< 18 or > 30/min	< 15 or > 40/min
Cyanosis	Present	Present
Hypotension	< 90/60mmHg	< 75 + age of child in yrs
Conscious State	GCS < 13	GCS < 15



INJURY

- Penetrating injuries (excluding isolated limb)
- Major blunt injuries or fractures
- Limb threatening injuries
- Spinal injury
- Burns > 20%



RISK

- Patients with high risk mechanism of injury whose vital signs deteriorate



OTHER

- Patients for whom trauma management or advice is required
- Multi-victim incidents where early response of additional clinical staff for assistance or retrieval is required



WHY?

- Early retrieval activation ensures access to critical care advice and more effective retrieval response
- Early activation and timely critical care transfer improves clinical outcomes

WHO?

- Patients who are likely to need transfer for critical care
- Referral may precede availability of results of tests or investigations, for example:
 - Major trauma
 - Intubated patients (requiring respiratory support)
 - Circulatory failure (requiring inotropes)
 - Severe sepsis
 - Complex multi-system disorders with clinical instability
 - Specialised critical care need

ARV

Adult Retrieval Victoria

EARLY RETRIEVAL ACTIVATION

For all critical care transfers consider early activation.

Statewide
24 hours

1300 36 86 61

2011 Unit 4, Victoria Court Esplanade Field, VIC 3207. Tel: 1300 36 86 61 www.arv.vic.gov.au info@arv.vic.gov.au

OTHER USEFUL NUMBERS
PETS
03 4345 5211
METS/PERS
1300 13 78 60
Emergency ambulance response
000

NON-EMERGENCY INTER-HOSPITAL TRANSFER
Alerts
1300 36 63 13
After hours
13 30 09



Adult Retrieval Victoria
ARV
Coordinators of Critical Care Services

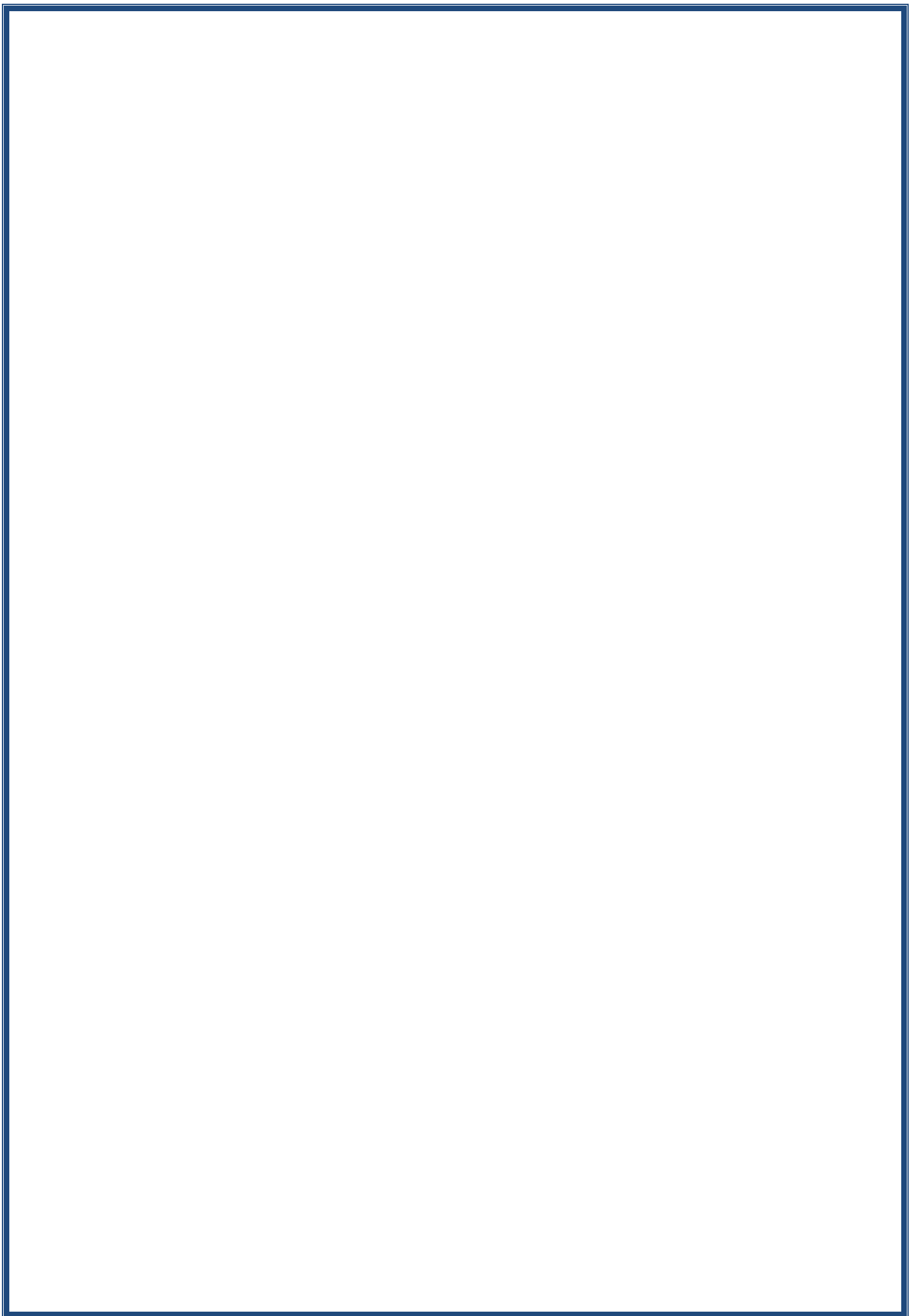


Table of Contents

1. Introduction:	5
2. Staff: Operational and Support	6
3. Stakeholders: Referrers and Receivers	6
4. Progress: Innovations and Developments	9
5. Knowledge: Research and Education	11
6. Data: Activity and Performance	12
6.1 <i>Case and Retrieval Activity</i>	12
6.1.1 Case Rate by Region and Date	12
6.1.2 Activity Rates by Time of Day and Day of Week	13
6.2 <i>Referral Site</i>	14
6.2.1 Referring Hospital (highest referral rates)	14
6.2.2 Referral Hospital by Region	14
6.3 <i>Case Type</i>	16
6.3.1 Clinical Problem	16
6.3.2 Patient Age and Gender	16
6.4 <i>Destination Hospital</i>	17
6.4.1 Destination Unit	18
6.4.2 Destination Unit vs. Date	18
6.5 <i>Reason for Case Referral for Inter-Hospital Transfer</i>	19
6.5.1 Reason for Transfer vs. Region of Origin	20
6.5.2 Top 10 Referral Hospitals vs. Reason for Referral	20
6.5.3 Service Unavailable vs. Problem Type vs. Top 10 Referral Hospitals	21
6.5.4 Public to Private Transfers	21
6.6 <i>Retrieval</i>	22
6.7 <i>Retrieval Platform</i>	23
6.8 <i>Crew Mix vs. Platform</i>	23
6.9 <i>Quality Measures</i>	24
6.9.1 Performance Times	24
6.9.2 ARV Coordinator Response Time	24
6.9.3 Second Retrieval Crew Despatched	24
6.9.4 Clinical Variations	25
6.9.5 Critical Care Access Restriction	25
6.9.6 Incident Review	27
7. Attachments:	28
7.1 <i>Research</i>	28
7.2 <i>Educational Material</i>	29

Adult Retrieval Victoria



1. Introduction:

This financial year (2010-11) has seen consolidation of ARV and Victorian retrieval systems.

The principal goals moving into the year were to deliver and embed the ARV Service Improvement Plan:

- Workforce improvements
- Implementation of Metro retrieval services
- Improvement of critical care bed access monitoring and case distribution
- Development of regional retrieval systems
- Progression of education and research

A new EBA was successfully implemented for medical staff, aligning conditions and entitlements with the hospital sector. Changes to roster structures have also improved the matching of resource to workload. Staff structure changes have allowed the roll out of metropolitan retrieval, and in particular support for smaller services in transferring critical patients. This service has reduced the need for referring hospitals to coordinate and escort patients, and has occurred for 245 additional patients.

Regional retrieval systems have provided similar services in 2010-11 to previous years.

ARV Workload The workload for ARV has increased very significantly. Case rates have increased significantly from 2009-10 (18.3%). Retrieval rates have increased by

25%, i.e. at a rate exceeding the rate of growth in cases. This is largely due to planned increases to metropolitan retrieval activity.

Growth Modelling

Current experience suggests that the present ARV case management systems are capable of managing volume loads of up to 350 cases per month for short periods (1-2 months). The impact of such workloads is realised in all ARV staff: retrieval staff, call taking and coordination. In many respects the load and its effects are more pronounced on call takers and coordinators – managing multiple cases concurrently, prioritising and making potentially critical decisions on a case by case basis.

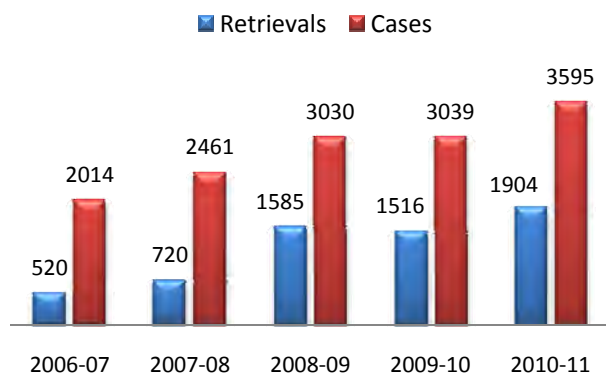
Sustained activity above this level is not manageable as experienced in the winter peak of 2010 (staff fatigue, extended overnight coordinator recall etc).

Case volume growth from 2009/10 to 2010/11 has been almost 20% due at least in large part to metropolitan retrieval expansion, and whilst this is unlikely to continue it is proposed that growth in case numbers is more likely to be in the 7.5-12.5% range.

Case growth implications: Modelling of these growth rates indicates that the retrieval case load may stress the capacity of current systems for 6 months per year by 2012 or 2013.

Before these levels are reached it is important that retrieval system review and redesign occurs to provide safe and economical alternatives or additions to current methods. This will involve review of all processes and practices.

These case load growth above is based on assumptions that the current scope of retrieval clinical and coordination activities does not change – should the nature of ARV caseload alter (e.g. increased involvement in lower acuity outreach work) the critical points described may be reached earlier.



2. Staff: Operational and Support

Administrative and Support Staff

Development of the RASO staff group has progressed this year, with stability in the workforce. Increasing roles in data entry with the new ARV database and in telehealth systems has added responsibility, value and interest to the role.

Clinical Support Officer (CSO)

An important staff development last year was the creation of a role within ARV for a seconded paramedic CSO. This role has brought valuable corporate knowledge and personal capability to the position. The role is both supportive (for training, orientation, case review, quality processes) and developmental (linking to other AV departments, assisting communication and cultural development). The role also provides a level of operational assistance to ARV medical staff through involvement in retrieval responses and in-field training of registrars. After 18 months the position has been evaluated by ARV and QES and has been recommended to be ongoing.

Senior Medical Staff

The current year has seen stability in the senior staff group, and considerable external interest in ARV employment opportunities. Several new critical care coordinators have joined the organisation, and have brought a range of new and valuable skills to the organisation. Credentialing and CME processes have been formalised, with all senior staff undergoing annual training in Crew Resource Management and performance management.

Registrars

Retrieval registrars have been appointed in 2010, and 3 rotations of three doctors seconded from major hospitals have occurred successfully. The integration of this group has been an important step in training and education for our system. Registrar recruitment for 2012 is now complete, with the available positions oversubscribed.

3. Stakeholders: Referrers and Receivers

Key linkages for ARV remain the DH convened committees and groups such as:

Regional Emergency & Critical Care Advisory Committees (RECCAC). ARV attends each of the regional meetings on approximately quarterly frequency either face-to-face or via videoconference, often together with AAV. ARV presents quarterly data on cases, performance and systems issues to these groups and works with them on local and broader improvement initiatives.

Intensive Care Advisory Committee (ICAC). ARV sits on this Departmental advisory committee, providing input into specific

issues related to system capacity, access, flow, ECMO transfer and defined transfers. ARV is also represented on the access and monitoring subcommittee where input is provided to areas such as ICU performance indicator development.

State Trauma Committee (STC). ARV also sits on this Ministerial committee and is represented at each of the STC subcommittees (education, coordination, quality) providing input, advice and support in areas such as transfer times, early activation, and development of common documentation for critical care transfers.



Follow Up Systems

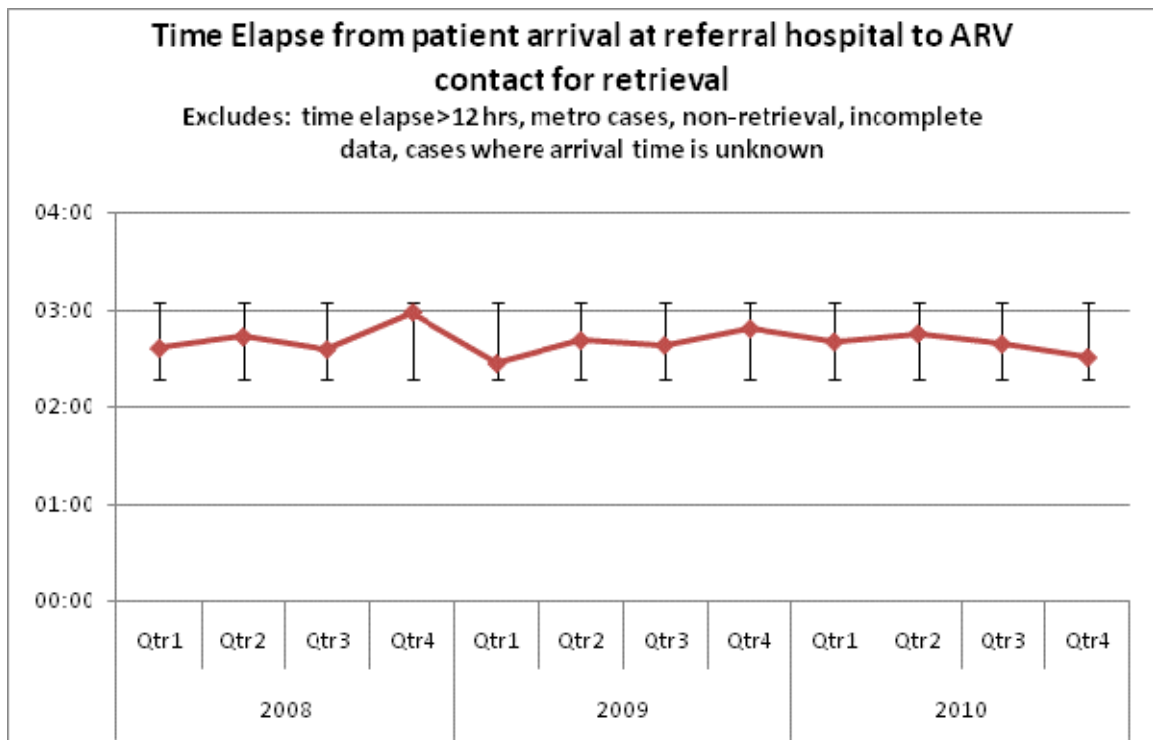
Since 2009-10 ARV has continued to work with stakeholders to improve retrieval services. Our referral base is extremely broad and varied. A common interest for referrers is patient outcomes and case feedback. ARV has implemented a system of case follow up. Each day, medical staff contact the receiving unit for all medical retrievals and cases of interest from the previous day. The receiver is asked about the patient status and progress, about the adequacy of the retrieval and any issues they may wish to feedback to ARV re clinical care. Subsequently the ARV clinician contacts the referring hospital and provides feedback on the outcome of the retrieval and the current patient status. An audit of this practice performed in 2010 demonstrated 91% follow up of medical retrieval cases, with almost 50% occurring within 24 hours and the remainder within 3 days. In discussion with referrers, only 3% provided feedback suggesting a need for improvement. Most feedback was clearly positive, with specific positive feedback regarding use of telehealth, the professionalism of the retrieval team, and the fact that ARV provides feedback by phone and an opportunity to discuss cases.

Early Activation

During 2011, ARV has embarked on an active project, promoting earlier activation of the retrieval system particularly for patients requiring time-critical transfer. This work includes provision of educational material, and guideline modification (with the trauma system). Historical data (below) suggests the system is reasonably stable, with a mean elapse time for referral in the order of 2.5-3 hours – this data represents retrieved patients i.e. the highest acuity component of ARV work, and may benefit from improvement. Sub analysis of the group does not show major differences by referral region or clinical problem type. ARV's new dataset (from 1/1/2011) allows assessment of stability, an acuity score, and perceived urgency for each case and it is expected that interrogation of this dataset and a period of system-wide education in this area will demonstrate important findings early in 2012.

Preparation for Transfer

Clinical preparation of patients for transfer and active management of critical care risk is important for optimised retrieval outcomes. ARV has initiated an education program in this area in parallel to the early activation work described above.





Craig Stillroe/The Age

Adult critical care advice and bed access
 Retrieval of critical adult patients
 Victorian paediatric and adult major trauma advice and referral

Adult Retrieval Victoria

ARV

MAJOR TRAUMA ACTIVATION

For patients meeting major trauma criteria initiate early consultation with ARV.

VITAL SIGNS



	Adult	Child (< 16yrs)
Respiratory rate	< 10 or > 30/min	< 15 or > 40/min
Cyanosis	Present	Present
Hypotension	< 90mmHg	< 75 + age of child in yrs
Conscious state	GCS < 13	GCS < 15

INJURY



- Penetrating injuries (excluding isolated limb)
- Major blunt injuries or fractures
- Limb threatening injuries
- Spinal injury
- Burns > 20%

RISK



- Patients with high risk mechanism of injury whose vital signs deteriorate

OTHER



- Patients for whom trauma management or advice is required
- Multi-victim incidents where early response of additional clinical staff for assistance or retrieval is required

EARLY RETRIEVAL ACTIVATION

For all critical care transfers consider early activation.

WHY?



- Early retrieval activation ensures access to critical care advice and more effective retrieval response
- Early activation and timely critical care transfer improves clinical outcomes

WHO?



- Patients who are likely to need transfer for critical care
- Referral may precede availability of results of tests or investigations. For example:
 - Major trauma
 - Intubated patients (requiring respiratory support)
 - Circulatory failure (requiring inotropes)
 - Severe sepsis
 - Complex multi-system disorders with clinical instability
 - Specialised critical care need

Statewide
24 hours

1300 36 86 61

ARV Unit 4, 12 Larkin Court/Essendon Fields VIC 3041 Fax 1300 38 78 82 www.arv.vic.gov.au info@arv.vic.gov.au

OTHER USEFUL NUMBERS

PETS 03 9345 5211

NETS/PERS 1300 13 76 50

Emergency ambulance response 000

NON EMERGENCY INTER-HOSPITAL TRANSFER

Metro 1300 36 63 13

Non metro 13 30 09



4. Progress: Innovations and Developments

ECMO

In collaboration with the Alfred Hospital, ARV has implemented major developments in the retrieval of patients requiring Extra Corporeal Membrane Oxygenation (ECMO). This technique of heart-lung bypass provides the highest possible level of clinical support and intervention for the retrieval patient. The technique is complex and resource dependant, and presents complex logistic, clinical and safety challenges, however has been increasingly successful in management of patients with the most severe forms of cardio-respiratory failure – including those caused by influenza.

In 2010, a cohort of Alfred Hospital intensive care physicians received additional training and credentialing in ECMO and also underwent training in retrieval and transport medicine and systems via ARV. As a result, and in combination with AV paramedics and ARV retrieval physicians, highly skilled teams were able to be dispatched for ECMO retrieval. World experience of this type of service is limited, and to date it appears that the Victorian service is comparable with international systems. Prior to this system, ECMO retrieval was ad hoc and unsystematised in Victoria.

In 2010-11, 15 ECMO retrieval cases were undertaken. The most common pathological basis for the patient presentation was pneumonia (13 cases). 12 underwent Venovenous ECMO and 3 underwent Venous-Arterial ECMO. Cases are typically long and arduous, varying in duration from around 4 hours (metro) to 22 hours (interstate). Most cases were transported by road utilising the AV Complex Patient Ambulance Vehicle. This is a larger ambulance with special loading systems and has space for the additional crew and equipment required for these cases. Five cases were performed by fixed-wing aircraft – air platforms are generally used only for ECMO transfers greater than 3-4 hours drive time.

13 (87%) of the 15 patients managed by ECMO retrieval survived to discharge from hospital.

ECMO Retrieval

Clinical Coordination: ARV

Destination: Alfred Hospital ICU

Crew:

- Alfred Intensivist (x2) staff
- ARV Retrieval physician
- Paramedic

Platforms:

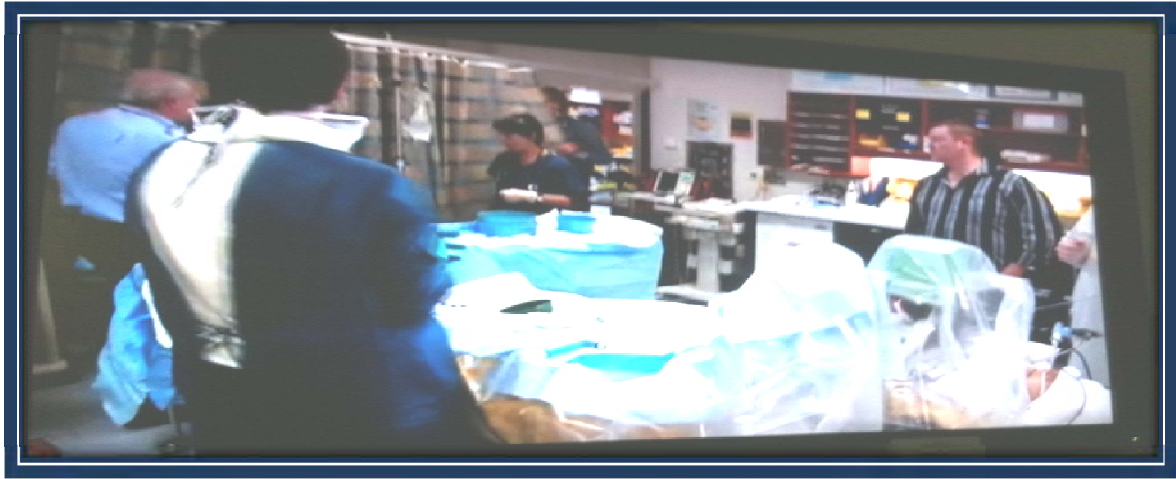
- Road (CPAV) 10 cases
- Air (Fixed Wing) 5 cases

87% survival to discharge

Information Systems

To support additional workload and clinical and business management of retrieval services, ARV has implemented a new mission database (web based with Oracle back end) and also implemented VACIS. VACIS is the Ambulance Victoria clinical information system. The system provides a base for further development, including external access, referral, and interagency applicability.

A significant concept in retrieval medicine is assessment of patient acuity – to this end ARV has developed a model within this system which specifically considers complexity of the patient's clinical presentation and the degree of clinical instability exhibited by the patient. This model has become core to coordination thinking and drives best decision making in assessment of the crew skill-set required and of the destination type required for the patient. Coupled with this is the application of physiological scoring systems to assist in definition of patient severity, and classifications of urgency. These key system decision support tools have been developed and applied through 2010-11.



Telehealth

Continuing from ARV's involvement in the Victorian Virtual Critical Care and Trauma Unit project (ViTCCU) in 2009-10, ARV has further implemented telehealth systems in retrieval. Connections now exist across all hospitals in the Loddon Mallee and Grampians health regions, with numerous small and isolated hospitals utilising the technology on a regular basis. Daily checks of the system provide regular communication between ARV and referrers, building on relationships and increasing everyday familiarity with the technology. Regular in-service educational sessions take place providing further opportunities with up to 15 sites and 50 clinical staff members connected across the network.

Case interactions are occurring on a more regular basis, with the system used almost daily for clinical case management and for communication with ARV teams in the field. Indications are that the application of telehealth systems in Victoria is about to develop significantly. Health Services, the Victorian Health Department, National Broadband strategies, Medicare Benefits for

With mobile technology available at many sites, ARV staff have been able to assist referrers with critical scenarios in wards as well as those occurring in emergency departments and critical care areas.

telehealth consultation and increasing consumer interest are all driving development at both technical and functional levels. Possibilities exist to bridge long-standing gaps in service and support to many areas including critical care and management of the deteriorating patient in isolated settings, or situations where clinical workforce is limited.

ARV continues to support development of telehealth, and is positioned well to support the system through its key roles in managing the interface between clinical groups and organisation, and through its governance systems. Opportunity exists for ongoing development will result in the availability of whole State critical care telehealth support and outreach in the next year.

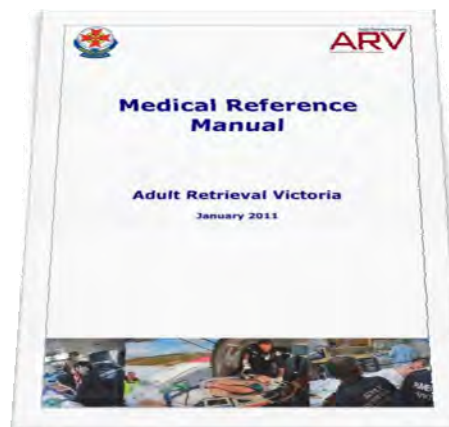
Trauma

ARV continues to provide important support to the State trauma system, and now manages all referral calls for paediatric and adult trauma advice and transfer collaboratively with The Royal Melbourne, The Alfred and The Royal Children's Hospitals. Early data suggests related significant improvement in transfer times for those patients with major trauma who require secondary transfer from an initial regional or other service. Improving speed of access to definitive care is assisted by other ARV projects such as the "Early Activation" and "Preparation for Retrieval" projects.

5. Knowledge: Research and Education

Reference Manual

Ongoing training commitments with 6 monthly registrar intakes together with regular retrieval consultant recruitment has led to formalisation of a manual for ARV medical staff. Developed over 2 years in collaboration with ambulance departments, including Air Ambulance Victoria, the manual is auspiced by the Ambulance Victoria Medical Advisory Committee. The manual spans over 150 pages, and comprehensively covers both coordination and clinical matters. It contains a growing body of retrieval clinical guidelines – brief documents intended to bridge the gap for our clinicians between the ‘every day’ critical care setting and the retrieval and transport environment. In addition it comprehensively covers more specific material including ECMO retrieval, retrieval of the bariatric patient, flight medicine and physiology essentials, Crisis Resource Management (CRM), problem solving in critical care coordination, crew selection skill mix and retrieval platform guidelines. The manual is a core resource and forms a



component of annual credentialing and performance management for ARV medical staff.

Research

Building on work initiated during his term as ARV registrar, Dr Philip Visser has completed a study which reviews the clinical demography of retrieval patients who die in ICU – the study is awaiting publication and adds significantly to knowledge of this group. Further research projects are also under way and promise significant outcomes in the areas of trauma and obstetric transfer.

Factors involved in ICU mortality following medical retrieval: Identifying differences between ICU survivors and non-survivors.

Principal investigator:

Dr Philip Visser

Co-investigators: Ambulance Victoria A/Prof Marcus Kennedy, Adult Retrieval Victoria, Dr Linton Harriss, Strategy and Planning; Australia and New Zealand Intensive Care Society, A/Prof Graeme Hart, Centre for Outcome and Resource Evaluation; Victorian Department of Health, Ms Megan Bohensky, Victoria Data Linkage, Dr Lalitha Sundaresan, Victoria Data Linkage

ABSTRACT

Introduction

The study aimed to determine factors related to ICU mortality in critically ill patients transferred by Adult Retrieval Victoria (ARV) medical staff. Patients who died in ICU after inter hospital transfer were compared against those who survived.

Methods

This is a retrospective cohort study of ARV cases between 1 January 2009 and 30 June 2010. Retrieval data was linked with data from the ANZICS CORE APD (Australia and New Zealand Intensive Care Society Centre for Outcome and Resource Evaluation Adult Patient Database). Data included demographic and clinical data obtained during transfer and data related to outcome measures in ICU.

Results

ARV transferred 601 cases during the study period that was linked to 25 543 ANZICS APD case records for the same period. Victoria Data linkage (VDL) matched 460 cases (83.8%). Increased ICU mortality was associated with ICU admission time between midnight and 08:00 (OR 2.52 95% CI 1.16-5.51 p=0.02). Principal clinical problem of ‘respiratory’ (OR 0.30 95% CI 0.10-0.91 p=0.03) and ‘trauma’ were associated with decreased mortality (OR 0.63 95% CI 0.01- 0.58 p=0.01).

Variables most strongly associated with mortality were: advanced age (OR 1.02, 95% CI 1.01-1.04, p=0.008), lower mean arterial pressure (OR 0.97, 95% CI 0.95-0.99, p=0.01) and tachycardia (OR 1.02, 95% CI 1.00-1.03, p=0.008) on arrival at destination hospital.

Conclusion

Advanced age, lower mean arterial pressure and persistent tachycardia during transfer were associated with increased ICU mortality in this population. Clinicians should be aware of the additional risk of overnight admission.

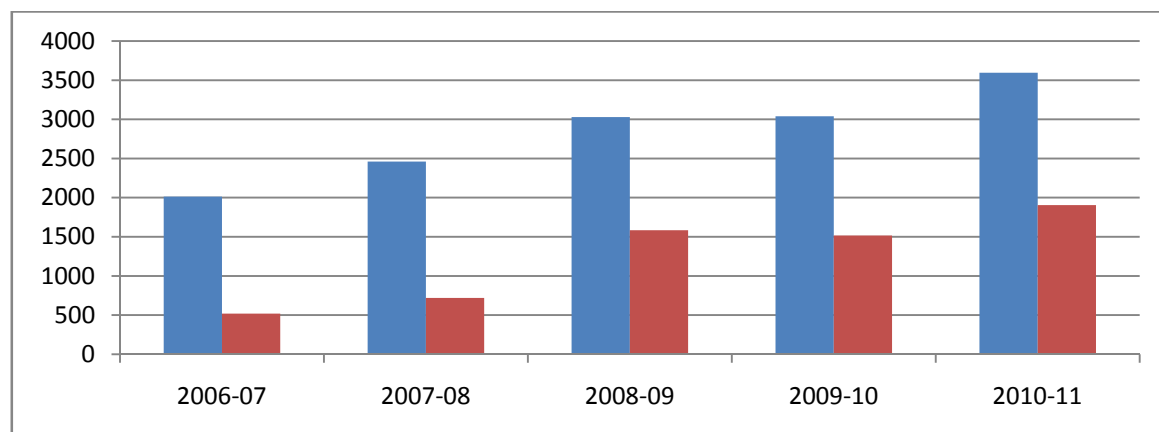
6. Data: Activity and Performance

6.1 Case and Retrieval Activity

6.1.1 Case Rate by Region and Date

	2006-07	2007-08	2008-09	2009-10	2010-11
Total Cases	2014	2461	3030	3039	3595
Retrieval	520	720	1585	1516	1904

NB due to database evolution between 2008-2010, minor discrepancies between reported data may be noted

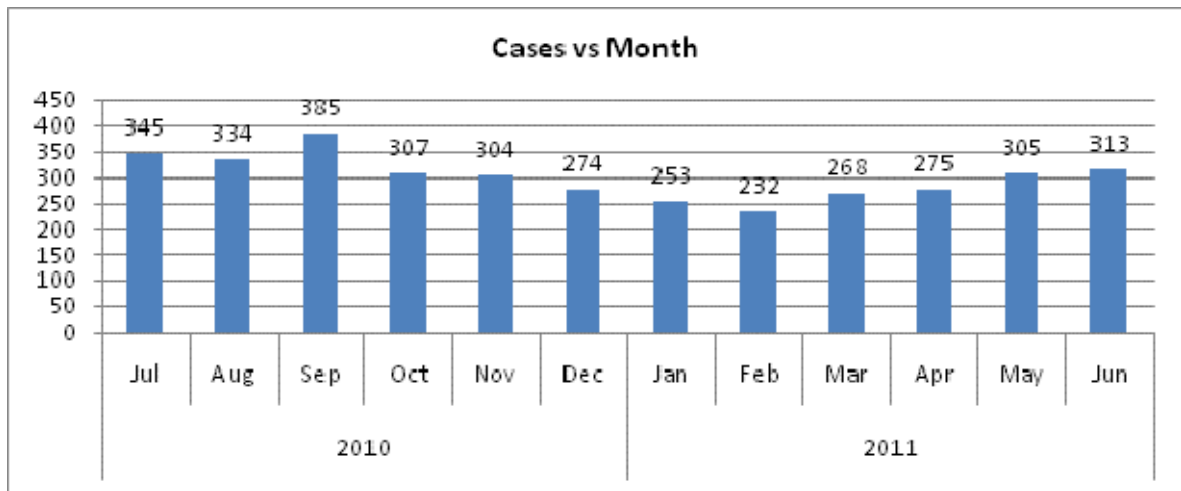


Region	Total	Region	Total
Barwon South West	427	Barwon South West	11.88%
Gippsland	723	Gippsland	20.11%
Grampians	325	Grampians	9.04%
Hume	368	Hume	10.24%
Interstate	6	Interstate	0.17%
Loddon Mallee	611	Loddon Mallee	17.00%
Metro	921	Metro	25.62%
NSW	159	NSW	4.42%
Other	44	Other	1.22%
South Australia	1	South Australia	0.03%
Tasmania	8	Tasmania	0.22%
(blank)	2	(blank)	0.06%
Grand Total	3595	Grand Total	100.00%

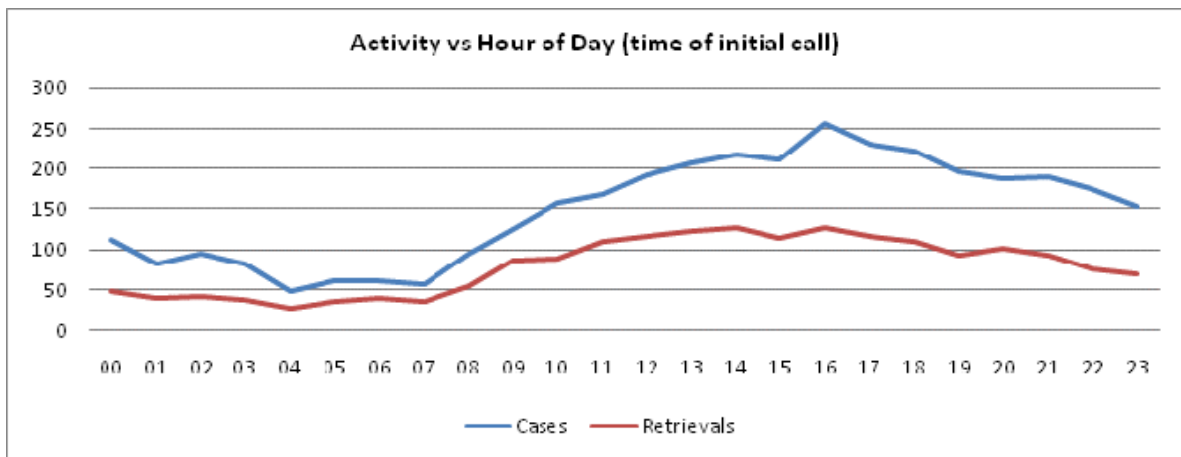
A “case” is any occasion of service provided for a patient by ARV. It may involve critical care or other advice, retrieval, or facilitation of access to a critical care bed.

ARV cases originate from all parts of the State of Victoria, with small numbers from interstate (particularly southern NSW). In 2010-11, 3595 cases were managed.

Case rates have increased significantly from 2009-10 (18.3%). The geographical distribution of case origins remains similar to previous years. Retrieval rates have increased by 25% i.e. at a rate exceeding the rate of growth in cases. This is largely due to planned increases to metropolitan retrieval activity (vide infra). Case rates in winter months are significantly higher than summer months.

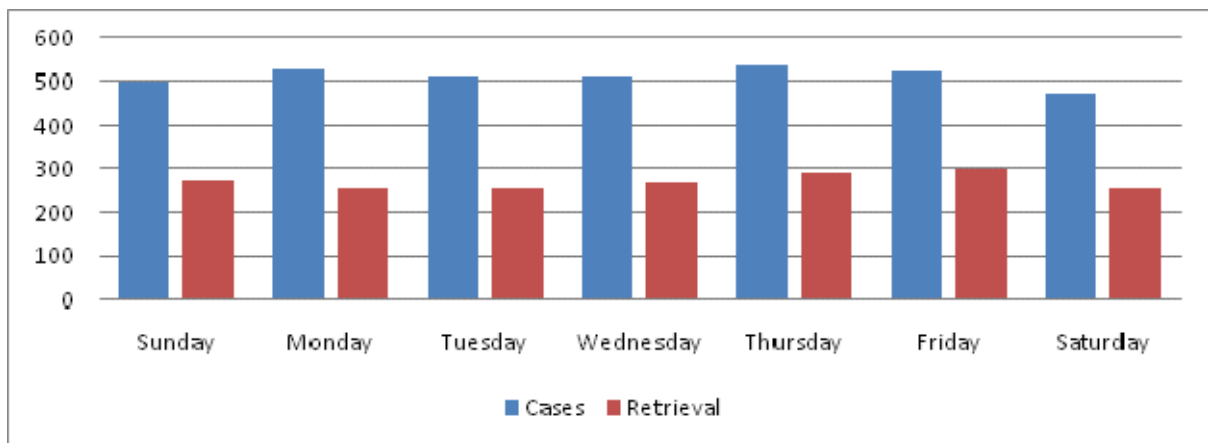


6.1.2 Activity Rates by Time of Day and Day of Week



Distribution of calls through the day shows more uniform spread of cases through day and evening hours – possibly reflecting earlier activation of retrieval, with low call rates between 0200 and 0700. ARV receives approximately 9-10 cases per day which are evenly spread throughout the week.

This pattern of calls has not altered in the 2010-11 period. ARV continues to advocate for early referral of cases likely to need transfer. ARV performs approximately 5-6 retrievals per day which are evenly spread throughout the week. Distribution of retrievals through the day shows relatively even spread from 1000-2200 hrs, with lower rates overnight.



6.2 Referral Site

6.2.1 Referring Hospital (highest referral rates)

Referral Hospital	Total
Latrobe Regional Hospital	181
Bendigo Health	159
Bairnsdale Regional Health Service	159
Werribee Mercy	137
Wangaratta (Northeast Health)	118
Mildura Base Hospital	117
Wonthaggi (Bass Coast RH)	115
Horsham (Wimmera Health)	112
Albury	104
Geelong Hosp (Barwon Health)	101
Shepparton (Goulburn Valley)	101
Maroondah Hospital	97
Ballarat Health Services	96
Warrnambool (South West Healthcare)	95
Echuca Regional Health	93

The 15 highest volume referral sites for ARV cases shows a significant variation in hospital types and service needs. Over 75% of transfers are due to lack of availability of specialised clinical services. Some sites do however show different trends such as larger proportions of transfers due to lack of ICU beds (Bendigo, Maroondah, Latrobe), or larger proportions of transfers due to major trauma (Geelong, Mildura, Albury, Ballarat)

6.2.2 Referral Hospital by Region

Region	Referral Hospital	Total
Barwon South West	Geelong Hosp (Barwon Health)	101
	Warrnambool (South West Healthcare)	95
	Portland District Health	81
	Hamilton (Western District Health Service)	58
	Colac Area Health	48
	Camperdown (South West Healthcare)	16
	Apollo Bay (Otway Health & Community Services)	7
	Casterton Memorial Hospital	5
	St John of God Hospital, Warrnambool	4
	Lorne Community Hospital	4
Gippsland	Latrobe Regional Hospital	181
	Bairnsdale Regional Health Service	159
	Wonthaggi (Bass Coast RH)	115
	Warragul (West Gippsland Healthcare Group)	90
	Sale (Central Gippsland Health Service)	58
	Leongatha (Gippsland Southern Health Service)	38
	Foster (South Gippsland Hospital)	28
	Orbost Regional Health	23
	Yarram & District Health Service	14
	Korumburra (Gippsland Southern Health Service)	10
Grampians	Horsham (Wimmera Health)	112
	Ballarat Health Services	96

	Stawell District Hospital	39
	Ararat (East Grampians Health Service)	35
	St Arnaud (East Wimmera Health Service)	12
	Bacchus Marsh	10
	St John of God Hospital, Ballarat	7
	Daylesford (Hepburn Health Service)	5
	Nhill(West Wimmera Health Service)	4
	Wycheproof (East Wimmera HS)	2
Hume	Wangaratta (Northeast Health)	118
	Shepparton (Goulburn Valley)	101
	Wodonga Regional Health Service	51
	Mansfield District Hospital	31
	Seymour District Memorial Hospital	22
	Yarrawonga District Health Service	18
	Alexandra District Hospital	7
	Corryong Hospital	5
	Benalla & District Memorial Hospital	4
	Cobram District Hospital	3
Loddon Mallee	Bendigo Health	159
	Mildura Base Hospital	117
	Echuca Regional Health	93
	Swan Hill District Hospital	85
	Maryborough District Health Service	76
	Kyneton District Health Services	20
	Castlemaine (Mount Alexander Hospital)	14
	Cohuna District Hospital	10
	Kerang District Health	8
Metro	Werribee Mercy	137
	Maroondah Hospital	97
	Frankston Hospital	86
	Northern Hospital	79
	Box Hill Hospital	70
	Casey Hospital	64
	Western Hospital	62
	Angliss Health Services	44
	Sunshine Hospital	30
	Dandenong Hospital	28

6.3 Case Type

6.3.1 Clinical Problem

<i>Principal Problem_ref</i>	<i>Total</i>
Cardiac	945
Neurological_Neurosurgical	606
Trauma	497
Respiratory	429
Gastrointestinal	264
Sepsis	221
Toxicological	168
Other	119
Renal	96
Vascular (not neuro)	94
Endocrine	37
ENT	26
Oncology	23
Haematological	20
Gynaecological	19
Multi-organ Failure	9
Immune_Allergy	9
Psychosocial	4
(blank)	4
Genitourinary	3
Shock (cause unknown)	2
Grand Total	3595

All ARV cases are classified according to clinical problem type.

The range of clinical problems defined at the referral point is consistent across the State and compared with 2009-10.

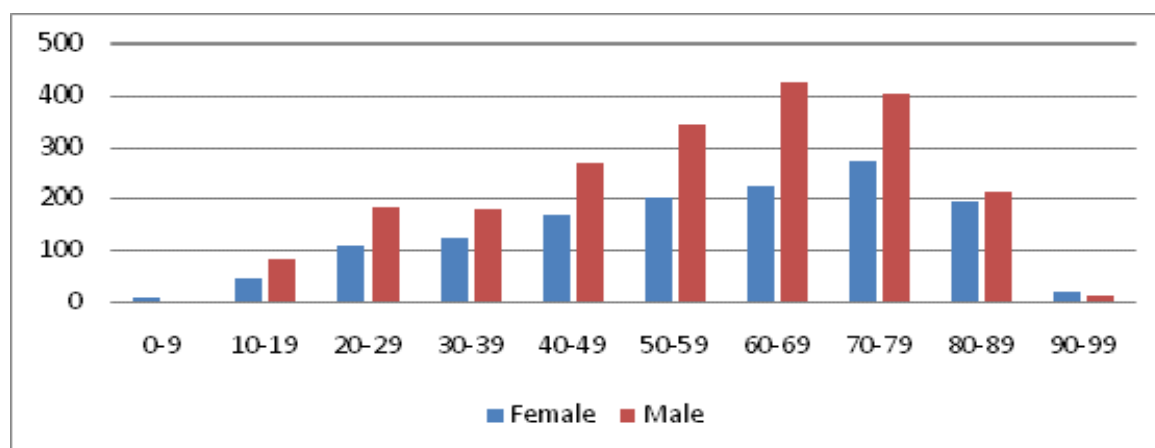
Cardiac problems account for 31% of cases across the system (27% in 09-10), suggesting an ongoing degree of mismatch of demand and service location and availability. A significant component of this mismatch is likely to be related to interventional cardiology needs. Given the time criticality of this type of case, the need for efficient retrieval and transfer services is highlighted.

Neurological and neurosurgical transfers are also common (16.8%) due to the limited number of available specialised sites. Neurosurgical referrals have increased in volume compared to 2009-10 (14.7%).

6.3.2 Patient Age and Gender

Gender	Total
Female	39%
Male	61%

Males are significantly more commonly in need of retrieval or critical care transfer services, with patients over 60 years forming 48% of the ARV caseload. There is a gradual, almost linear increase in demand with age up to 80 years.



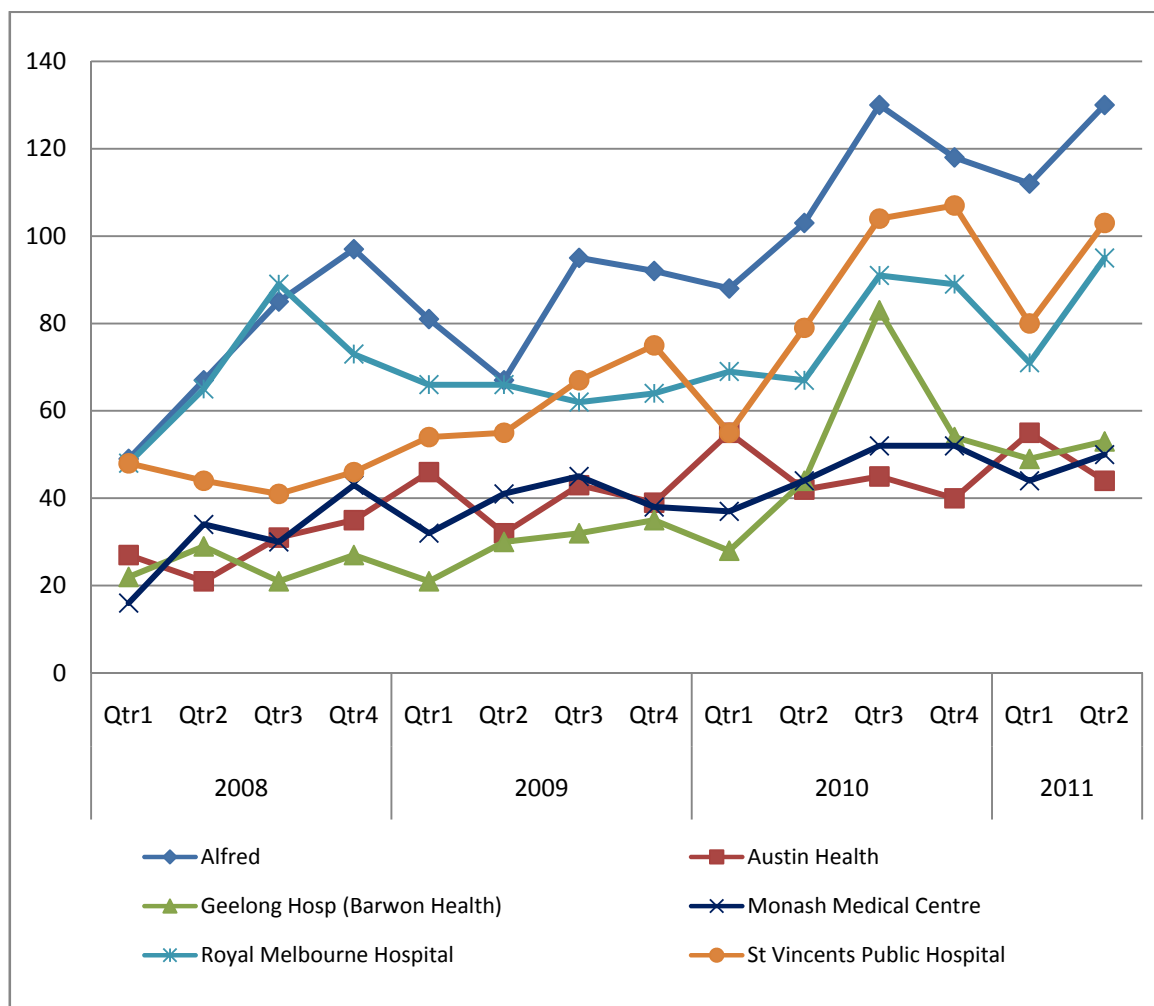
6.4 Destination Hospital

Destination Hospital	Total
Alfred	490
St Vincent's Public Hospital	394
Royal Melbourne Hospital	346
Geelong Hosp (Barwon Health)	239
Monash Medical Centre	198
Austin Health	184
Box Hill Hospital	144
Western Hospital	112
Dandenong Hospital	92
Northern Hospital	85
Bendigo Health	82
Ballarat Health Services	61
St Vincents Private Hospital	45
Epworth Hospital Richmond	40
Frankston Hospital	38

The Alfred, St. Vincent's and The Royal Melbourne Hospitals are the most common receiving sites, consistent with previous years' data. Geelong Hospital has increased as a destination, consistent with its strong regional commitment and geographical catchment.

Both Monash Medical Centre and Austin Hospitals provide specialised tertiary critical care (paediatrics and spinal respectively) which may not be reflected in ARV transfer data, where The Alfred and RMH specialist trauma reception is captured by ARV case processes (major trauma referral systems)

Distribution to tertiary hospitals compared to non-tertiary has increased to 60% in 2010-11 compared to previous years (~51% in 2009-10).



6.4.1 Destination Unit

Destination Unit	Total
Angio_Cath Lab	1.19%
CCU	15.64%
ED	36.81%
HDU	2.32%
ICU	35.45%
OR	0.44%
Other	0.85%
Ward	7.29%

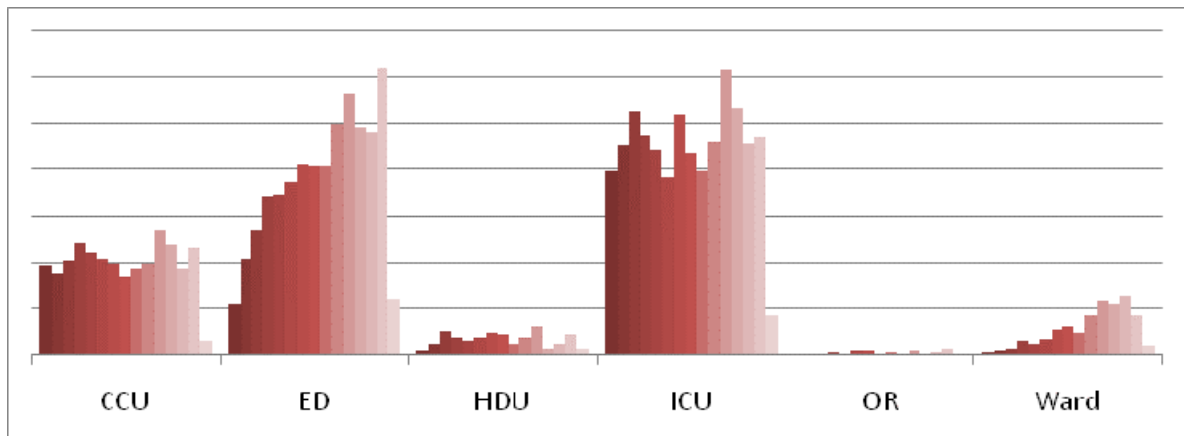
The most common destination unit is the ICU (37.8%) with ED and CCU next.

It is preferred that transferred patients be received into a critical care ward setting to decrease impact on congested emergency departments.

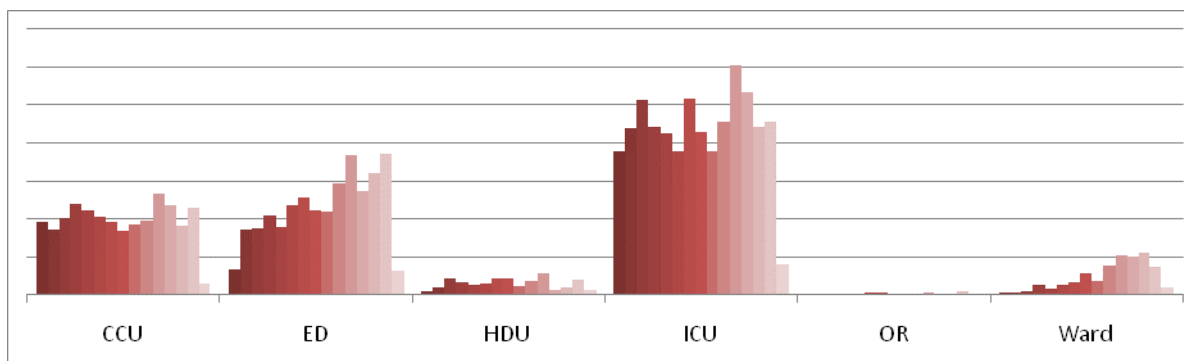
Major trauma patients are normally and appropriately transferred to the MTS ED for initial trauma team workup.

Increased patient numbers have a ward destination (7.3% vs. 5.2% in 09-10) which may reflect increased numbers of non critical care transfers effected by ARV e.g. neurosurgical acute/emergency transfers.

6.4.2 Destination Unit vs. Date



The data points (columns) above represent calendar quarters from June 2008 to June 2011 within each destination unit block. There is a clear trend for increasing use of the ED as a destination unit. This is largely explained by the increased involvement of ARV in major trauma transfer, and appropriate reception of such patients into the ED. As such this is unlikely to represent increased ED load but rather a patient cohort which is now being coordinated by ARV.



Destination unit vs. date (quarters from 3/2008 to 3/2011) with trauma cases excluded, demonstrating more even distribution over time.

6.5 Reason for Case Referral for Inter-Hospital Transfer

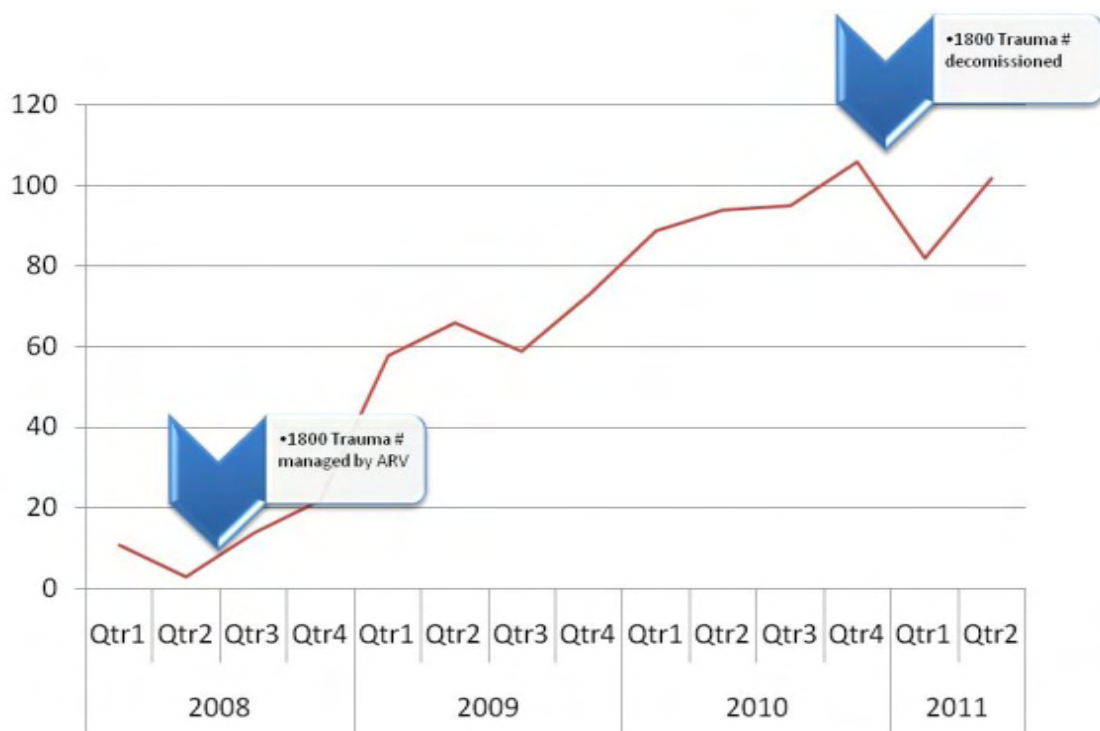
Reason for Transfer	09-10	10-11
Specialised Clinical Service not available	1995	2672
ICU bed not available	443	355
Major Trauma	315	385
CCU bed not available	100	39
HDU Bed not Available	85	52
Other	54	44
Appropriate Medical Staff not available	21	9
(blank)	14	4
ECMO Transfer	6	18*
Uninsured Patient in Private Hospital	2	13
Appropriate Nursing Staff not available	2	3
General bed not available	2	1
Grand Total	3039	3595

There has been significant change in recorded reason for referral.

Increased involvement in trauma coordination has seen major trauma move to the second most common reason behind specialised care availability.

Referral for CCU bed decline may be consistent with increasing referral for early PCI (service not available) rather than later referral for post thrombolysis CCU care.

*18 cases initiated as "reason for transfer" = ECMO; 15 transferred with ECMO, 3 not transferred (1 interstate, 2 clinically not appropriate)



6.5.1 Reason for Transfer vs. Region of Origin

Reason for Transfer	Barwon South West	Gippsland	Grampians	Hume	Loddon Mallee	Metro	Grand Total
Spec. Clinical Service not available	80.1%	81.7%	79.7%	83.4%	79.5%	57.3%	74.5%
ICU bed not available	1.4%	5.0%	2.2%	1.9%	4.7%	29.0%	10.4%
Major Trauma	16.9%	10.7%	14.5%	13.3%	11.1%	3.1%	10.1%
HDU Bed not Available	0.2%	0.8%	0.3%	0.3%	0.2%	4.6%	1.5%
CCU bed not available	0.0%	1.0%	0.6%	0.3%	2.1%	1.7%	1.2%
Other	0.5%	0.8%	1.2%	0.3%	1.1%	1.6%	1.0%
ECMO Transfer	0.7%	0.0%	0.3%	0.5%	0.2%	0.7%	0.4%
Uninsured Pat in Private Hospital	0.0%	0.0%	0.3%	0.0%	0.0%	1.3%	0.4%
Appropriate Med Staff not available	0.0%	0.0%	0.3%	0.0%	1.0%	0.2%	0.3%
(blank)	0.2%	0.0%	0.3%	0.0%	0.0%	0.1%	0.1%
Appropriate Nurs Staff not available	0.0%	0.0%	0.3%	0.0%	0.0%	0.2%	0.1%
General bed not available	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%

Availability of specialised services (especially cardiac and neurological-neurosurgical) remains a much greater contributor to reason for transfer in non-metro settings.

Lack of local availability of ICU, CCU and HDU beds was a disproportionately high factor in transfer in the metro region. ICU bed not available accounts for 29% of ARV metro cases.

6.5.2 Top 10 Referral Hospitals vs. Reason for Referral

Referring Hospital	Specialised Clinical Service not available	Major Trauma	ICU bed not available	CCU bed not available	Other	HDU Bed not Available	ECMO Transfer
Albury	71.2%	26.0%	2.9%	0.0%	0.0%	0.0%	0.0%
Bairnsdale Regional Health Service	88.1%	10.7%	1.3%	0.0%	0.0%	0.0%	0.0%
Bendigo Health	61.6%	13.2%	14.5%	6.9%	2.5%	0.6%	0.0%
Geelong Hosp (Barwon Health)	66.3%	25.7%	4.0%	0.0%	1.0%	1.0%	2.0%
Horsham (Wimmera Health)	83.9%	14.3%	0.9%	0.0%	0.9%	0.0%	0.0%
Latrobe Regional Hospital	70.2%	7.2%	16.6%	3.9%	0.0%	2.2%	0.0%
Mildura Base Hospital	74.4%	20.5%	1.7%	0.0%	0.9%	0.0%	0.9%
Shepparton (Goulburn Valley)	75.2%	18.8%	3.0%	0.0%	1.0%	0.0%	2.0%
Wangaratta (Northeast Health)	83.9%	13.6%	2.5%	0.0%	0.0%	0.0%	0.0%
Werribee Mercy	94.2%	2.9%	1.5%	0.0%	0.0%	1.5%	0.0%
Wonthaggi (Bass Coast RH)	88.7%	9.6%	0.0%	0.0%	0.9%	0.9%	0.0%

6.5.3 Service Unavailable vs. Problem Type vs. Top 10 Referral Hospitals

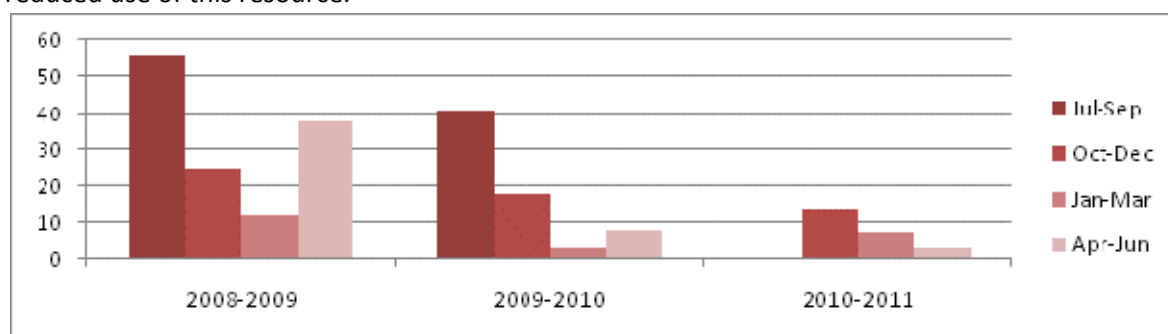
When patients are transferred due to lack of locally available specialty services it is useful to understand what services may need to be considered in future strategic planning, and in which regions or locations.

	Cardiac	Neurological_Neurosurgical	Respiratory	Gastrointestinal	Sepsis	Vascular (not neuro)	Renal	Toxicological	Trauma	Other	Oncology
Bairnsdale Regional Health	45	23	13	20	4	9	6	9	3	4	2
Bendigo Health	36	36	2	5	6	4	1		2	4	1
Echuca Regional Health	26	12	11	13	5	1	2	5	4	3	1
Horsham (Wimmera Health)	26	21	13	12	7	3	3	1	3	2	2
Latrobe Regional Hospital	38	27	5	16	10	4	7	4	4	5	
Mildura Base Hospital	30	11	8	12	3	2	10	2	2	2	1
Shepparton (Goulburn Valley)	15	22	4	10	4	9	1	2	3	3	
Wangaratta (Northeast Health)	30	26	6	6	7	5	4	2	7	3	1
Werribee Mercy	16	12	44	18	11	2	7	5	3	5	1
Wonthaggi (Bass Coast RH)	35	19	11	5	10	3		6	4	2	2
Grand Total	297	209	117	117	67	42	41	36	35	33	11

6.5.4 Public to Private Transfers

Number of public cases transferred to private hospitals	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun
2008-2009	56	25	12	38
2009-2010	41	18	3	8
2010-2011	0	14	7	3

Use of private hospital beds for uninsured patients is a resource option at times of greatest critical care bed occupancy. Additional ICU bed numbers in the State, together with improved methods of patient distribution and system occupancy measurement have resulted in markedly reduced use of this resource.



6.6 Retrieval

Retrieval:

Retrieval is the transfer of a patient from one hospital to another in which specialised clinical teams and transport platforms and equipment are used. These teams may include medical, nursing, paramedic or MICA paramedic personnel. Patient retrieval provides specialised assessment and management, prior to and during transfer of time critical or critically ill patients. Retrieval occurs from facilities where resources or services are inappropriate for ongoing care to facilities that are able to provide definitive care for the patient. During transfer, a retrieval team provides the same or higher standard of care than that available at the point of referral.

This refers to the skill set and care standards offered by the retrieval team – both direct clinical care and transport care (this is not craft group, profession or ‘rank’ specific).

Time Critical:

In respect of Retrieval Transfer, a patient is considered time critical if the patient has a clinical condition which presents an immediate threat to life, limb, cognition or future quality of life, and:

- Delay in definitive treatment will significantly increase that outcome risk, and;
- Definitive management of that condition or threat is likely to be achieved by urgent transfer to another hospital, or;
- Management of that condition definitively, or for a prolonged interim period, is beyond the resource capacity or clinical skill capacity of the current provider (or would result in unacceptable resource drain and exposure of other patients to risk).

Region	% cases retrieved
Barwon South West	64.87%
Gippsland	55.60%
Grampians	60.31%
Hume	69.57%
Loddon Mallee	61.37%
Metro	29.10%
NSW	68.55%
South Australia	0.00%
Tasmania	50.00%
Grand Total	53.26%

Responding ARV Retrieval Service	09-10	10-11
Medical (+ paramedic) crew		
Ballarat ARV	2	0
Bendigo ARV	7	13
Geelong ARV	31	39
Metro ARV	391	723
Total	431	775
Paramedic only crew	1085	1129
Grand Total	1516	1904

Overall approximately 53% of ARV cases progress to a coordinated retrieval (the remainder receiving bed coordination services or isolated clinical advice). For regional cases this proportion is considerably higher, with 62.3% progressing to retrieval.

Retrieval crewing is mixed, with the distribution remaining a historically stable proportion: 40% doctor and paramedic crew and 60% paramedic (MICA) only crew.

A significant increase in medical retrieval in 2010-11 is largely due to increased metropolitan retrieval (245 additional cases) however growth in medical crewed non-metro retrieval was also significant (99 additional cases).

6.7 Retrieval Platform

Principal Transport Platform	Total
AAV Fixed Wing	894
HATS	174
HEMS1	23
HEMS2	108
HEMS3	95
HEMS4	68
HEMS5	198
Metro CPAV	34
Metro Emerg	92
Other	2
Rural CPAV	15
Rural Emerg	192
(blank)	9
Grand Total	1904

Air transport is utilised in 73% of retrieval cases (decreased from 81% in 209-10).

HEMS 5 (retrieval helicopter) accounted for 14.3% of air retrievals.

High Acuity Transport Service (HATS) use increased from 62 cases in 2009-10 to 174 in the current year.

Principal Retrieval Transport Platform	Total
Air	72.8%
HATS	9.1%
Metro Road	6.6%
Rural Road	10.9%

6.8 Crew Mix vs. Platform

Principal Transport Platform utilisation	Dr + Paramedic Crew		Paramedic Only Crew	
AAV Fixed Wing	336	43.4%	558	49.4%
HEMS1	2	0.3%	21	1.9%
HEMS2	3	0.4%	105	9.3%
HEMS3	4	0.5%	91	8.1%
HEMS4	7	0.9%	61	5.4%
HEMS5	61	7.9%	137	12.1%
HATS	172	22.2%	2	0.2%
Metro CPAV	33	4.3%	1	0.1%
Metro Emerg	77	9.9%	15	1.3%
Other	0	0.0%	2	0.2%
Rural CPAV	13	1.7%	2	0.2%
Rural Emerg	59	7.6%	133	11.8%
(blank)	8	1.0%	1	0.1%
Grand Total	775		1129	

Distribution of AAV road vs. air platform use for retrieval cases is split between Dr/Paramedic and Paramedic-only crew types with a higher proportion of medical retrieval utilising the road platforms (as would be expected due to the increase in metro retrieval). As is expected from crew geographical distribution, regional HEMS is largely Paramedic-only crewed.

Tasking of the retrieval helicopter (HEMS5) for retrieval is disproportionately weighted towards paramedic crewing (150% of the proportion of unadjusted cases and twice the absolute number). Analysis of reasons for this difference and planning of future HEMS fleet and utilisation strategies are under consideration.

6.9 Quality Measures

6.9.1 Performance Times

	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	2010-11 financial year
Number of Medical Retrievals Without Planned/Agreed Delays	329	167	n/a	n/a	Agreed delays occur with planned missions of non time-critical nature which are scheduled at an appropriate time.
Median Medical Activation Time (mins)	85	92	n/a	n/a	From 1/1/2011 data collection has commenced which measures response performance against clinical urgency. This data will be presented in future reports.
Median Time to patient	153	155	159	164	Time to patient is time from first ARV contact to crew arrive at patient time (includes clinical coordination and platform activation) excludes cases with agreed delay. Performance is approximately 12% improved against 2009-10
Median At Hospital (Scene) Time	65	60	60	53	Average 60 mins (vs. 66 in 2009-10) Time spent at the referral hospital involved in clinical assessment and stabilisation of a critical care patient (At Patient to DepT, target = 60 minutes)
Proportion of Cases with At Patient (clinical) Time < 60 Minutes	60%	58%	60%	61%	Average 60 % (vs. 55 in 2009-10) Time spent in clinical care (At Patient T - Ready to Depart T) (target >50%)

6.9.2 ARV Coordinator Response Time

Reason Coord Contact Elapse Time >15 min	Total
Attending to another ARV Call	3.03%
Involvement in Clinical Priority Activity	0.25%
No explanation	0.03%
Other	0.75%
Telephone Fault	0.06%
Contact < 15 minutes	95.88%

ARV aim to provide referrers with access to a specialist critical care coordinator within 15 minutes of initiating a call.

This indicator is met in 95.9% (94% in 2009-10) of cases – and where unable to be met, the reason is usually attention to another ARV case.

6.9.3 Second Retrieval Crew Despatched

	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun
Despatch of second retrieval crew (required due to patient need for higher skill set) ²	1	1	2	1

Initial crew dispatched is unable to provide the required level of care, and a second crew is required (with higher skill set). This is a key indicator for the quality of clinical coordination, case assessment and planning. ARV patients are by their nature critically unwell and often unstable.

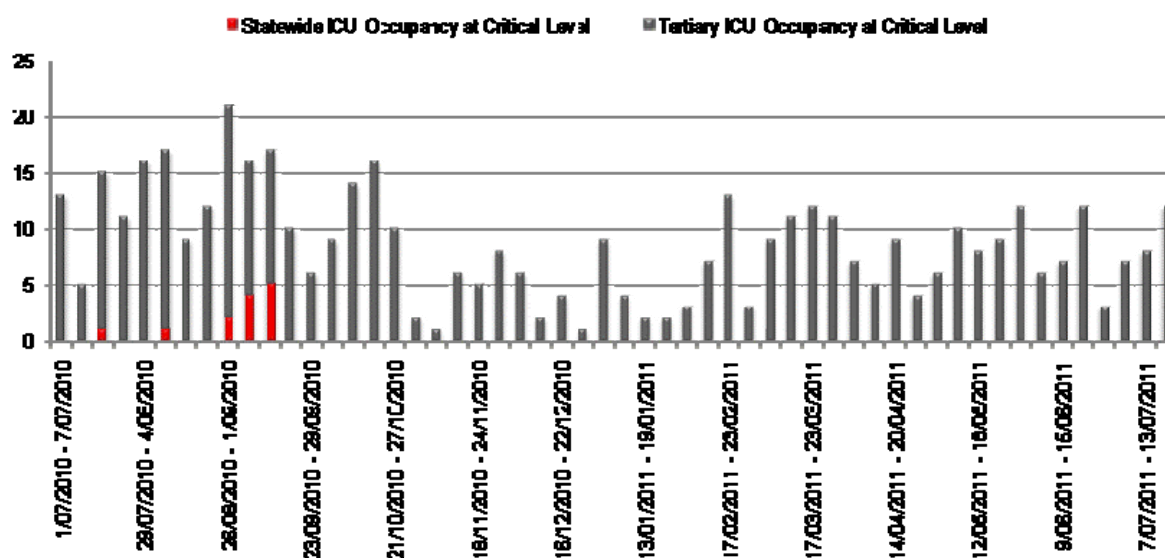
6.9.4 Clinical Variations

	July-Sep	Oct-Dec	Jan-Mar	Apr-Jun
Very serious (Levels 1)	0	0	0	0
Moderately serious (Level 2)	1	2	0	0
Minor documentation (Level 3-4)	1	2	1	1
No variation	201	165	158	185
Retrieval Cases reviewed	203	169	159	186 (717)

All cases where medical staff provides crewing are reviewed by ARV. In addition with appointment of a senior AV Clinical Support Officer within ARV, 25% of paramedic ARV cases are also reviewed. Staff receive feedback on the findings of the review of each case they perform. Minor variations to documentation or guideline adherence are managed by ARV clinical advisor feedback to medical staff. More serious variations where patient harm may (or does) occur are referred for external clinical review and reported to the Clinical Review Committee.

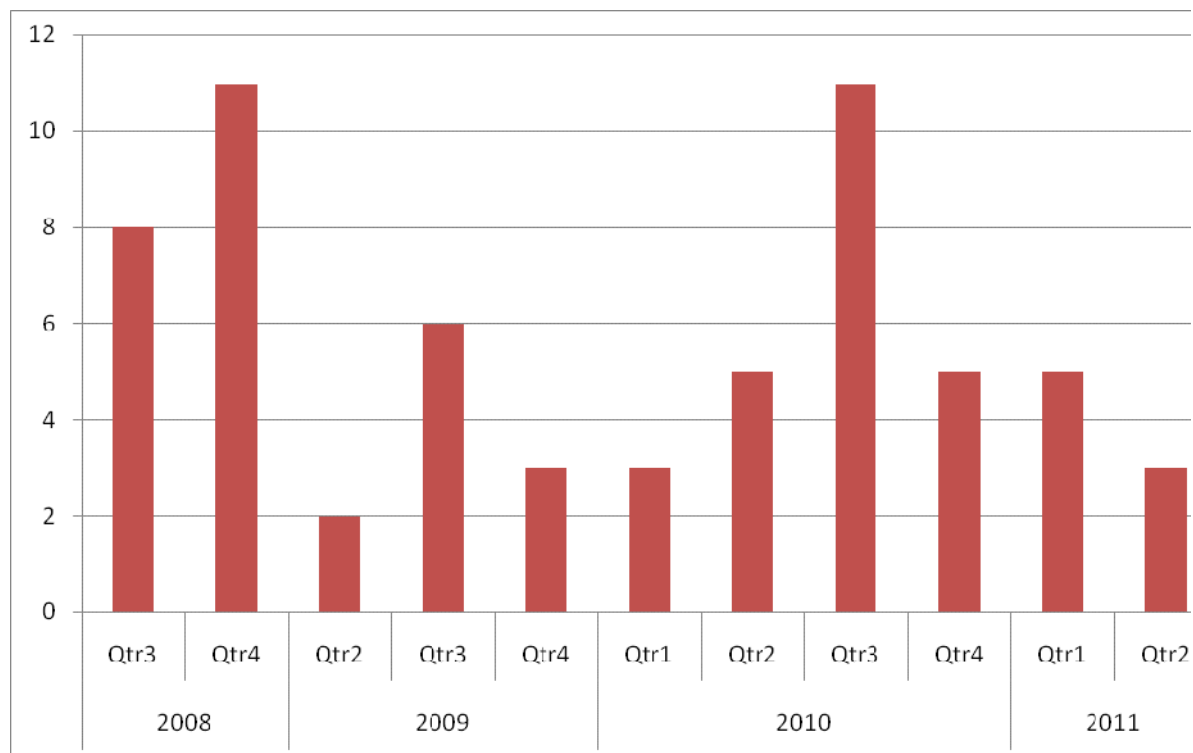
6.9.5 Critical Care Access Restriction

In August 2008, DHS implemented an Interim Critical Care Access Guideline which provided a mechanism to manage situations where critical care bed occupancy was extremely high. ARV developed a system of 'early warning' of low ICU bed capacity via a group fax and e-mail system. In early 2009, this system was modified to provide earlier warning (resulting in increased rates of notification). In 2010, this system has moved to a combination of e-mail and SMS alert messaging when system occupancy is critical (red bars below).



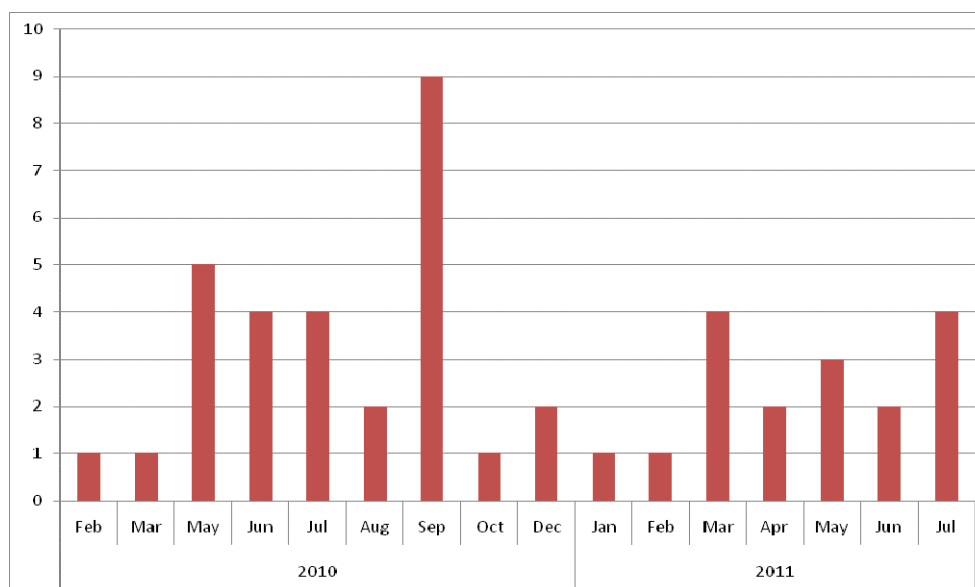
Where no ICU bed can be identified for a patient who requires time critical transfer, ARV will define a destination for that patient and ensure transfer of the patient (rather than have the patient wait for an extended time in a setting which is unable to provide the required level of care). Such distribution is managed carefully across the system and reported regularly to DHS and the Intensive Care Advisory Committee.

The rate of defined transfers is seasonal, and has decreased from year to year due to (putative) improvement in critical care patient distribution and access management, and to increased ICU bed capacity in Victoria.



Defined Transfers

In January 2010 this process was expanded to include defined transfer for acute neurosurgical patients who though not critical, have time urgent neurosurgical problems and require transfer to a neurosurgical unit. This safety and quality initiative has resulted in more timely transfer of a number of patients whose clinical outcomes may have become compromised due to inability to access specialist care. It has also raised awareness of this issue and the need to ensure access queues manage both acuity and urgency for optimised clinical outcomes.



Neurosurgical Defined Transfers

Where defined neurosurgical transfers are required, patient distribution is usually along geographical corridors of natural patient referral patterns i.e. patients from Gippsland are usually transferred to Monash Medical Centre, patients from Grampians are usually transferred to RMH.

6.9.6 Incident Review

The purpose of the ARV Incident Report is to record any issues, unusual situations or variations to normal practice relating to adult retrieval activities across the state.

The information captured in this process is reviewed to ensure that circumstances around an identified case are explored, any suggested actions are considered and improvements to the system are introduced if required.

The Business Manager, ARV is responsible for assigning the incident report to the relevant business owner for consideration and monitoring them to ensure they are actioned and an appropriate outcome is achieved. All cases are reviewed in a monthly interdisciplinary meeting. Incidents may be referred on to the clinical review process, RCA etc.

A response to the issue lodged is provided to the originator of the report, prior to the incident being closed.

Incident rates have remained stable and acceptable – as would be expected, communication challenges within a pressured clinical and logistic environment underpin many incidents.

Approximately 1 in 50 cases are reviewed through the incident review process.

7. Attachments:

7.1 Research

Analysis of Patients who Left Without Being Seen (LWBS) in the Emergency Department
BRAND C, **KENNEDY M**, et al, Monash University

Factors for mortality in patients during the first 72 hours after inter hospital transfer and admission to an intensive care unit by comparing survivors with non-survivors. Linkage and analysis of components of the ARV and Aust NZ Intensive Care databases.
VISSER P, KENNEDY M, HART G.

Victorian Emergency Interhospital Transfer of Pregnant Women – Collaborative research involving ARV, PERS and acute Obstetric Hospitals, to assess rates, risks, characteristics, needs and outcomes of patients.
HUNNING E, **KENNEDY M**, et al

VSTORM linkage – analysis of retrieval factors in major trauma outcomes pre-post development of ARV.
McKENZIE B, KENNEDY M, CAMERON P, GABBE B.

7.2 Educational Material



Craig Sillitoe/The Age

Adult critical care advice and bed coordination
Retrieval of critical adult patients (interhospital)
Victorian major trauma referral and advice (adult and paediatric)

Adult Retrieval Victoria
ARV

Statewide
24 hours

1300 36 86 61

Unit 4, 12 Larkin Court, Essendon Fields VIC 3041. Tel: 1300 36 86 61. www.arv.vic.gov.au @ARVvic.gov.au

OTHER USEFUL NUMBERS

PETS 03 9345 5211

NETS/PERS 1300 13 76 50

Emergency ambulance response 000

NON EMERGENCY INTER-HOSPITAL TRANSFER

Metro 1300 36 63 13

Non metro 13 30 09



PREPARATION FOR RETRIEVAL

1300 36 86 61

Adult Retrieval Victoria
ARV



Careful Preparation for Retrieval Transport Improves Care & Reduces Risk.



AIRWAY

ENSURE PATIENT AIRWAY SAFETY

- 1 Assess airway stability for all patients
- 2 Secure endotracheal tube
- 3 Record size and lip length
- 4 Oro-gastric tube placed
- 5 CXR to confirm position of endotracheal tube



BREATHING

ENSURE OPTIMISED OXYGENATION

- 1 Observe respiratory rate and character
- 2 Measure SpO₂ and ETCO₂
- 3 Administer oxygen using the correct delivery device
- 4 Check ABG's if indicated
- 5 Secure Intercostal catheters if present



CIRCULATION

ENSURE IV ACCESS & MANAGEMENT

- 1 Insert two peripheral IV lines
- 2 Secure all lines – ensure injection ports are accessible
- 3 Prepare drug infusions in 50 ml syringes. For advice on infusion concentrations call ARV
- 4 Record all IV fluids
- 5 Transduce all arterial and central lines.



DOCUMENTS

ENSURE COMPLETE PATIENT DOCUMENTATION

- 1 ARV referral form
- 2 Provide copies of all patient charts
- 3 Investigation results – pathology & ECG
- 4 Imaging – films / scan / MRI
- 5 Please advise any 'limitation of treatment' orders

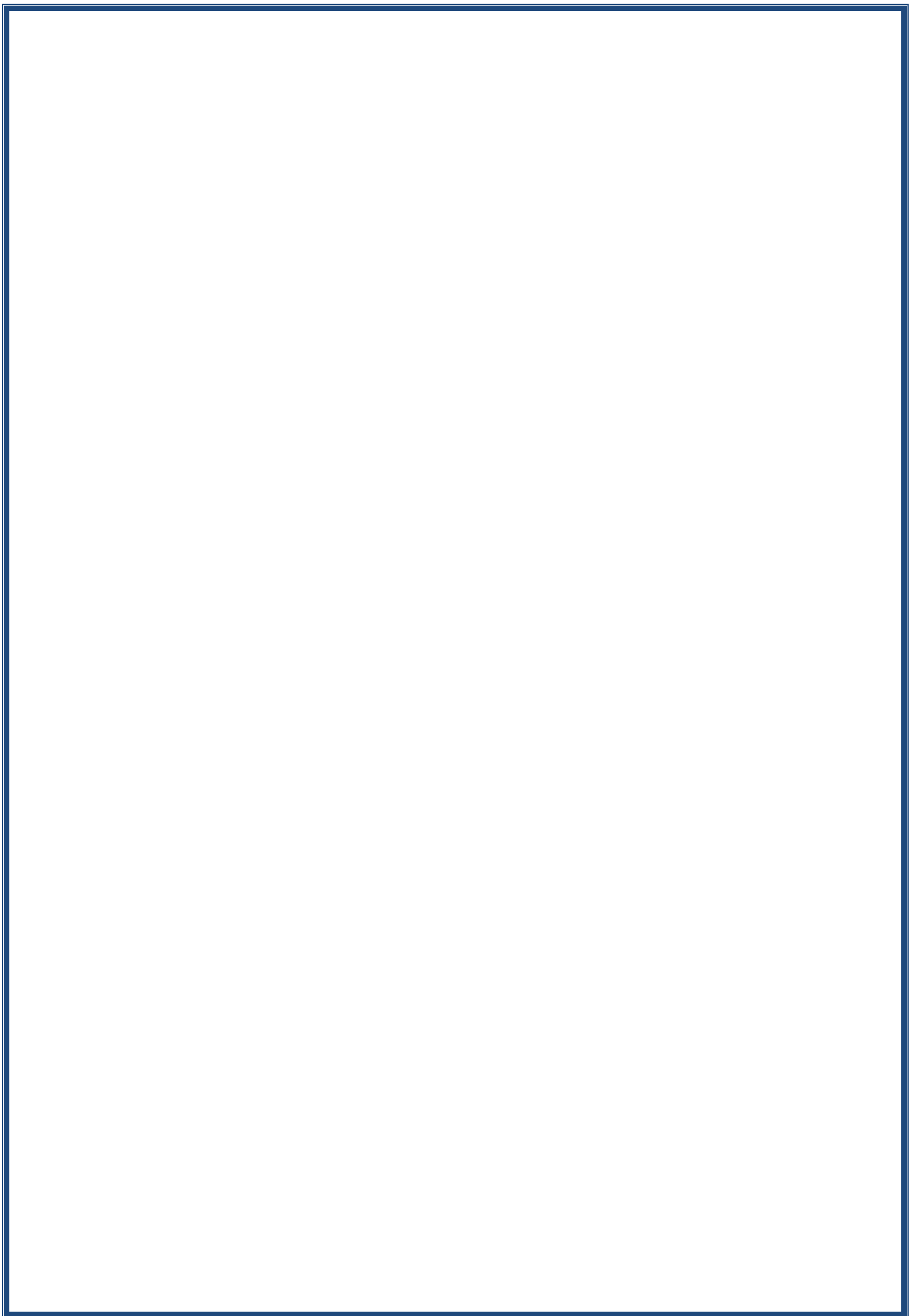
OTHER

- 1 Maintain body temperature
- 2 Consider indwelling catheter – maintain Fluid Balance Chart
- 3 Empty drainage bags prior to transport
- 4 Administer antiemetic
- 5 Maintain spinal precautions if indicated

ALERT

It is important that you notify the ARV Coordinator of:

- 1 Significant deterioration in:
 - Conscious state
 - Blood Pressure
 - Heart Rate
 - Respiratory status
 - Oxygenation
- 2 Major clinical developments such as significantly abnormal diagnostic tests, new clinical signs etc
- 3 The need for major interventions prior to the retrieval team arriving (eg intubation, surgery, etc)



Adult Retrieval Victoria

ARV

Coordinators of Critical Care Services

1300 36 86 61