

Adult emergency retrieval services in Victoria

Discussion paper | December 2006

Adult emergency retrieval services in Victoria

Discussion paper

December 2006

Published by the Victorian Government Department of Human Services
Melbourne, Victoria

© Copyright State of Victoria 2006

This publication is copyright, no part may be reproduced by any process
except in accordance with the provisions of the *Copyright Act 1968*.

This document may also be downloaded from the Department of Human
Services web site at <http://www.health.vic.gov.au/retrieval>

Authorised by the State Government of Victoria, 50 Lonsdale Street,
Melbourne.

Table of contents

Introduction	4
Background	4
Feedback	5
Current adult emergency retrieval services	6
Strategic framework	7
Stakeholder consultation workshop	9
Demand analysis	11
Victorian Adult Emergency Retrieval and Coordination Service	11
Metropolitan Ambulance Service	12
Rural Ambulance Victoria	12
Australia and New Zealand Intensive Care Society database	12
Victorian Emergency Minimum Dataset	12
Intensive care unit transfers	13
Interstate comparison	13
Summary of data	14
Workforce	16
Retrieval physicians	16
Critical care nurses	18
Metropolitan Ambulance Service	19
Air Ambulance Victoria	19
Victorian Adult Emergency Retrieval and Coordination Service	19
Quality and safety recommendations	21
Coronial inquest	21
Aviation safety investigation	21
Sentinel events	21
Recommended service model	23
Service scope	23
Centralised coordination	23
Integrated services	24
Accessible	25
Governance	25
Promotion	26
Early activation	26
Emergency preparedness	26
Next steps	27
Recommended service model	27
Literature review	28
Acronyms	32

Introduction

This discussion paper reflects the work undertaken by the Adult Retrieval Services Working Group and the department in 2006 regarding adult emergency retrieval services in Victoria. The paper provides an overview of the current service scope, activity review and recommended framework for adult retrieval services in the future.

The department has received feedback from stakeholders regarding the current level of adult emergency retrieval services and has identified areas for improvement that led to the review of the adult emergency retrieval services model.

Opportunities for improving adult emergency retrieval services in Victoria described in this discussion paper are focused on addressing the set of agreed principles that underpin an effective retrieval service that were identified during stakeholder consultations.

Background

In April 1985, the Office of the Coordinator of Emergency and Critical Care Services commenced operations to facilitate inter-hospital transfers of critical care patients within Victoria through the Medical Emergency Adult Retrieval Service.

In 1999, the Department of Human Services released the *Review of Trauma and Emergency Services – Victoria 1999* (RoTES) report. RoTES was the final report of the Ministerial Taskforce on Trauma and Emergency Services and the Department Working Party on Emergency and Trauma Services and provided a framework for the management of trauma known as the Victorian State Trauma System.

RoTES made recommendations relating to adult retrieval and transfer and proposed a retrieval service model be developed by a consultancy for further consideration. KPMG Consulting were engaged to review adult emergency retrieval and delivered the *Service specifications for medical retrieval services in Victoria final report* in March 2001.

The KPMG report led to the establishment of the Victorian Adult Emergency Retrieval and Coordination Service (VAERCS) which subsumed the responsibilities of the Office of the Coordinator of Emergency and Critical Care Services and Medical Emergency Adult Retrieval Service. VAERCS commenced operations in 2002 under the auspice of St Vincent's Health.

In 2003, the department published *VAERCS strategic direction 2003-08*. The strategic direction identified a commitment to a strengthened focus on regional and rural needs, robust management and long-term sustainability.

In late 2005, the department commenced a review of the adult emergency retrieval service model through stakeholder consultation and the convening of a working group. This discussion paper summarises the outcomes from stakeholder consultations and a preferred model for adult emergency retrieval services in Victoria to promote optimal patient outcomes.

Feedback

Feedback on this paper can be provided in writing by Thursday, 25 January 2007 to:

Dr Martin Lum
Senior Medical Advisor, Access and Metropolitan Performance
Department of Human Services
GPO Box 4057
Melbourne 3001

martin.lum@dhs.vic.gov.au

Current adult emergency retrieval services

Adult emergency retrieval services in Victoria are integral to the efficiency and effectiveness of the health system and outcomes for emergency critical care patients. Services are currently provided by multiple agencies. VAERCS, auspiced by St Vincent's Health is responsible for the coordination of adult emergency retrieval services within Victoria. The service provides retrieval services within Victoria where Melbourne is the patient's definitive destination, and coordinates limited regional retrieval services in Bendigo, Ballarat and Geelong. These regional retrieval services receive limited funding to operate for 60 hours per week.

The service is also responsible for coordinating access to critical care beds as required. Metropolitan inter-hospital transfers are undertaken by the Metropolitan Ambulance Service and individual hospitals. Some hospitals provide their own critical care transfers utilising local clinicians and both emergency and non-emergency patient transport providers.

Air Ambulance Victoria (which is part of the Metropolitan Ambulance Service) and Rural Ambulance Victoria undertake adult emergency retrievals. VAERCS tasks one of the ambulance services to undertake a retrieval and may provide a retrieval physician as required.

A regional retrieval service based in Albury, New South Wales, delivers some services to the northeast sector of Victoria, and a South Australian retrieval service operating out of Adelaide retrieves from Mildura and surrounding areas of the northwest Victorian sector.

The VAERCS duty coordinator physician is available 24/7 to assist clinical staff seeking advice or assistance with managing critically ill or critically injured patients who may require acute inter-hospital transfer. Duty coordinators provide telephone advice and assistance, facilitate access to critical care units and arrange medical retrievals. VAERCS is managed by a director and operations manager, and is supported by administrative staff. A pool of retrieval physicians undertakes retrievals.

Strategic framework

Improving the retrieval system and the service components of adult emergency retrieval in Victoria is consistent with the mission and objectives of the department, which is to enhance and protect the health and wellbeing of all Victorians, emphasising vulnerable groups and those in most need. The Department of Human Services Annual Plan identifies the importance of building sustainable, well managed and efficient human services, providing timely and accessible human services.

As critical care services are of a highly specialised nature, they are only provided as a statewide service in major tertiary hospitals, large metropolitan hospitals and regional hospitals. Coordination of access to these services requires infrastructure to support operational relationships between health services and with ambulance services.

Access to these services for all Victorians requires an efficient and effective system for transporting critically ill patients. This in turn requires specialised and expert capability for the clinical management of often complex and unstable patients in a mobile environment.

The preferred service for retrieval outlined in this paper is designed to ensure continued sustainability, safety and quality of adult emergency retrieval services.

Adult retrieval services working group

The adult retrieval services working group was convened in May 2006 to provide advice regarding adult emergency retrieval services including:

- Role of retrieval in the patient journey from pre-hospital system response, through delivery to definitive care in regional and metropolitan Victoria
- Scope of advice and referral systems, appropriate patient selection with particular attention to critically ill, trauma and cardiac patients
- Service delivery and coordination considerations with respect to workforce, transport modalities and access to critical care beds
- Organisational governance including structure, staff and logistic resource requirements, budget, management, audit and ongoing monitoring, evaluation, and performance measures
- Clinical governance of the retrieval system, including mechanisms for clinical improvement, ensuring clinical standards are maintained, reporting adverse events, credentialing and continuing education, clinical review and clinical performance indicators
- Transition to the preferred retrieval service model.

The members of the working group were:

Dr Craig White (Chair)	Southern Health
Dr George Braitberg	Austin Health
Dr Ian Carney	Peninsula Health
Ms Frances Diver	Department of Human Services
Dr Craig French	Western Health
Mr David Gardner	Department of Human Services
Mr David Garner	Rural Ambulance Victoria
Ms Chris Giles	Wangaratta Health
Ms Margaret Goding	St Vincent's Hospital
Dr Mark Harris	St John of God, Ballarat
Dr Marcus Kennedy	Melbourne Health
Dr Martin Lum	Department of Human Services
Dr Matt Maiden	Barwon Health
Mr Kevin Masci	Metropolitan Ambulance Service
Dr Andrew Rosengarten	Victorian Adult Emergency Retrieval and Coordination Service
Dr Susan Sdrinis	Department of Human Services
Ms Sue Thornton	Mildura Hospital
Ms Jenny Tunbridge	Department of Human Services
Dr Peter Wright	Latrobe Regional Health

Ms Kaylene Baird and Mr Evan Spurway of the Department of Human Services supported the working group.

Stakeholder consultation workshop

In June 2006, a stakeholder consultation workshop facilitated by Dr Norman Swan and attended by over sixty participants was held in Melbourne.

The workshop provided stakeholders with an opportunity to provide feedback on the current adult emergency retrieval services model.

Ten principles of an effective and efficient service were identified by workshop participants:

Standard operating procedures to include single activation process, standardised equipment and protocols, occupational health and safety standards, staff competencies, appropriate patient escorts, risk management strategies that include hospital and retrieval service feedback across the continuum of patient care.

One-stop shop with a single telephone number to access retrieval service for medical advice, critical care bed, and retrieval activation.

Central governance structure accountable for retrieval service conduct and outcomes.

Operational integration including coordination with ambulance, health and interstate service providers.

Clinical governance processes for retrieval benchmarks, data collection, analyses and comprehensive reporting.

Centralised service with dedicated 24/7 medical teams coordinated by a physician, and including regional and metropolitan retrievalists.

Comprehensive system to include delineated hospitals that are resourced appropriately, suitable transport platforms, equipment and patient escorts in a timely and risk affirmative environment.

Accessible statewide retrieval service and awareness, including access to critical care beds.

Promote health service participation within the retrieval system.

Early warning and activation.

The working group considered how the current service aligns with the agreed principles. This is summarised in table 1.

Table 1

Service principles	Victoria
Central governance	St Vincent's Health responsibility is limited to physician assisted retrievals. Governance of regional retrieval is separate.
Clinical governance	Multiple agencies with separate clinical governance structures.
Operational integration	Coordination of retrieval by referral to multiple providers
Comprehensive system	Medical retrieval services separated from transport platforms; central and regional services are not integrated; limited capacity for interdisciplinary teams; hospitals undertake metro transfers
Centralised service	Central service available 24/7; regional service limited hours
Promote health service participation	Retrieval physicians based in health services
Standard operating procedures	Centralised, but regional differences
'One stop shop'	No; requires referral to multiple providers
Accessible	Inconsistent access due to the current service model
Early warning and activation	No established criteria or system for early activation

These principles and the feedback provided by workshop attendees have guided the working group in developing the preferred service model in this discussion paper.

Demand analysis

As multiple providers including VAERCS, ambulance services and individual hospitals undertake adult emergency retrievals within Victoria there is no consolidated data collection or repository.

The working group established a data subgroup to review data available from various sources to estimate the demand for adult emergency retrieval services.

There is currently no explicit definition or triage guidelines for critically ill patients. At times critical patients are transferred between health services without the involvement of the Victorian Adult Emergency and Retrieval Coordination Service, with the transfer undertaken by personnel from the referring health service.

A quantitative analysis estimating the potential demand was conducted using identifiable data sources including VAERCS, Metropolitan Ambulance Service, Rural Ambulance Victoria, Victorian Emergency Minimum Dataset and the Victorian State Trauma Registry. An estimate of the demand for adult emergency retrieval services was based on how many critically ill patients require interhospital transportation within Victoria.

A **critically ill patient** was defined as:

- Requiring transport to an intensive care unit or
- Intubated or
- On inotropes (circulation sustaining medication) or
- Glasgow Coma Score (GCS) of less than 13.

For the purposes of the demand analysis 'Medical retrieval' refers to transport of patient with a doctor.

Victorian Adult Emergency Retrieval and Coordination Service

The total number of referrals to VAERCS in 2005-06 was 1,891, representing approximately five cases per day.

Of these referrals, 1,370 calls (70 per cent) were for intensive care unit or coronary care unit bed finding and the remaining 521 calls (30 per cent) resulted in 336 mobile intensive care ambulance (MICA) transfers and 185 medical retrievals.

VAERCS physicians undertook 148 of these medical retrievals using fixed wing aircraft (113 cases), road car (25 cases) and rotary wing aircraft (8 cases). The remaining 37 cases were undertaken by the regional retrieval services.

Metropolitan Ambulance Service

Road transports

Metropolitan Ambulance Service (MAS) data relates to the number of inter-hospital road transfers crewed by a MICA paramedic. In 2005-06, MAS recorded 4,344 inter-hospital transfers. Of these transfers, 336 required a MICA paramedic. However it should be noted that most metropolitan inter-hospital transfers of critically ill patients are undertaken by a non MICA paramedic crew with a medical escort from the referring hospital.

Air ambulance transfers

In 2005, Air Ambulance Victoria (AAV), which is a part of MAS, undertook a total of 810 transfers. Of these, 533 were rotary wing aircraft inter hospital transfers and 277 were fixed wing aircraft urgent transfers (128 of the fixed wing aircraft cases were tasked by VAERCS).

These AAV figures do not include transport from a small rural hospital or clinic as these transfers are regarded as primary transfers.

Rural Ambulance Victoria

In 2005-06, Rural Ambulance Victoria (RAV) undertook 6,122 inter-hospital transfers. Of these RAV transfers, 1,404 were with a MICA paramedic (489 transfers to Melbourne, 833 transfers to a regional hospital and 81 transfers to regional New South Wales).

Australia and New Zealand Intensive Care Society database

In 2005, there were 13,661 intensive care unit admissions in Victoria. These admissions were from operating theatres (6,748 admissions), emergency departments (3,360) and from wards (2,491). Eight hundred and twenty nine admissions were directly transferred from another hospital indicating that they required transfer.

Victorian Emergency Minimum Dataset

The Victorian Emergency Minimum Dataset (VEMD) shows 362 transfers between emergency departments for patients requiring intensive care. Of these, 278 were from metropolitan emergency departments and 84 from regional emergency departments. During the same period, there were 624 transfers between emergency departments for patients requiring coronary care.

These figures only include the 38 hospitals participating in VEMD data collection. It does not include the number of patients transferred from small rural hospitals.

Intensive care unit transfers

An audit of metropolitan Melbourne referrals to intensive care units¹ was undertaken in 1999. Ten public metropolitan hospitals took part in the audit which showed that 620 critical care patients underwent inter-hospital transfers. This excludes transfers to and from private critical care units.

The department intensive care services review reported 275 public to private transfers but some private intensive care units are collocated with public hospitals. This figure excludes arranged intensive care unit transfers for therapeutic or diagnostic purposes.

A telephone poll of 12 metro hospital ICUs in September 2006 indicated they undertook an average of one transfer per month, which represents approximately 150 cases per year.

It is estimated that 1,000 critically ill patients are transported within metropolitan Victoria per year.

Interstate comparison

A comparison of rates of medical retrieval based on data reported by retrieval services around the country is detailed in table 2.

Table 2

	New South Wales	Queensland	South Australia	Victoria
Population	6.7 million	3.8 million	1.5 million	4.9 million
Rural/Regional	30 per cent	45 per cent	28 per cent	26 per cent
Referrals/10,000	Unknown	12.7	2.80	1.90
Retrievals	3,700	3,800	1,100	185
Retrievals/10,000	5.5	10.0	7.3	0.4

Reported levels of medical retrieval in Victoria are significantly lower than in any other state. If retrieval activity in Victoria occurred at the same rate per capita as in other jurisdictions there would be between 2700 and 4900 retrievals per annum.

Trauma

The adult retrieval service is an essential element of the Victorian State Trauma System. Currently 10 per cent of adult emergency retrieval service activity is major trauma related. Major trauma patients are transferred to a major trauma service through staged trauma service levels in line with the state trauma triage guidelines. The Victorian State Trauma Registry collects data relating to trauma transfers.

¹ *Metropolitan Audit of Appropriate Referrals Refused Admission to Intensive Care, Duke GJ. Anaesth Intensive Care 2004; 32: 702-706*

Approximately 10 per cent of major trauma patients within Victoria have required transfer into Melbourne. In 2004-05, 1,855 major trauma patients received definitive care within the Victorian State Trauma System.

Summary of data

The current degree of operational separation between agencies, together with gaps in knowledge about activity in critical care transport supports the experiences expressed by stakeholders, that access to retrieval services is limited. Critically ill and injured patients continue to be transported without VAERCS involvement in many settings. This activity escapes capture in many of the data systems and possibly represents unmet demand for coordinated retrieval services.

The best available estimate of demand for adult retrieval services in Victoria is based on data drawn from all possible sources.

Table 3

Type of transfer	Source	Number
Metropolitan Interhospital transfers	ICU audit data, MAS data, VEMD	1000
RAV urgent inter-hospital transfers	RAV data	1400
AAV interhospital transfers	AAV data	800

The overall demand for a comprehensive single adult emergency retrieval service responsible for retrieval and inter-hospital transfers is approximately 3,500 retrievals per year. Of this number, the majority are safely able to be tasked by ambulance paramedics. The available data suggests that approximately 800 to 1200 of these require medical retrieval. This represents an average of two to three retrievals per day rather than the current average of one medical retrieval every two days.

Interstate comparison

The following table compares retrieval systems currently operating in New South Wales, Queensland and South Australia to the principles of an effective and efficient service agreed by stakeholders.

Table 4

Service principles	New South Wales	Queensland	South Australia
Central governance	NSW Health/ Ambulance	Queensland Emergency Services and Ambulance	Hospital based (in transition)
Clinical governance	Aeromedical Retrieval Unit, service providers	Queensland Ambulance Queensland Health	Hospital based (in transition)
Operational integration	Central and regional coordination of service providers	Central coordination; collocation of retrieval and ambulance	Hospital referral, historical patterns
Comprehensive system	Integrated road, fixed wing and helicopter service across the state; mixed levels of interdisciplinary teams	Integrated aeromedical service across the state; comprehensive interdisciplinary teams; hospital based metro transport	Separation of hospital based services from transport platforms; predominantly physician nurse teams
Centralised service	Central and regional	Central, with two zone operational centres	Fragmented between hospital services
Promote health service participation	Mixed health service/third party providers	Predominantly dedicated retrieval system to health services	Health service based
Standard operating procedures	Centralised over sight, but regional differences	Highly centralised	Little standardisation between services
'One stop shop'	Yes	Yes	No
Accessible	Yes	Yes	Variable
Early warning and activation	Yes	Yes	No

Workforce

Retrieval missions are carried out by a number of clinician groups. These clinicians have different skill sets, training and capabilities. The ideal staffing profile for a retrieval mission matches the clinical needs of the patient to the expertise of the retrieval clinician. This ideal profile may be constrained by workforce availability particularly in regard to regional workforce. Descriptions of the possible retrieval clinician workforce are detailed below.

Retrieval physicians

Specialist critical care physicians undertake medical retrievals performed under the auspice of VAERCS. These physicians are specialists in the disciplines of Emergency Medicine, Intensive Care or Anaesthesia.

Some medical retrieval missions are performed without VAERCS involvement, usually with a medical escort provided by the referring hospital. The Victorian Trauma Foundation reported on 451 trauma transfers in Victoria, between April 2003 and December 2004. The study identified that VAERCS escorted 10 per cent of major trauma patients that required transfer, and referring hospital staff in 18 per cent. The referring hospital escorts were registrars (49 per cent), medical specialists (18 per cent), and Hospital Medical Officers (17 per cent). Referring hospital escorts were most likely to originate from metropolitan hospitals (S. Zalstein, personal communication, 2006).

Anecdotal evidence suggests that emergency, intensive care or anaesthetic registrars perform these retrievals. It is likely that trainees are performing these retrievals without specific training in the transportation of critically ill patients, as there is currently no training stream for retrieval medicine in Victoria.

The retrieval of critically ill patients from rural hospitals staffed by a general practitioner (GP) is classified as primary missions in the RAV data set. There is anecdotal evidence that GPs provide a medical escort for some of these retrievals.

No data is available relating to the volume and frequency of these retrievals and some GPs have expressed an interest in participating in a formalised system of retrieval in rural Victoria.

VAERCS currently has 16 (2.7 full time equivalent (FTE)) retrieval physicians located at metropolitan hospitals, six (1.2 FTE) coordinators and a two-tier roster (pool for expansion amongst critical care specialists).

Regionally, there is 1.2 FTE per region (Barwon, Bendigo and Geelong) with a pool for expansion (Ballarat 12.5 FTE, Loddon Mallee 7.0 and Geelong 14.0 FTE).

The FTE figures, depth of capability, potential for expansion, distribution and skills and scope of practice need to be considered.

Paramedic workforce

MAS has a total of 1,218 ambulance paramedics including 274 MICA paramedics, 16 flight paramedics on roster (drawn from paramedics pool) and 31 MICA flight paramedics on roster (drawn from paramedics pool).

There are MICA crews 24/7 in many rural areas, however the roster may often have the capability for only one crew per shift. Utilisation of MICA crews for inter-hospital missions reduces their capacity to respond to primary tasks.

MAS and RAV practice is governed by clinical practice guidelines and clinical work instructions approved by a medical standards committee. Paramedics and MICA paramedics are delegated to operate under these guidelines and instructions.

Education for paramedics is based on having sufficient background, knowledge and expertise to practice in accordance with the guidelines and work instructions.

Figure 1. Distribution of metropolitan ambulance resources



Critical care nurses

The utilisation of critical care nurses for transport of the critically ill patient is not recognised as a component of the adult retrieval system in Victoria. There are 6,600 registered critical care nurses in Victoria, of these an estimated 2,200 are in rural and regional areas. Anecdotal reports suggest that there are some adult critical care retrievals which involve critical care nurses, however there is no data available to support this. Critical care nurses participate in paediatric and neonatal retrievals and in retrieval services in other jurisdictions.

Dispatch systems

Dispatch centres are operational bases that coordinate, organise and authorise transport of patients in Victoria. There is no overarching coordination centre that has responsibility for oversight of all critical care transport in Victoria.

Currently, there are five RAV dispatch centres covering regional areas, one MAS centre covering the metropolitan area and one AAV dispatch centre responsible for air ambulance dispatch. VAERCS operates from St Vincent's Hospital.

Metropolitan Ambulance Service

MAS have a computer aided dispatch system integrated with a mobile data network (including automatic vehicle location) and structured call taking software with offsite redundancy capability. The Emergency Services Telecommunications Authority (ESTA) provides the communications capability. ESTA has legislative responsibility for handling triple 0 calls, dispatching emergency organisations and providing emergency communications for Victorian communities.

Triage is based on the medical priority dispatch system (MPDS). It is a structured call taking process based on algorithms to identify the most critical calls at the earliest part of the call taking process. Calls are allocated a response determinate (priority) upon which dispatch is then based.

Air Ambulance Victoria

AAV operates a separate self-contained communications system staffed by specialist flight coordinators. Call taking and dispatch within AAV is governed by specific operating procedures outlining primary and secondary dispatch of aircraft based on specified criteria.

The coordinators match the expected interventions and complexity of the patient's condition to the required skill sets and appropriate response platform. Air Ambulance personnel triaging calls for retrieval have a detailed understanding of the application of MAS skill sets in all areas and have consultation processes established with current retrieval agencies and hospitals.

Victorian Adult Emergency Retrieval and Coordination Service

The VAERCS duty coordinator is available 24/7, but is not always located at St Vincent's Hospital or close to transport platforms. Duty coordinators provide telephone advice and assistance, facilitate access to critical care units and arrange medical retrievals. Retrieval physicians are available on-call offsite.

Standards and regulations

There are professional and regulatory documents which define standards of care and authority for the clinical and operational delivery of patient transport. These have been considered in the preparation of this discussion paper.

Minimum Standards for the Transport of Critically Ill Patients (Review IC-10 (2003)) are published jointly by the Joint Faculty of Intensive Care Medicine, the Australian and New Zealand College of Anaesthetists, and the Australasian College for Emergency Medicine.

MAS and RAV have a mandate to provide ambulance services to the State of Victoria by legislation as determined by the *Ambulance Services Act 1986*.

Clinical Practice Guidelines (CPG:PR03) define the scope of practice for metropolitan and rural ambulance personnel. The authority to practice matrix defines three categories of ambulance personnel, Qualified Ambulance Paramedics MICA<12 and MICA>12. The skill matrix further defines selective authorities and includes specific instances where approved medical consult authority is required.

Australia and New Zealand Standard (AS/NZS 4535:1999) relates to ambulance restraint systems. Specifications for restraint and anchoring are defined, including static and dynamic tests for equipment.

Quality and safety recommendations

Adult retrieval services in other state jurisdictions have responded to coronial recommendations and aviation safety investigations. An analysis of recommendations identified through a search of the National Coroners Information System (NCIS) has been undertaken.

Coronial inquest

Central authority and accountability are key recommendations of the coronial inquests and accident investigations of other jurisdictions and are supported by international literature. A coronial inquest in South Australia² recommended clarification of the role and procedural process for recruiting and activating rural medical practitioners to provide assistance at rural trauma scenes. The Coroner also recommended a protocol stipulating a 30 minute margin from initial notification to activation of retrieval of a critically ill or injured patient be reviewed and a central aeromedical consultant role be considered to coordinate retrieval activities, which should not be confined to one trauma centre.

Aviation safety investigation

The Australian Transport Safety Bureau investigated a fatal rotary wing accident involving the Emergency Medical Service in Queensland in 2003³.

Whilst the incident involved the night crash of the helicopter operating under Visual Flight Rules, operational procedures relating to the clinical coordination and tasking of the mission were identified.

Aeromedical operations were informed by the *Queensland Aeromedical and Air Rescue Network Helicopter Tasking Guidelines*, which defined the circumstances for inter-hospital transfer. Whilst these guidelines provided for clinical coordination and tasking of the patient transfer and flight activation, neither the clinical coordinator, nor ambulance communication centre personnel had operational aviation experience. This led to the establishment of centralised clinical coordination and tasking of aeromedical aircraft and helicopters in Queensland.

Sentinel events

There have been six sentinel events in Victoria in the last three years in which patient transfer, retrieval or transport arrangements has been identified as a significant clinical risk. The outcomes of the review of these cases were recommendations for a range of initiatives such as clinical guideline and policy development. Other recommendations included enhancing the role of medical specialists in managing communication between services where transfer/retrieval is requested.

² South Australia coronial inquest 23/2005 (1902/2002)

³ Australian Transport Safety Bureau aviation safety investigation 200304282

The sentinel event review also recommended an escalation policy and procedures be put in place to ensure there is an appropriate mechanism to facilitate access to critical care resources as required. It was identified that a better understanding and awareness of services available in an emergency, such as VAERCS could be achieved through education and training programs.

Recommended service model

This service description recognises the strengths of current adult emergency retrieval services and identifies areas for development. It brings together the diverse perspectives of stakeholders, agencies and service partners that care for critically ill and injured patients in need of inter-hospital transport.

The functional description is intended to guide and strengthen adult emergency retrieval services. A detailed implementation plan will be required to address transition to a new service model (including workforce).

Service scope

An essential requirement is to establish a clear service scope that provides an appropriate service boundary for the system, and which defines the operational requirements for medical, and critical care (nurse or paramedic) clinicians.

The service scope forms the basis for retrieval activation and is designed to facilitate an appropriate response coordinated through a single responsible entity. A definition of retrieval activation criteria needs to be established within the following general description.

The service scope is proposed as:

- transport of critically ill or injured patients where an inter-hospital transfer is required as a result of local healthcare facilities and expertise being unable to provide appropriate critical care expertise and/or a critical care bed is unavailable at the referring hospital
- primary retrieval that requires interventions outside the paramedic scope of practice.

Centralised coordination

There is a need for a single responsible entity for adult emergency retrieval services within Victoria. This entity may be a health service, ambulance service or a new entity. It is vital for the service to have the necessary authority and accountability including clinical and corporate governance to ensure that critically ill or injured patients are transported with high standards of quality, safety and efficiency.

The system would provide, maintain and develop a critical mass of expertise in critical care transport. The service should provide sufficient flexibility to ensure the most appropriate and efficient team be dispatched to optimise patient outcomes.

In recognition of the geography of Victoria and to provide a comprehensive statewide service the retrieval system would need to incorporate metropolitan and regional components.

Metropolitan based service

The coordination of all emergency retrievals across Victoria would be provided by a metropolitan based service.

The metropolitan based service would also be responsible for providing support for inter-hospital transfers within metropolitan Melbourne and for retrievals from rural and regional areas to Melbourne.

Regional services

Regional retrieval services based at major regional health services would be responsible to retrieve within that region. Regional based services would provide an important capability for rapid response to remote and rural areas. This should support the local catchment responsibility for critical care services. The metropolitan based service would undertake retrievals from regional health services to Melbourne. Regional services would be available 24 hours a day seven days a week. The number and location of regional services should be driven by issues of geography, resources and workforce availability.

The division of responsibilities outlined above will be flexible; tasking of retrieval mission will be done by the central coordination agency based on clinical need, timely response and resource availability.

Collocated with dispatch

Due to the complexity of matching clinical requests to retrieval clinicians, transport platforms and logistics management, collocation of the retrieval coordination with dispatch and transport coordination is an important component of a strengthened adult emergency retrieval service.

Possible strategies to strengthen this element include collocation with an existing ambulance dispatch centre or the establishment of a technological hub for 'virtual' collocation.

Opportunities for strengthening the response to unmet retrieval demand warrant a review of workforce location and configuration to meet this need. An increased mission activity profile may provide the critical mass for workforce collocation, although further detailed modelling is required to refine this further.

Integrated services

Multiple agencies are currently involved with the transport of critically ill or injured patients. While their involvement is in the most part appropriate, the differences in operational approaches, competing priorities and disparities may impact on patient outcomes.

A streamlined approach to integrate the multiple service elements that are required for the patient journey from beginning to end is required. In addition, the adequacy and compatibility of current transport platforms has not been reviewed. To strengthen retrieval capabilities there needs to be closer alignment between the medical retrieval and transport providers.

Interface with ambulance

Explicit service agreements between the retrieval service and all ambulance services would be required. This would include an agreed prioritisation framework, default transport platforms, expected retrieval times, and service guidelines. Performance indicators that link ambulance and retrieval response and outcomes would be established, monitored and reported.

As part of the implementation plan, transport compatibility including ventilators, stretchers and cross transport platform will require review to allow for bed-to-bed transfer with minimum transfer times and stretcher changes. Consideration should be given to stretcher and stretcher bridge designs. National experience with testing and certification should be leveraged. The equipment strategy should establish specifications and standardisation across the state, together with a defined distribution, testing, maintenance and servicing program.

Accessible

Communications for all components of retrieval would be channelled through a single communication hub. The hub must be transparently integrated and centralised to efficiently and effectively establish the clinical, transport and logistic needs of each patient.

Adult emergency retrieval services would be accessed through a single telephone number. The service would also provide access to intensive care and coronary care beds including the authority to allocate patients to beds.

Calls will be recorded for quality audit and conferencing facilities will be available. This may be achieved through investing in improved technological linkages between agencies, or by identifying options for shared communication and coordination systems or the 'virtual' collocation.

Governance

The retrieval service would require the capacity to manage the operational aspects of retrievals and critical care bed access coordination on a day-to-day basis. The service would have authority to coordinate service delivery across multiple agencies. The service would require an overarching governance and accountability mechanism with overall responsibility for retrieval.

Governance committee

An adult emergency retrieval services governance committee would be convened and meet regularly to provide advice and guidance on the implementation and development of the adult emergency retrieval service. The governance committee will also review the functioning and effectiveness of the service with emphasis on service capacity, capability and utilisation. Membership will comprise representatives from the department, clinicians and providers.

Accountability

The retrieval service would be accountable to the department through a separate service agreement. The department would monitor the service against agreed performance indicators and report service activity and outcomes.

Performance indicators and reporting

The retrieval service would be responsible for ensuring that data collection and reporting systems are in place to meet reporting and system improvement requirements.

Each agency involved in emergency adult retrieval would be required to contribute to a retrieval data collection system. The multi-agency characteristic of retrieval has been a barrier to consolidating the data to produce informative reports that facilitate continuous improvement and strategic development.

Quality and safety

The retrieval service would need to meet appropriate accreditations standards such as those set by the Australia Council on Healthcare Standards (ACHS) and International Standards Organisation (ISO).

A quality and safety group would be convened and be responsible for review of patient level data relating to retrievals.

Promotion

The retrieval service would undertake a program of promotion to build an understanding of adult emergency retrieval services in the sector. It would be necessary to undertake initial and ongoing education and marketing to establish clear and appropriate expectations of the service and its capabilities.

Early activation

A critical element of safe and effective retrieval is early activation and referral, which will be achieved through the implementation of guidelines to facilitate the early identification of critically ill patients requiring retrieval.

Emergency preparedness

There are strong synergies between retrieval services and emergency and mass casualty response services. The two services share similar workforces, clinical expertise and logistical skills; therefore it is logical that a strong relationship be maintained between the two agencies.

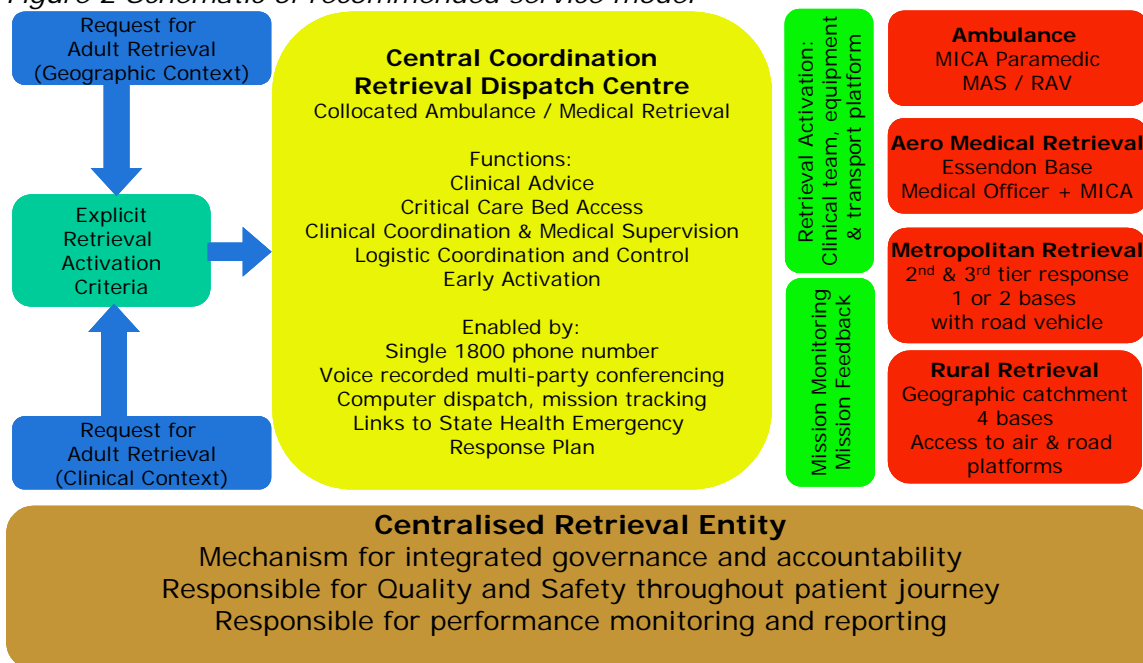
Next steps

The department and the adult retrieval working group welcome feedback on this discussion paper. Further consultation with stakeholders will be undertaken once the feedback has been received and compiled.

The final recommendations of the working group on the preferred service model will be formally considered by the department in February 2007.

Recommended service model

Figure 2 Schematic of recommended service model



Literature review

Relevant peer reviewed publications relating to emergency and critical care inter-hospital transport were identified for the period 2000 to 2006. A comprehensive literature review of retrieval related publications is documented in the KPMG report. More recent publications were sought to further inform the review process of current knowledge.

Australian context

Iedema R, Flabouris A, Grant S, Jorm C. Narrativizing errors of care: Critical incident reporting in clinical practice. *Social Science Medicine* – in press

A study of critical incident reports of 124 medical retrievals was used to examine the engagement of clinicians in quality and safety objectives in a complex clinical setting. The consequences of self-reported errors, mishaps and critical incidents in the normative context of organizational coordination, accountability, planning and management are identified.

Flabouris A, Runciman WB, Levings B. Incidents During Out-of-Hospital Patient Transport. *Anaesth Intensive Care* 2006; 34:228-236

In this retrospective case review, 125 cases documenting 272 incidents from four organisations relating to out-of-hospital patient transport of critically ill patients (retrieval) were examined. The frequency of incident types is described and it is suggested that 91 per cent were preventable. It is concluded that incident monitoring is a useful quality improvement tool.

Holland J, Cooksley DG. Safety of helicopter aeromedical transport in Australia: a retrospective study. *Med J Aust* 2005; 182(1):17-19

A retrospective observational study of Australian HEMS flying hours and accidents from 1992-2002 quantified the risk of aeromedical transport in Australia. The calculated accident rate was 4.38 per 100,000 flying hours, or one accident per 16,721 missions. Night time Visual Flight Rule (VFR) missions represented a high-risk category.

The Australian accident rate is similar to those reported from other countries.

Duke GJ. Metropolitan Audit of Appropriate Referrals Refused Admissions to Intensive Care. *Anaesth Intensive Care* 2004; 32:702-706

A three month prospective cohort study of admission 'refusals' to intensive care units in metropolitan Melbourne and Geelong. An acute inter-hospital transfer rate of 1.7 per day was reported.

Flabouris A. A description of events associated with scene response by helicopter based medical retrieval teams. *Injury, Int J Care Injured* 2003; 34:847-852

This retrospective case review of 257 patient transport records documented 216 incidents and 41 positive events from scene responses. This descriptive study provides a foundation for quality evaluation that can be applied to the broader retrieval community.

Duke GJ, Green JV. Outcome of critically ill patients undergoing interhospital transfer. Med J Aust 2001; 174:122-125

A three year retrospective case-control study based on a medical record audit of 73 consecutive patients(1996-99) transferred from one metropolitan teaching hospital. Delayed intensive care unit admission and increased length of stay was observed with no statistical difference in mortality.

International context

Warren J, et al. Guidelines for the inter- and intrahospital transport of critically ill patients. Crit Care Med 2004; 32:256-262

This special article documents the development of practice guidelines for the conduct of intra- and inter-hospital transport of the critically ill patient in the United States of America.

The evidence base and minimum standards are described, encompassing the following major categories: pretransport coordination and communication, accompanying personnel; minimum equipment required; monitoring during transport; preparing a patient for inter-hospital transport.

Gray A, Bush S, Whiteley S. Secondary transport of the critically ill and injured adult. Emerg Med J 2004;21:281-285

This review of interhospital transports of critically ill patients in the United Kingdom describes the core issues relating to emergency medicine. A list of indications and definitions for secondary transport of the critically ill adult is described and a list of citations for additional references is provided.

Koppenberg J, Taeger K. Interhospital transport: transport of critically ill patients. Curr Opin Anaesthesiol 2002, 15:211-215

This review outlines the status of secondary inter-hospital transfer systems, including the European perspective. The system is discussed in terms of transport systems and equipment, personnel and time management.

The authors conclude that in the context of increasingly specialised and concentrated medicine, highly developed, specially equipped transport systems, staffed by highly skilled personnel, are necessary.

The inter-hospital transport system should have high accessibility, great transportation speed, 24 hour availability, and central coordination. Prospective investigations are required to support the evidence for medical efficiency and cost-effectiveness.

Whitelaw AS, Hsu R, Corfield AR, Hearn S. Establishing a rural emergency medical retrieval service. Emerg Med J 2006; 23;76-78

In this review the establishment of the Emergency Medical Retrieval Service in 2004 by the Argyll and Clyde health board to support its six rural community hospitals staffed by rural GPs is described. Descriptions of activation criteria; community hospital liaison, Ambulance service liaison; clinical governance; equipment management; training are provided.

Bellingan G, Oliver T, Batson S, Webb A. Comparison of a specialist retrieval team with current United Kingdom practice for the transport of critically ill patients. Intensive Care Med 2000;26:740-744

This retrospective review was conducted over one year (1994) of all transfers to the University College London Hospitals intensive care unit. Comparison of the standard ambulance/junior doctor escort with the specialist retrieval teams revealed that specialist teams achieved significantly better physiological scores on arrival, and had lower early mortality.

Emerging trends and enabling technologies

Essebag V et al. Air Medical Transport of Cardiac Patients. Chest 2003;124;1937-1945

This review of guidelines for air medical transport of cardiac patients addresses both emergency and elective transport. The paper identifies the growing use of helicopter emergency transport for suspected acute myocardial infarction. It cites a report of a randomised study Air Primary Angioplasty in Myocardial Infarction Study. J Am Coll Cardiol 2002; 39:1713-1719

McGrow KM, Roys R, Maloney RC, Xiao Y. Using wireless Technologies to Improve Information Flow for Interhospital Transfers of Critical Care Patients. Critical Care Nurse: 2004;24:66-72

This paper describes the pilot trial of wireless technologies to automate the communication of arrival times. A system using global positioning system (GPS), 2-way pagers, and internet/personal digital assistant enables location mapping. The system was designed to improve communication of transport information, patients' arrival time, and clinical status.

Hudson TL, Weichert T. A Method of Transporting Critical Care Mass Casualties. Disaster Manage Response 2002:26-8

Recent demand for the transport of mass casualties has prompted the development of new approaches to critical care transport. This paper provides a report of the Defense Advanced Research Projects Agency critical care transport and treatment platform which is designed to carry standard off-the-shelf critical care equipment placed on standard North Atlantic Treaty Organisation (NATO) military litters. A computer system inside the platform tracks all patient data and supports automatic documentation.

Acronyms

AAV	Air Ambulance Victoria
ACHS	Australian Council On Healthcare Standards
ESTA	Emergency Services Telecommunications Authority
FTE	Full Time Equivalent
GCS	Glasgow Coma Score
GP	General Practitioner
GPS	Global Positioning System
ISO	International Standards Organisation
MAS	Metropolitan Ambulance Service
MICA	Mobile Intensive Care Ambulance
MPDS	Medical Priority Dispatch System
NATO	North Atlantic Treaty Organisation
NCIS	National Coroners Information System
RAV	Rural Ambulance Victoria
ROTES	Review Of Trauma And Emergency Services – Victoria 1999
VAERCS	Victorian Adult Emergency Retrieval And Coordination Service
VEMD	Victorian Emergency Minimum Dataset
VSTORM	Victorian State Trauma Outcomes Monitoring