

**FINAL REPORT**

**FEASIBILITY STUDY ON A  
HELICOPTER EMERGENCY  
MEDICAL SERVICE (HEMS) FOR  
THE ISLAND OF IRELAND**

Department of Health, Social Services & Public Safety (Belfast)  
and  
Department of Health & Children (Dublin)

**Booz | Allen | Hamilton**

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## EXECUTIVE SUMMARY

### *Introduction and Overview*

A feasibility study on the costs and benefits associated with the introduction of dedicated Helicopter Emergency Medical Service (HEMS) was commissioned by the Department of Health and Children, Dublin and the Department of Health, Social Services and Public Safety, Belfast. The study was commissioned on foot of advice by the Cross Border Working Group on Pre-Hospital Care Working Group, one of the Groups established under the “Good Friday Agreement”.

Currently, there is no dedicated HEMS in either Northern Ireland (NI) or the Republic of Ireland (RoI). The focus of the study is the feasibility of dedicated HEMS, and the geographical scope of the study is the island of Ireland.

The terms of reference for the feasibility study required the consultants to:

- Identify the costs and benefits of HEMS including capital and annual operating costs as well as funding issues and non-monetary factors
- Review international research and evaluations of HEMS
- Review existing arrangements and needs with respect to HEMS
- Develop possible dedicated HEMS options.

### *Key Findings*

- There are three relatively distinct HEMS operations available:
  - ‘Primary response’ – transport of medical personnel and equipment direct to the scene (or nearby) of an incident / accident (e.g. road traffic accident, fall, train derailment etc) and the rapid transport of patient(s) / victim(s) to hospital. (Most people recognise HEMS in the ‘primary response’ role)
  - ‘Secondary response’ – direct to a designated site<sup>1</sup> to meet road ambulance(s) coming from either a hospital or incident site to facilitate rapid on-carriage of patient(s) by helicopter to a hospital<sup>2</sup>
  - ‘Tertiary response’ – planned urgent and rapid transfers of critically ill patients requiring specialised care between hospitals (inter-hospital transfers – often referred to as ‘air ambulance’).

*(Refer section 1.2)*

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<sup>1</sup> Designated sites would need to be identified, recorded, mapped / charted and entered in a database available to clinical coordinators, HEMS operational crew and emergency service agencies. Such sites will need to be ‘monitored’ to ensure that they maintain operational integrity (i.e. remain free from obstructions etc), and if required for “24/7” operation, sites will need appropriate lighting facilities.

<sup>2</sup> ‘Secondary response’ missions can be either a response to an incident / accident and transport to an appropriate hospital via an intermediate designated site or a planned transport from one hospital to another hospital via an intermediate designated site.

- A valuable and much needed service is currently provided by the Irish Air Corps in the Republic of Ireland by way of a limited air ambulance service ('tertiary response' HEMS) on a 'request and availability' basis.<sup>3</sup> In addition, Search & Rescue (SAR) helicopter operators based in the Republic of Ireland and the UK provide emergency 'scoop and run' services as a low priority to core activities that focus primarily on marine rescue missions. These two services, whilst highly regarded and contributing benefits to the community are effectively rapid transport services (with occasional medical escort). They do not involve provision of full-time dedicated medical crew and specialist aero-medical equipment. *(Refer section 2.4)*
- There are dedicated ground-based specialist transport / patient transfer services that are providing a recognised service across the island: in the Republic of Ireland - the Mobile Intensive Care Ambulance Service (MICAS) with 54 transports in 2001 and the National Neonatal Transport Programme (NNTP) with 174 transports between March 2001 and March 2002; and in Northern Ireland - the Northern Ireland Critical Care Transfer Service (NICCaTS) with 349 transports between October 2000 and October 2001. The scope and capacity of these services is, however, limited, and various groups within the community do not fall within their 'core' patient profile.<sup>4</sup> *(Refer section 2.3 and 2.4)*
- The consideration of dedicated HEMS reveals a range of claimed 'advantages' and 'disadvantages' (or limitations) from other jurisdictions that may be relevant in the all-Ireland context. The reviewed literature predominantly focuses on medical outcomes. It offers, in the main, a generally supportive view of helicopter use for inter-hospital transfers ('tertiary' and 'secondary' response roles) with a much less unequivocal view for 'primary-response' HEMS.<sup>5</sup> The question as to the effectiveness of 'primary-response' HEMS on grounds of unequivocal positive or negative outcomes on medical grounds is still subject to considerable debate, even within the medical professions. Indeed, various studies have clearly questioned the clinical value of 'primary-response' HEMS while others indicate advantages to certain injury patterns and mechanisms and stress the importance of effective triage. *(Refer Section 4.3 and Appendices C and G)*

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<sup>3</sup> In 2001, the Irish Air Corps undertook 86 'air ambulance' missions reflecting a decline in 'availability' from the period 1992-1996 when an average of 149 missions were undertaken annually (ranging from 106 in 1992 to 202 in 1995).

<sup>4</sup> Similar to the situation with the Irish Air Corps, for example, the capability of these services is limited and 'impacted' by the distances and time of transfer involved in many cases and the matching of resources (equipment and crew / medical team expertise) available precluding using the 'dedicated' services more often.

<sup>5</sup> A 'secondary response' mission can be a variation to a 'tertiary response' mission except that the pick-up site for the patient by the aircraft is not a hospital and the operation incorporates a road ambulance journey from the dispatching hospital or it could be a variation to a 'primary response' mission except that the pick-up site by the aircraft is not an incident site but is a designated site and initial transport is by road ambulance.

- A 'primary response' HEMS mission will typically involve an immediate response of specially trained medical personnel to the scene of an accident / incident. Treatment of the patient commences immediately and continues while the patient is rapidly transported to the nearest appropriate hospital. *(Refer Chapters 4 and 5).*
- Appropriately staffed and equipped helicopters can facilitate early response in the 'primary response' situation as well as facilitate rapid transport to an appropriate hospital and thereby facilitate early administration of pre-hospital trauma and life support, often where not readily available otherwise. *(Refer Chapter 4).*
- Among the various issues, questions of efficacy raised, and limitations identified with HEMS, particularly in the 'primary response' role, are:
  - Helicopters are costly to procure and to operate
  - Weather and other environmental conditions can limit the operation of helicopters (fog, low cloud or falling snow can keep HEMS on the ground, high winds and rain will not usually prevent a normal service)
  - 'Primary response' HEMS, which is almost exclusively a 'daylight' only capability, is potentially a diversion of funds from more cost effective investment in the pre-hospital emergency care system
  - Incidents of inappropriate tasking of helicopters are not uncommon in the 'primary response' role particularly in terms of the severity of the injury being attended to by, in many instances, highly qualified medical crews
  - Data on mortality and morbidity benefits to all patients transported by HEMS in the 'primary response' role, *per se*, and relative to ground ambulance services, is inconclusive.  
*(Refer Chapter 4).*
- HEMS requires effective coordination with other emergency services agencies, particularly in the 'primary response' role where the policing services are necessary to supervise and manage incident sites in a safe manner.  
*(Refer Chapter 4).*
- 'Secondary response' involves the combined use of ground ambulances and helicopters (or fixed wing aircraft in some locations) at designated and approved landing sites to facilitate patient transfer to reduce the overall transfer time and to allow the ground ambulance to return to its designated area of cover. *(Refer Chapters 4 and 5).*
- 'Tertiary response' missions differ in the main from 'primary response' missions, in two ways: the transport is planned and the medical crew and equipment can be 'tailored' to the specific needs of the patient to be transported. In this 'air ambulance' role, the air transport task is usually initiated by the dispatching hospital in consultation with the specialist receiving hospital and in accordance with appropriate clinical protocols. HEMS in the 'tertiary response' role is analogous to the services currently provided by MICAS, NICCaTS and the NNTP in that transport is planned and involves transfers of critically ill patients between hospitals. *(Refer section 2.3 and Chapters 4 and 5).*

- Reduced residual disability / enhanced long term health outcomes and enhanced survival rates, particularly in critically ill patients requiring inter hospital transfer is a claimed benefit of HEMS in the ‘tertiary response’ role. *(Refer Chapter 4).*
- In the ‘tertiary response’ role, HEMS offers fast long distance transport without dangerous and destabilising transfers, particularly for the critically ill requiring specialist tertiary care. *(Refer Chapter 4).*
- It is claimed in some quarters that ‘tertiary response’ HEMS increases the overall quality of healthcare with a complementary service for ground ambulance services. *(Refer Chapter 4).*
- There are implications for receiving hospitals under some HEMS ‘models’ (particularly in the ‘tertiary response’ role) in terms of additional facilities and staffing requirements. *(Refer Chapter 4).*
- Effective HEMS (in any response role) requires an integrated (as opposed to fragmented) pre-hospital emergency care system and the development of a significant amount of (usually new) ‘institutional’ mechanisms including a system of clinical co-ordination, and implementation of an effective operational and clinical audit regime. *(Refer Chapter 4).*
- The NIAS and the public ambulance services of the Republic of Ireland combined currently ‘attend’ in excess of 250,000 ‘emergency’ incidents annually and undertake a significant number of planned patient transport tasks, including numerous ‘long distance journeys’.<sup>6</sup> *(Refer sections 2.2 and 2.5)*
- The Northern Ireland Ambulance Service (NIAS) and those across the Republic of Ireland are currently implementing significant investment programmes designed to upgrade the quality and improve the effectiveness of services:
  - As part of the Stg£2 billion Strategic Investment Programme over the 5 years to 2007/08 announced in February 2003, funding of Stg£29.1 million has been ‘earmarked’ for the further development of the NIAS. Part of this funding has been allocated to investments in the reconfiguration of ambulance control and communications systems and the balance has been assigned to the implementation of the modernisation and improvement of ambulance services as recommended in the 2000 Strategic Review. In addition to these funds, a further Stg£9 million has been allocated between 2001/02 and 2004/05 to implement a pilot Rapid Responders Project as well as to fund the purchase of 57 A&E ambulances, 18 Patient Care Service vehicles (non-emergency) and other assets / facilities.<sup>7</sup>

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<sup>6</sup> Of the total, approximately three-quarters were in the RoI and one-quarter in NI.

<sup>7</sup> In 2002/03, the operating cost of the NIAS was almost Stg£30 million (approximately €44 million)

- Since 1991, pre-hospital and ambulance revenue funding provided directly by the Department of Health & Children (DoHC) in the Republic of Ireland has increased significantly. Expenditure in 1991 was €25.8 million and by 2003 expenditure has increased to €77 million. The funding requirement over the five year period to 2006 is set out in the Strategic Review of the Ambulance Service 2001 which recommended: “in order to give a clear commitment to the development of the ambulance services there should be a provision for at least £1R4 [€5.08 million] of development funds in real terms in revenue budgets each year for the next five years”. Among the key priorities to be progressed is the introduction of an EMT-A training programme for ambulance personnel. (*Refer section 2.2*)
- A significant amount of enhancement is currently planned for the ambulance services of both Northern Ireland and the Republic of Ireland. Furthermore, specialist ground-based transport / patient transfer services exist that could also be expanded and developed further in order to increase the level of critical care services across the island. The existing air ambulance services provided by maritime Search & Rescue operators and the Irish Air Corps, in particular, are evidence of need and the perceived deficits in dedicated facilities for tertiary transfers. These could be enhanced, particularly in terms of establishing an integrated all-island system for activation. Dedicated HEMS will not necessarily alter the number of critically ill / severely injured patients requiring transfer, simply the manner and time involved to access definitive care (if done in a timely fashion). The patients involved in HEMS (particularly in the ‘tertiary response’ role) are those requiring specialist interventions only available in tertiary centres. (*Refer sections 2.3, 2.4, 5.6 and 5.10*)
- There are dedicated HEMS operating in many countries worldwide, including across England, in Wales and in Scotland.<sup>8</sup>  
(*Refer section sections 4.2 and 6.11*)
- “Air ambulance is not a substitute for a ground ambulance service”.<sup>9</sup> HEMS is not a substitute for current activities and expenditure (other than at the margin and possibly in place of some current activity / practices associated with the transport / transfer of the critically ill and seriously injured); HEMS is about an incremental improvement, expanded capability and enhanced accessibility, not a replacement service.  
(*Refer section 4.3 and Appendix G*)

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<sup>8</sup> Thirty-eight operators were surveyed as part of this feasibility study. Detailed responses were received from 21 operators (operating 64 bases and utilising 74 helicopters) in countries as diverse as the UK, Australia, the USA, Germany, Switzerland, The Netherlands and South Africa.

<sup>9</sup> Audit of London HEMS by Clinical Evaluation Sciences and Department of Medicine, University of Toronto, quoted in “Examination of the need for a dedicated air ambulance service by the Standing Committee on Air Ambulance Services”, Ireland 1996



- Where the time interval between the identification of a particular patient condition and the delivery of the appropriate treatment or procedure is considered material to patient outcome, the use of HEMS can shorten this interval, except where short distances (e.g. within 30 miles / 50 kilometres) or where intra-city transfers are involved because in such circumstances road transport may be as rapid and effective. (Refer section 5.3 and Appendices C and G)
- HEMS should not be viewed as a panacea for perceived shortcomings in the current EMS / pre-hospital emergency care systems operating in Northern Ireland and the Republic of Ireland. The focus on enhancing these as outlined in current strategic plans in both jurisdictions is warranted. (Refer section 2.2)
- The economic and financial case for HEMS generally, and for the dedicated HEMS in an all-Ireland context is equivocal and may always be so, particularly in the ‘primary response’ role. A key concern with ‘primary response’ HEMS relates to inappropriate use, both in terms of modality and / or skills provided to the scene of incidents. The debate as to the appropriateness and effectiveness of HEMS has been on-going since the late 1970s.<sup>10</sup> However, there does appear to be very real potential for dedicated HEMS to deliver significant benefits to the healthcare outcomes for critically ill patients across the island, particularly in the inter-hospital transfer role. (Refer section 4.3)
- A feasible role for dedicated HEMS in an all-Ireland context appears to be:
  - The rapid inter-hospital transfer of critically ill or severely injured patients escorted by appropriately skilled and trained medical professionals.

However, significant investment would need to be made into, *inter alia*, supporting assets (e.g. helipads, communications systems) and other systems (e.g. skills training, operational and management arrangements, pre-hospital emergency care and related systems integration) in order for dedicated HEMS in the inter-hospital role to be effective and exploit the potential societal and financial benefits that could reasonably be expected to accrue. (Refer sections 2.3, 2.4, 4 and 5)

- The case for HEMS in the ‘primary response’ role, in particular (and to a lesser extent, in the ‘secondary response’ role) is significantly less obvious, particularly in terms of cost-effectiveness and in terms of the potential that may exist to divert funds from existing plans and initiatives associated with development of ground ambulance services and other elements of critical care transport. (Refer sections 2.3, 2.4, 4 and 5)

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<sup>10</sup> For example, Air Medical Journal, October – December 1998, “New Order of Things: An International Overview of Air Medical Transport” concludes: “We must develop effective air medical research models for proper and reliable evaluation of the cost-effectiveness of HEMS and air medical transfer. If researchers fail to define the optimal functions of the system and allow opinion and dogma to drive the type of care being rendered, our opportunity to identify the importance and impact of HEMS and air medical interhospital transfer may disappear.”

- Any development of dedicated HEMS for the island of Ireland should be fully integrated and should ‘evolve’ from, and complement, existing services for pre-hospital emergency care and critical care. However, the implementation of dedicated HEMS, particularly in the ‘tertiary response’ role (i.e. inter-hospital transfers), does not necessarily need to be contingent on implementation of all elements of current strategies for public ambulance services and specialist patient transport services. (*Refer sections 4 and 5*)
- Development of dedicated HEMS would require a considerable time frame. The key elements involved would include, *inter alia*: recruitment and training of appropriately skilled staff; development and implementation of education awareness programmes; identification, development and certification of landing sites (including planning processes such as environmental impact studies as well as construction) and the procurement of aircraft (or a service provider). Various institutional arrangements would also need to be put in place, including funding and payment agreements, hospital resourcing and staffing arrangements and protocols, clinical and operational auditing functions and ‘memorandum of understanding’ with various other agencies, particularly those in the emergency service sector. The establishment of appropriate linkages between the pre-hospital emergency care services and the hospital services will be essential. The timescale for completion of the wide range of activities required would be up to 3 years from any decision to proceed. (*Refer section 5*)
- Any decision to introduce dedicated HEMS on an all-Ireland basis would involve significant capital investment and annual operating costs. For example, due to the need to provide landing sites and other supporting infrastructure to ensure an effective service, a single helicopter dedicated inter-hospital transfer HEMS would involve up to €11.5 (Stg£8.0) million in capital investment and incur annual operating costs of €4.1 (Stg£2.8) million.<sup>11</sup> However, the nature of the capital investment associated with establishing an initial HEMS operation as an inter-hospital transfer service would mean additional helicopters could be added at limited additional capital cost (between €150,000 and €200,000) with an annual recurrent cost for each additional aircraft and service of approximately €3.3 (Stg£2.3) million.<sup>12</sup> Of this additional annual operating cost, approximately two-thirds to three-quarters would be associated directly with helicopter operations (including a base for the aircraft and operational crew) and the remainder associated with medical staff salaries and asset maintenance. (*Refer section 5*)

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<sup>11</sup> Most HEMS operations involve either use of leased aircraft or the use of an operating contract and a service provider. It is not common for helicopters to be purchased outright by sponsoring agencies. The annual operating costs include the costs of helicopter operations provided by a contractor incorporating both a ‘standing charge’ (usually a monthly charge) and a charge per flying hour.

<sup>12</sup> The establishment of HEMS initially in the ‘tertiary response’ (inter-hospital transfer) role would mean that investment would have been made in the provision of landing sites across the island; this being the major initial investment required to commence an effective service. It is assumed that an expanded service would involve a number of additional ‘secondary’ landing sites to supplement rooftop and ground landing facilities provided at hospitals, and additional medical equipment to support the service.

- If the aim were to achieve ‘total population coverage’ across the island of Ireland with a network of dedicated ‘primary response’ HEMS operations, operating within a 30 minute response time band, four aircraft would be required. *(Refer section 5.4).*
- In the context of dedicated ‘primary response’ HEMS, the appropriateness of four helicopters for the island of Ireland would be debatable. Concerns associated with inappropriate tasking of assets would clearly exist given the population and geography involved and the existing and planned enhancements to the pre-hospital emergency care services. *(Refer section 5.4).*
- Evidence from other countries indicates that the major function of ‘primary response’ HEMS is attendance to road traffic accidents and falls.<sup>13</sup> Other missions would include responses associated with persons collapsing, sporting injuries, horse riding, work and farm incidents. *(Refer Chapter 4 and section 5.11).*
- Based on historical data on air ambulance activity in Ireland, long distance ambulance journeys and the activity levels of the specialist road-based transfer services operating across the island of Ireland, an estimated level of demand in the order of 400 to 600 missions is envisaged for a dedicated inter-hospital transfer HEMS. This would translate to annual flying hours in the range of 1,000 hours to 1,500 hours.<sup>14</sup> This would indicate demand for a single dedicated HEMS operation in the inter-hospital transfer role (albeit at the high end of activity levels for a single aircraft).<sup>15</sup> *(Refer sections 2.8 and 5)*
- Key considerations in assessing the most appropriate location for a dedicated ‘tertiary response’ HEMS will include the quality, depth and breadth of medical skills, resources and services available for the treatment of ‘incoming’ critically ill and / or severely injured patients.<sup>16</sup> Potential locations for a ‘retrieval service’ (i.e. inter-hospital transfer service) would include the principal cities on the island, in particular Dublin, Belfast and Cork. *(Refer sections 2.3, 2.4, 5.4 and 5.6)*

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<sup>13</sup> Data for 2001 for all HEMS in England and Wales indicated that almost half (47%) of the HEMS activity was associated with road traffic accidents and 11% associated with falls (figures in excess of 60% of all call-outs ‘to RTAs’ were recorded for each of the Yorkshire and North West HEMS in England). These operations are all ‘daylight only’.

<sup>14</sup> The spatial distribution of activity will impact on the actual flying hours. However, the Irish Air Corps records indicate an average ‘flying hours per mission’ of approximately 2.5 hours.

<sup>15</sup> A single helicopter dedicated inter-hospital transfer HEMS would have the capability / potential to perform the equivalent of 4 to 5 times the current air ambulance activity performed by the Irish Air Corps and SAR operators. Importantly however, a key to effective utilisation of a single aircraft will be well co-ordinated transfer planning (and awareness of the system) between originating and receiving hospitals.

<sup>16</sup> The helicopter does not need to be located at a hospital, but an aircraft base within close proximity to the site of the specialist medical crew is required.

- Provision of an NI dedicated HEMS via services based in Scotland, utilising the existing facilities of the Scottish Ambulance Air Wing, is unlikely to provide a satisfactory service to NI. Such a proposal may also meet with resistance from Scottish authorities as such an arrangement would lead to a diminution of services in Scotland as a whole (without additional resources). Sound practical reasons also suggest that such an option would be a sub-optimal arrangement for much of the population of Northern Ireland unless a new base closer to NI than the current nearest base in Glasgow is established. (Refer section 5.4)
- A common theme that emerges when reviewing the performance of HEMS is the need to focus, *inter alia*, on the following:
  - Operational integration with existing ground ambulances
  - HEMS as complementary to ground ambulance (and other elements of the pre-hospital care system) and other parts of a national healthcare system
  - Appropriate tasking of assets
  - Training of dispatchers in aircraft use
  - Clinical co-ordination as the key to modality determination
  - Well developed communications systems / networks and operational protocols
  - Strong links (physical, formal and informal) between crew (operations and medical) and hospital(s) for purposes of on-going education, debriefings, audits and other elements to facilitate continuous improvement
  - Continuous improvement across all areas of operations - from dispatching protocols and systems, to records keeping and database development, to staff training and equipment uniformity, to systems R & D
  - The need for thorough and rigorous audit of tasking and skills application
  - Familiarisation of medical professionals at receiving hospitals, as well as dispatching hospitals, of the capabilities and limitations of aircraft
  - Optimal utilisation of available national health services.(Refer section 5)

Any future deliberations with respect to dedicated HEMS on an all-Ireland basis should also include consideration of the following:

- Various options are available which range from maintaining the *status quo* to focusing on an inter-hospital transfer role only, through to the possible inclusion of a 'primary response' HEMS at a later stage (notwithstanding the concerns regarding the cost-effectiveness and appropriateness of 'primary response' HEMS).
- Funding for dedicated HEMS should be additional to existing plans and should not be at the exclusion of current pre-hospital emergency care and critical care strategies. These costs would be incremental to any current planned and recurrent expenditure of the health authorities in the RoI and NI. There may be some 'economies' at the margin but essentially, the costs estimates outlined in this report would be additional to current and planned expenditures.

- Clinical co-ordination, utilising and liaising with local and regional medical expertise, should be the prime ‘driver’ of any dedicated HEMS activity if implemented.
- For effective dedicated all-Ireland HEMS, guidelines for a clinical co-ordination system will need to be developed jointly by Department of Health, Social Services & Public Safety, Belfast (DHSSPS) and Department of Health & Children, Dublin (DoHC) to ensure standardised procedures across the island of Ireland.
- Effective dedicated HEMS on an all-Ireland basis would necessitate asset co-ordination and communications to be undertaken, potentially, by a joint Northern Ireland / Republic of Ireland service agency / secretariat.
- A ‘single number dial’ initial contact system with the healthcare network (and / or emergency services) would need to be established to include the existing clinical co-ordination mechanisms, e.g. Mobile Intensive Care Ambulance Service, National Neonatal Transport Programme and Northern Ireland Critical Care Transfer Service.
- An internal (from within the DHSSPS and DoHC) and external (using medical expertise from other jurisdictions, e.g. England or Scotland) operations and clinical audit system would be required to ensure that appropriate HEMS responses were being arranged through the clinical co-ordination process.
- Uniform minimum training standards for HEMS and other aero-medical escort/support crew staff would need to be introduced and agreements between DoHC, DHSSPS, NIAS and the National Ambulance Training Board, Pre-Hospital Emergency Care Council (PHECC) and the medical coordinators at major hospitals would need to be devised regarding the level of escort skills required and appropriate staffing levels. The issue of professional indemnity and associated insurance issues would also need to be resolved for inter-jurisdiction activities.
- Any possible adoption of ‘user pays’ concepts and mechanisms should be considered in the context that they do not interfere with the delivery of appropriate and timely clinical decisions (both medical and transportation).
- A well-specified service requirement is essential for the effective operation of a dedicated all-island HEMS.

*(Refer sections 3.2, 4 and 5)*

Since the final draft of this report was completed, the *Report of the National Task Force on Medical Staffing (Hanly Report)*, commissioned by the Department of Health and Children) was published. The recommendations of this report and their implementation have major implications for the ambulance service in the Republic of Ireland and account of this must be taken when considering the possibility of introducing dedicated HEMS.

The Report sets out measures to reduce the working hours of non-consultant hospital doctors in line with the European Working Time Directive; proposes changes to medical education and training; recommends a substantial increase in the number of hospital consultants working under a new contract and outlines necessary changes in the organisation of acute hospital services in the Republic of Ireland.

The ambulance services play a key role in the initial care, transport and treatment of emergency patients and change in the ambulance service must parallel change in acute hospital services. The Task Force's recommendations underline the importance of having a well organised ambulance service capable of meeting the needs of emergency patients rapidly.

In Northern Ireland, decisions taken on 24 February 2003 by Minister Des Browne on the proposals contained in "*Developing Better Services - Modernising Hospitals and Reforming Structures*" also have major implications for ambulance services. A significant programme of acute hospital reorganisation will concentrate specialist acute care on fewer sites, reinforcing the need for a highly trained and well equipped ambulance service capable of providing an effective emergency response.

## **1 INTRODUCTION**

### **1.1 Background and Objectives**

Booz Allen Hamilton was commissioned in April 2002 jointly by the Department of Health, Social Services and Public Safety (DHSSPS) of Northern Ireland and the Department of Health and Children (DoHC) in the Republic of Ireland to undertake a feasibility study on the costs and benefits associated with the introduction of dedicated Helicopter Emergency Medical Service (HEMS) for the island of Ireland. The study was commissioned on foot of advice by the Cross Border Working Group on Pre-Hospital Care, one of the Groups established under the “Good Friday Agreement”.

The assessment of a possible dedicated HEMS operation(s) is consistent with the broader goals of the health services of both jurisdictions in terms of seeking enhanced health outcomes for the community and is mentioned in various planning / strategic documents e.g. *Health Strategy 2001* (DoHC), *Corporate Plan 2002/03-2004/05* (DHSSPS) and *Priorities for Action 2002/03* (DHSSPS). Currently, there are no dedicated HEMS in either Northern Ireland (NI) or the Republic of Ireland (RoI).

The Terms of Reference of the study is provided at Appendix A.

This document constitutes the Final Report of the feasibility study.

### **1.2 Defining Helicopter Emergency Medical Service in an Island of Ireland Context**

The term Helicopter Emergency Medical Service (HEMS) has become globally acceptable as a term to describe the use of helicopters for the transport of patients to hospital. This can in fact result in a degree of misunderstanding of what actually constitutes HEMS from both clinical and operational perspectives. This is particularly the case where existing helicopters that have primary roles in other activities (e.g. military and Search and Rescue) undertake HEMS activity or HEMS-like activity as a secondary role.

Whilst there is considerable misunderstanding as to what actually defines the terms HEMS (even within the medical professional), aviation regulatory authorities have developed formal descriptions of emergency medical transport activity that involves the use of helicopters. These are set out in the Joint Airworthiness Regulations (known as JAR-OPS) by the Joint Airworthiness Authority that regulates European aviation matters of which both Ireland and the UK are participants.

Helicopters used in Search and Rescue (SAR), HEMS and Air Ambulance services by civil operators are categorised under three headings (JAR-OPS 3.170). The JAR-OPS definition of SAR operations is as follows:

- (1) *Search & Rescue (SAR)* – “A flight the purpose of which is to give immediate assistance to persons threatened by grave and imminent danger or hostile environment”.

The ‘HEMS’ function as defined under JAR-OPS is consistent with the more widely recognised ‘primary response’ operations which is consistent with the ‘Primary Mission’ categorisation where medical crews provide immediate assistance at the accident scene:

- (2) *Helicopter Emergency Medical Service (HEMS)* – “A flight by a helicopter operating under a HEMS approval, the purpose of which is to facilitate emergency medical assistance, where immediate and rapid transportation is essential, by carrying:
  - Medical personnel; or
  - Medical supplies (equipment, blood, organs, drugs); or
  - Ill or injured persons and other persons directly involved”.

The retrieval service (inter-hospital transfer) is consistent with the JAR-OPS definition of ‘Tertiary Mission’:

- (3) *Helicopter Air Ambulance Flight* – “A flight usually planned in advance, the purpose of which is to facilitate medical assistance, where immediate and rapid transportation is not essential, by carrying:
  - Medical personnel; or
  - Medical supplies (equipment, blood, organs, drugs); or
  - Ill or injured persons and other persons directly involved”.
- This corresponds to the “Tertiary Mission”, or the ordered *inter-hospital transfer*.

The understanding of the “Secondary Mission” is one where the helicopter combines with a ground ambulance under a number of different scenarios to optimise patient outcome as well as optimising overall resource use. It is envisaged that a ‘retrieval service’ would primarily (potentially almost exclusively) undertake ‘tertiary missions’, i.e. inter-hospital transfers with a limited number of ‘secondary missions’ and / or ‘primary missions’ if appropriate.<sup>17</sup>

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<sup>17</sup> It is reasonable to expect that if a single dedicated aircraft in a ‘tertiary response’ HEMS role is involved, the opportunities for ‘primary response’ tasking will be limited. Furthermore, the immediate response capacity of ‘primary response’ HEMS can involve differing aircraft and crew basing and crew skill arrangements than that used for inter-hospital transfers. It is worth noting that a recent survey of 14 of the 16 Helicopter Emergency Ambulance Services in England and Wales (published in *A Review of the Costs and Benefits of Helicopter Emergency Ambulance Services in England and Wales*, Medical Care Research Unit, Sheffield University, July 2003) indicated that, on average, each of these undertook 329 patient transports annually in ‘primary missions’ and 51 in inter-hospital transfers.



A key element important in the consideration of the differing roles in HEMS relates to crew configuration. The highest skill levels of crew (i.e. use of specialist doctors, for example) are typically associated with the ‘tertiary response’ role whilst the lowest levels of medical crew skill level (for example, no doctor on-board) are typically associated with the ‘primary response’ role. However, as is the case when reviewing HEMS operations, variations are common as was revealed in the survey of international operators discussed later in this report.

In the island of Ireland context, the activity of the UK’s Maritime & Coastguard Agency (MCA) and the Irish Coast Guard fall within the SAR definition of activity, whilst those of the Irish Air Corps fall within the Air Ambulance activity definition. Neither falls within the precise HEMS definition as applied by the European aviation regulatory authorities.

For the purpose of this feasibility study, activity under consideration includes both Helicopter Emergency Medical Service and Helicopter Air Ambulance Flight as defined under JAR-OPS.

### **1.3 Method of Approach**

Reflecting the objectives contained in the Terms of Reference, the method of approach to this study involved various interrelated tasks:

- Situation analysis / needs assessment: the determination of what currently occurs with respect to emergency medical services
- Review of existing services and needs
- Options development, including drawing upon information obtained from a survey of HEMS operators around the world and from a literature review
- Identification of the range of cost and benefits associated with feasible options
- Consideration of the various institutional and systems integration issues associated with the possible establishment of a dedicated HEMS
- Stakeholder inputs, including written public submissions.<sup>18</sup>

### **1.4 Data Sources**

Information for the feasibility study has been obtained from various sources:

- International survey of HEMS operators
- A review of articles published in medical journals dealing with HEMS and related topics<sup>19</sup>
- Public submissions (88 submissions received from a wide range of individuals and groups, e.g. medical consultants, private citizens, hospitals, politicians, HEMS operators)
- Discussions with various individuals and groups, e.g. medical consultants, Health Boards, ambulance services, healthcare agencies, HEMS operators

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<sup>18</sup> A list of those who made written submissions is provided in Appendix B.

<sup>19</sup> A reference list of published articles and reports is provided in Appendix C.

- Available published reports and strategy documents.

Presentations were also made to various groups, including the Northern Ireland Ambulance Service Trust Board, the Association of Chief Ambulance Officers, the Health Board CEOs Group and the Pre-Hospital Emergency Care Council (PHECC).

## **1.5 Structure of the Report**

The remainder of this report is structured as follows:

- Chapter 2 contains a discussion on information associated with the potential demand for dedicated HEMS including the current situation vis-à-vis emergency medical services on the island of Ireland and demographics and other information (such as traffic accident data).
- Chapter 3 contains a summary of the public submissions and related data gathering activities undertaken during the feasibility study.
- Chapter 4 presents information from a survey of international HEMS operators and from the literature review.
- Chapter 5 contains a discussion and presentation of possible options for dedicated HEMS.
- Chapter 6 presents the findings and related issues associated with the feasibility study.

Appendix A: Terms of Reference

Appendix B: Submissions Received

Appendix C: List of References

Appendix D: Road traffic accident data for the Republic of Ireland and Northern Ireland

Appendix E: HEMS Survey

Appendix F: Examples of HEMS aircraft

Appendix G: Summary of literature review key findings

Appendix H: Maps showing indicative response time bands for possible HEMS options.

## 2. DEMAND CONSIDERATIONS

### 2.1 Introduction

This section of the report considers a range of information deemed useful in endeavouring to assess the potential level of demand that may accrue to dedicated HEMS in Ireland. It is reasonable to expect that for dedicated HEMS to be feasible there should be sufficient demand for the service. It is further reasonable to assume that some of the demand for such a service is likely to come from some substitution of existing activity (e.g. Air Corps air ambulance missions and some long distance road transports and transfers).<sup>20</sup>

This section contains a review of five areas with respect to gaining an insight into the potential demand for dedicated HEMS:

- i. Public Ambulance Services
- ii. Other Specialised Land Transport Services
- iii. Current Aviation Activity
- iv. Long Distance Ambulance Transports
- v. Other Relevant Data and Material.

Emergency Medical Services currently operate in various forms across the island of Ireland. The principal emergency medical service (pre-hospital) operated across the island are those of the various ambulance services; the Northern Ireland Ambulance Service (NIAS) and the various public ambulance services in the Republic of Ireland (RoI) provided by the Health Boards and the ERHA.<sup>21</sup>

There are also three specialist dedicated ground based services operating across the island:

- Northern Ireland Critical Care Transfer Service (NICCaTS)
- Mobile Intensive Care Ambulance Service (MICAS)
- National Neonatal Transport Programme (NNTP).

There is no dedicated paediatric transfer service in the RoI. There are no dedicated paediatric and neonatal transfer services in NI. In the absence of dedicated services explicitly catering for all categories of critically ill / seriously injured patients requiring inter-hospital transfer (IHT), semi-formal arrangements have emerged.<sup>22</sup> These arrangements are utilised regularly in order to facilitate the transfer of patients, invariably from regional hospitals to major trauma centres / Intensive Care Units (ICUs) / specialist theatres and units (e.g. burns, neurosurgical etc).

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<sup>20</sup> A proportion of those persons requiring transfer between hospitals, for example, will have been involved in road traffic accidents. For this reason, and in order to provide some additional contextual material, data on road traffic accidents (RTAs) in the RoI and NI is provided in Appendix D of this report.

<sup>21</sup> There are also a number of private ambulance services in operation, however the vast majority of activity is undertaken by the public services.

<sup>22</sup> In Northern Ireland, a Memorandum of Understanding (MoU) has been finalised for aeromedical transports (this is discussed in more detail later in this chapter). It is understood that discussions are on-going regarding the development and refinement of aircraft activation procedures in the RoI.

There is also a limited air ambulance service (rotary and fixed wing) provided by the Irish Air Corps, and on a significantly more limited basis, under the auspices of the existing Search and Rescue (SAR) arrangements within both Northern Ireland and the Republic of Ireland.<sup>23</sup> These two services, whilst highly regarded and contributing benefits to the community are effectively rapid transport services (with occasional medical escort). They do not involve provision of full-time dedicated medical crew and specialist aero-medical equipment.

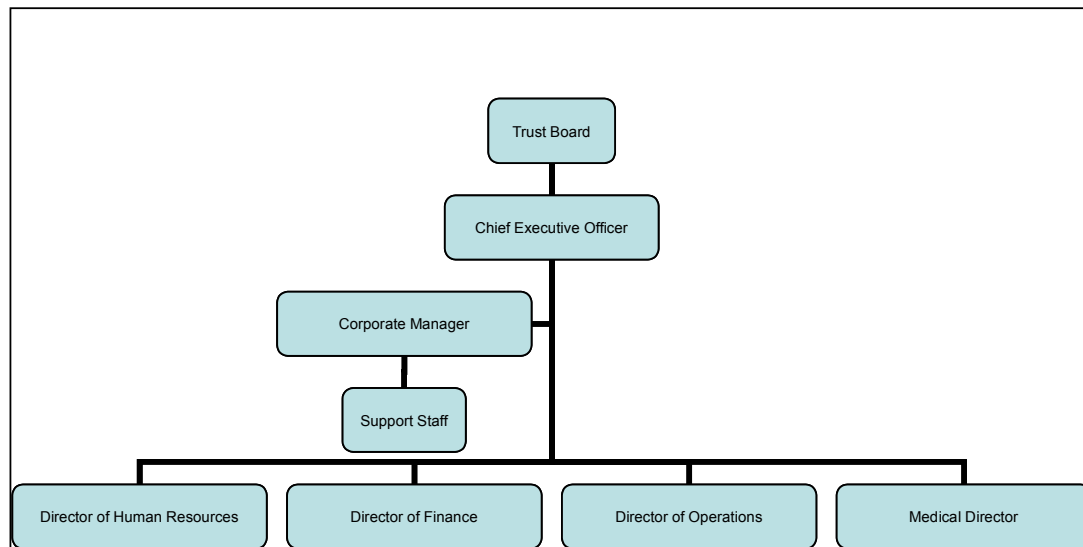
## 2.2 Public Ambulance Services

### 2.2.1 Northern Ireland Ambulance Service

The Northern Ireland Ambulance Service (NIAS) functions under a single NI-wide Ambulance Trust. The operational divisions mirror the areas covered by the four Health and Social Services Boards serving a population of approximately 1.7 million:

- i. East<sup>24</sup> – population of approximately 670,000
- ii. North – population of approximately 412,000
- iii. West – population of approximately 272,000
- iv. South – population of approximately 299,000.

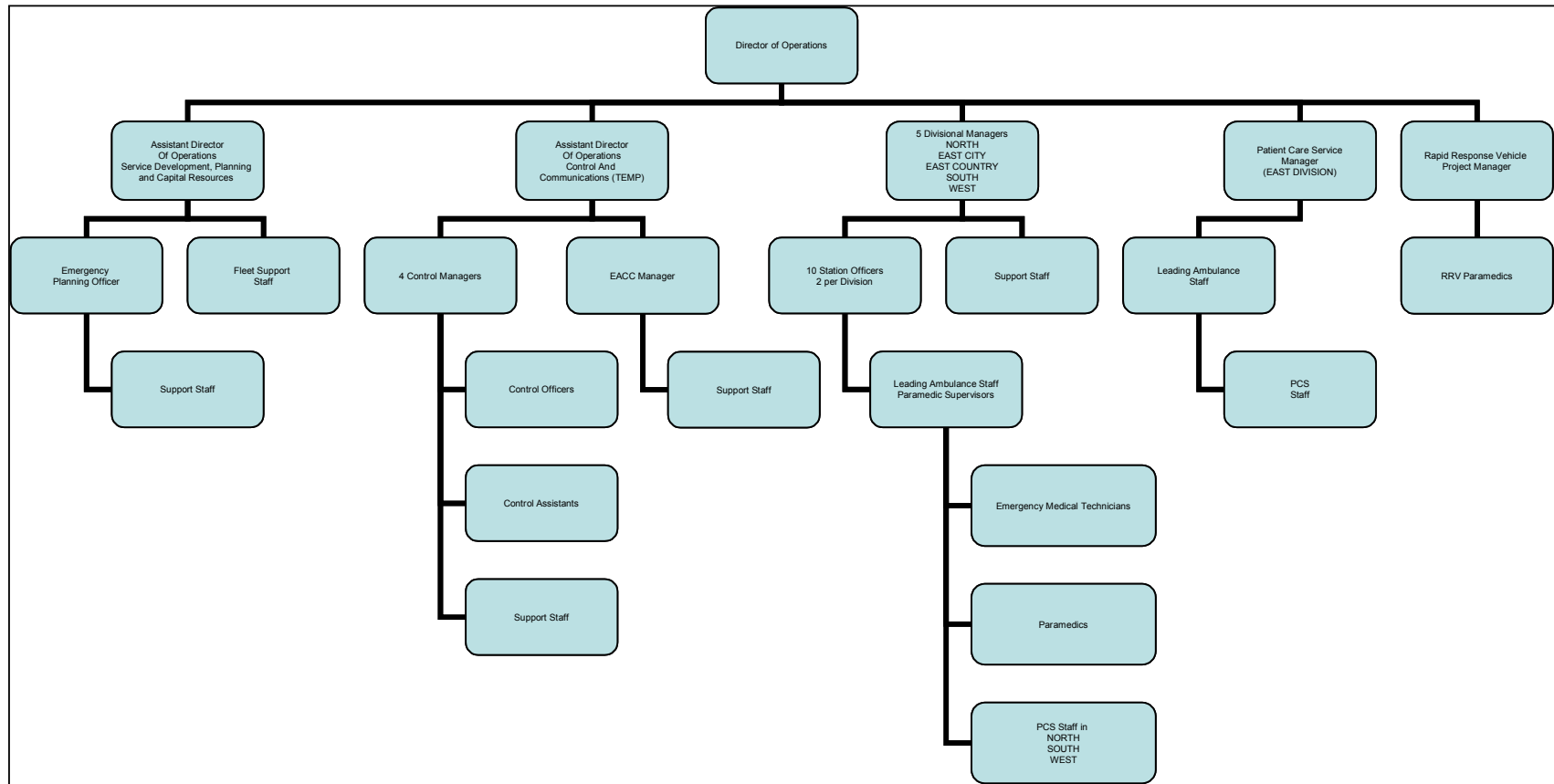
The overall and the operational structure of the NIAS is shown in the charts that follow:



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<sup>23</sup> The Search and Rescue (SAR) operations are primarily involved in maritime activities, but also land based rescues, particularly where mountainous terrain is involved are also undertaken.

<sup>24</sup> Includes East City and East Country for managerial purposes.



The NIAS has an operational area of approximately 14,100 square kilometres. As well as local centres, the NIAS serves a number of acute hospitals across Northern Ireland: Belfast (3), Ulster Hospital, Dundonald, Whiteabbey, Londonderry / Derry, Omagh, Enniskillen, Craigavon, Antrim, Coleraine (Causeway), Lisburn, Newry, Downpatrick and Magherafelt.

NIAS in figures	
▶	Northern Ireland Ambulance Services (NIAS) manages a fleet of 224 ambulances (137 x A&E; 87 x Patient Care Service Vehicles) as well as 4 Rapid Response vehicles.
▶	NIAS employs almost 900 staff including 737 ambulance staff operating from 28 ambulance stations and controlled from four control centres: Belfast, Antrim, Craigavon and Londonderry / Derry.
▶	Total emergency and urgent calls in 2002/03 (FY2002/03) were 109,000 including 36,000 urgent calls.
▶	In addition, the Patient Care Service (routine patients transfer) undertook approx. 221,000 journeys.
▶	NIAS current estate comprises: <ul style="list-style-type: none"> <li>- 28 stations</li> <li>- 4 control centres</li> <li>- One regional training centre</li> </ul>
▶	The 2002/03 Budget for the NIAS was almost Stg£30 million.

Northern Ireland Ambulance Service Summary of patient journeys 2002/03						
Patient Need	Eastern	Northern	Southern	Western	Total NI	Percentage
Attended by Cardiac ambulance	268	576	348	603	1,795	1%
Stretcher	18,192	17,711	8,764	9,245	53,912	16%
To be carried (crew of 2)	14,817	299	918	470	16,504	5%
Walking (crew of 1)	17	164	149	191	521	0%
<b>Total Emergency</b>	<b>33,294</b>	<b>18,750</b>	<b>10,179</b>	<b>10,509</b>	<b>72,732</b>	<b>22%</b>
Urgent	14,945	8,565	6,918	5,595	36,023	11%
Special Planned	68,090	57,920	60,522	34,259	220,791	67%
<b>Total Journeys</b>	<b>116,329</b>	<b>85,235</b>	<b>77,619</b>	<b>50,363</b>	<b>329,546</b>	<b>100%</b>
Number of Urgent Journeys attended to within 15 minutes	14,262	8,016	6,394	5,322	33,994	94%

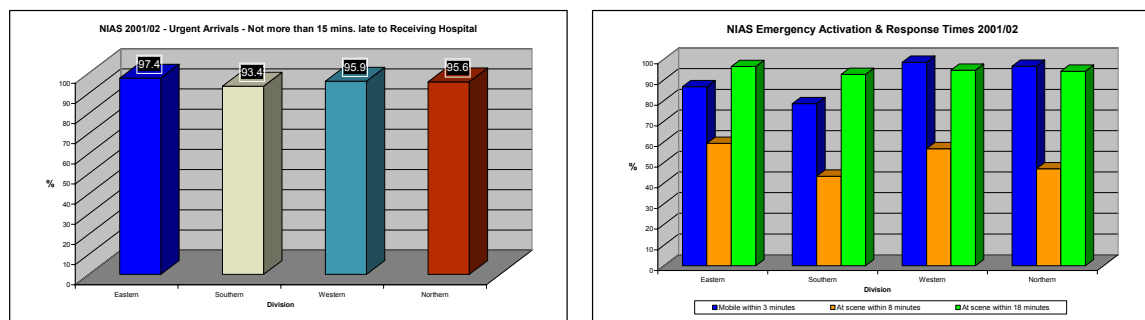
Source: DHSSPS, Dec 2003

Emergency call-outs accounted for approximately 22% of NIAS ambulance activity in 2002/03.<sup>25</sup>

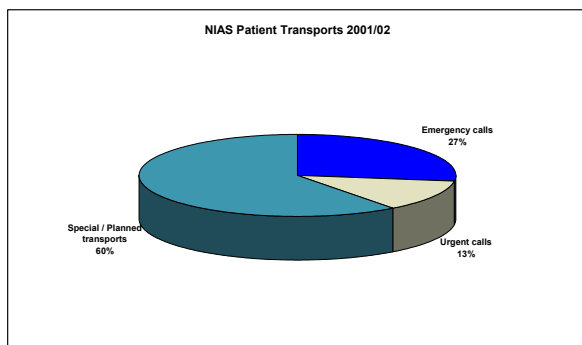
Data for the Eastern Division (centred on Belfast and northern parts of Co. Down) indicates that:

- For 62.6% of all emergency calls, units were at the scene within 8 minutes
- For 96.9% of all emergency calls, units were at the scene within 18 minutes
- Units were mobile within 3 minutes for 94.4% of emergency calls
- For 2000/01, 98.4% of all urgent transports were at hospitals within 15 minutes of the agreed time
- 96.5% of all urgent calls were activated within 3 minutes
- Urban areas exhibited a significantly higher (in the range of 54% to 74%) ‘at the scene’ within 8 minutes response time for emergency calls than more rural areas (in the range 33% to 58%) – however, for the ‘at the scene’ within 18 minutes the results are much closer; in the range 97% to 99% and 85% to 96% respectively.

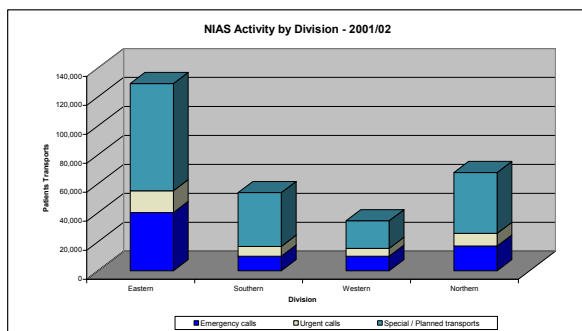
In England, 14 ambulance services (of 32 services – 24 ‘rural’ and 8 ‘urban’) in 2001/02 responded to over 75% of Category A emergency calls (i.e. immediately life threatening) within 8 minutes. In Scotland, the average ambulance response time in 2000/01 was 9.6 minutes (ranging from 13.7 minutes in Shetland Islands to 8.7 minutes on Tayside).



<sup>25</sup> It is important to recognise that there are definitional differences between the NIAS and the ambulance services in the RoI in relation to patient journey categories and other performance indicators. For these reasons, inter alia, it is not appropriate to make direct comparisons between the ambulance services of the two jurisdictions on the island of Ireland in relation to such indicators.

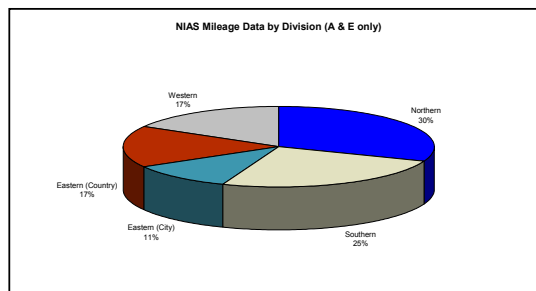
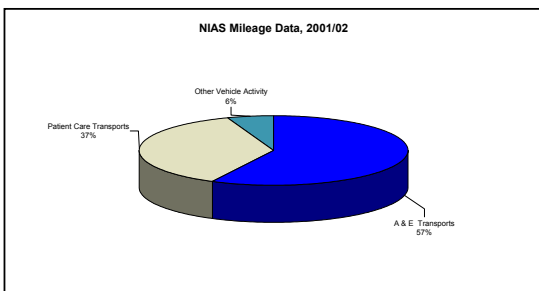


Special / Planned patient transports dominate the activity of the NIAS (approximately 60% of all transports).

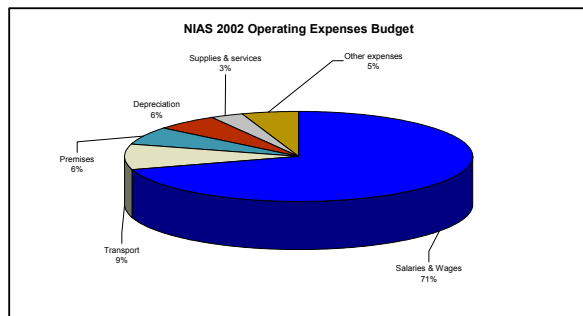


The East region (centred on Belfast and northern parts of Co. Down) accounts for just over half of all emergency activations; 42% and 43% of urgent activations and special / planned transports respectively, and 45% of all transport activity of the NIAS.

In the financial year, 2001/02, the NIAS 'ran up' almost 5 million vehicle miles (8 million vehicle kilometres) of which over half were associated with the provision of A & E ambulance services. The data for the NIAS also indicates that the average length of transport is higher in the more remote / less urbanised parts of Northern Ireland, particularly in the North region of the NIAS jurisdiction.







The 2002, operating cost of the NIAS was approximately Stg£27 million including a salaries and wages component of Stg£18 million (70% of total operating expenses). Of the 807 staff members, 737 (91%) are direct ambulance staff with the remainder predominantly administrative and clerical employees.

The NIAS is under going a major development phase. As part of a Stg£2 billion Strategic Investment Programme over the 5 years to 2007/08, announced in February 2003, funds amounting to Stg£29.1m were allocated for the NIAS. This funding includes Stg£3.0 million for the reconfiguration of ambulance control and communications systems during 2004-05 and 2005-06 and approximately Stg£26 million to take forward the modernisation and improvement of the ambulance service as set out in the implementation plan of the 2000 Strategic Review.<sup>26</sup> It is understood that the annual expenditure on the actions necessary to achieve this will be profiled once decisions have been reached on the best approach to financing them.

In addition, the NIAS was allocated Stg£2.0 million in 2001 from the Northern Ireland Executive Programme Funds to fund the introduction of Digital Trunk Radio, Stg£1.21 million over three years from 2001/02, also from the Executive Programme Funds, for a pilot Rapid Responders Project and Stg£4.0 million over two years from 2002/03 through the Chancellor's Reinvestment and Reform Initiative to fund the purchase of 42 A&E ambulances,<sup>27</sup> 8 patient care service (PCS) vehicles and new fleet management software, and to establish a Regional Ambulance Training Centre at NIAS HQ in Belfast. In 2003/04, NIAS also received Stg£1.85 million to purchase 15 A&E ambulances and 10 PCS vehicles.

### 2.2.2 Public Ambulance Services in the Republic of Ireland

Ambulance services in the Republic of Ireland (RoI) are provided separately by seven Health Boards, by the Eastern Regional Health Authority (ERHA – three area Health Boards) and by the Dublin Fire Brigade (which provides services to the ERHA). The development of ambulance services by the ERHA and the Health Boards is co-ordinated through the Health Boards Executive.<sup>28</sup>

<sup>26</sup> "Mapping the Road to Change" – A Strategic Review of the Northern Ireland Ambulance Service, 2000.

<sup>27</sup> It is understood that some of these vehicles are currently being delivered.

<sup>28</sup> The Health Boards Executive was established in February 2002. It was established to enable the health boards, the ERHA and non-statutory provider agencies to work together on an agenda to develop and modernise the health delivery system.

The number of personnel employed in the Health Boards' statutory ambulance services has increased from 723 in 1993 to 1092 in 2002. Of the total complement of staff in the ambulance services (excluding Dublin Fire Brigade) 894 in 2002 were emergency medical technicians (EMTs) (up from 529 in 1993). To date, seven of the eight ambulance services have progressed to having each emergency ambulance staffed by two trained EMTs. The remaining ambulance service, the Mid-Western Health Board, has made significant progress in this area and has introduced two person crewing in 6 of its 9 ambulance stations.

Ambulance call centres are located in 13 centres across the Republic of Ireland – Ballyshannon, Castlebar, Cork, Dublin, Naas, Navan, Limerick, Galway, Roscommon, Tralee, Tullamore, Wicklow and Wexford. In 1993, there were 22 control centres. Of the current 13 control centres in the RoI, five are regional control centres.

The standard of facilities, uniformity and availability of systems varies considerably across the various control centres, particularly in terms of mapping systems, command and control systems, radio system types, use of mobile data, medical priority dispatch systems and integrated communication control systems.<sup>29</sup>

Approximately half of ambulance service activity in the Republic of Ireland occurs within the Eastern Regional Health Authority area - counties Dublin, Kildare and Wicklow.

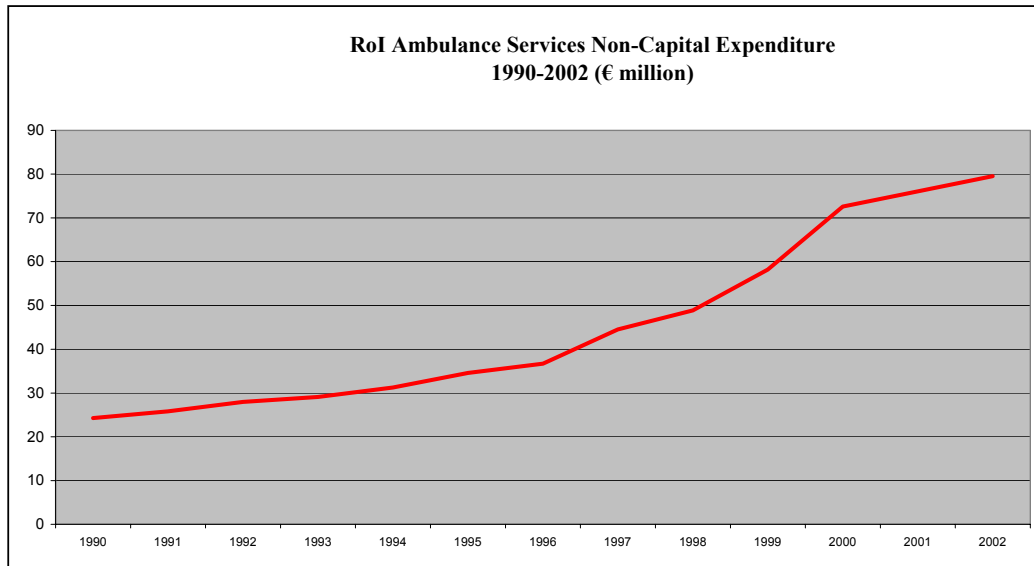
Ireland 2000							
	A&E vehs.		Area (sq. kms)	Public roads (kms)	Total calls (approx.)	Calls answered within 20 mins (%)	Calls per A&E veh.
Dublin Fire Brigade	14	}					
Eastern Regional Health Authority	44	}	4,632	8,001	176,000	97	3,034
North East Health Board	28		6,353	10,039	14,000	82	500
South East Health Board	39		9,065	16,189	25,000	66	641
Midlands Health Board	24		6,599	8,907	16,000	80	667
Southern Health Board	35		12,195	17,373	32,000	84	914
Midwest Health Board	27		7,770	9,485	19,000	80	704
Western Health Board	43		14,273	16,976	43,000	67	1,000
North West Health Board	27		8,285	11,276	13,000	62	481
	281		69,172	98,246	338,000		1,203

Note: Of the total calls responded to, 53% were 'emergency' and 47% were 'urgent / routine'. As noted earlier, there are definitional differences used for performance indicators for ambulance services in the RoI and the NIAS and therefore direct comparisons would be inappropriate.

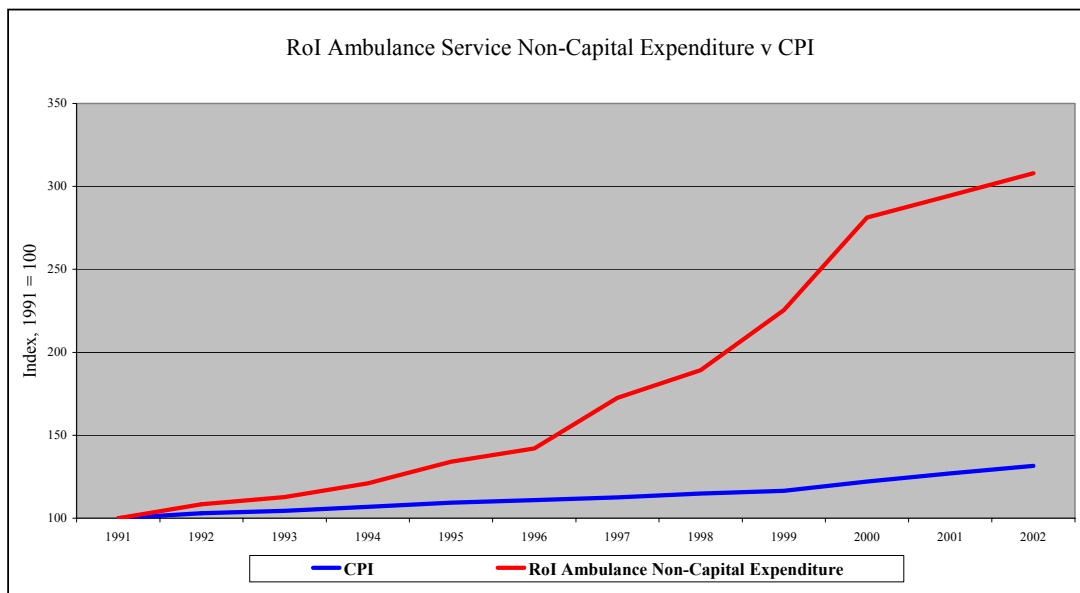
Source: Strategic Review of Ambulance Services, 2001

The data with respect to response times for public ambulance services in the RoI exhibit a significant degree of variability. The more remote areas, particularly in the western and north western areas of the country, 'perform' well below the average and the best examples in the country are in areas of higher population densities. The south eastern region also exhibits results similar to those of the western and north western areas.

<sup>29</sup> *Strategic Review of Ambulance Services, Ireland 2001.*



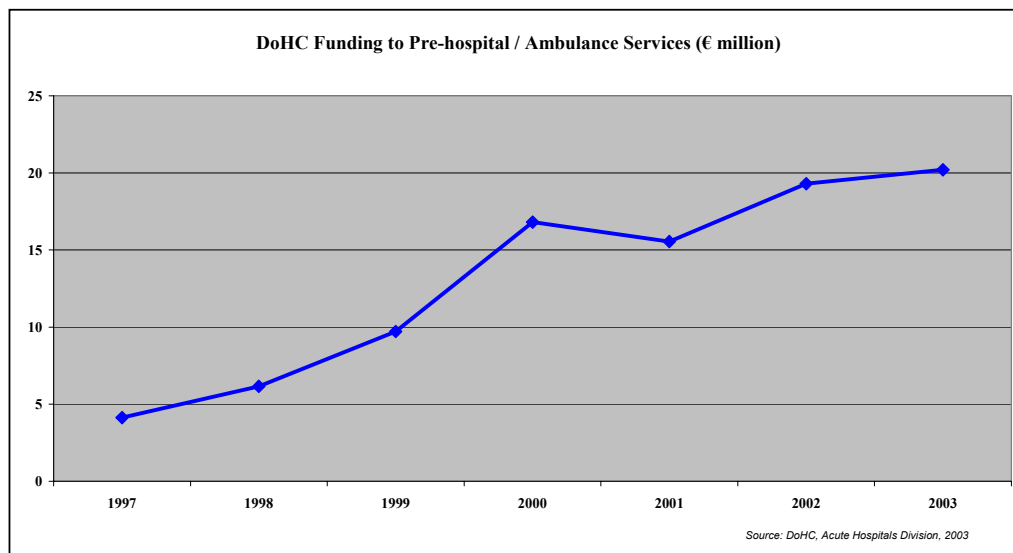
Source: DoHC



Notes: 2001 - Provisional Outturn; 2002 - Estimate

Source: DoHC, Central Statistics Office

Since 1991, pre-hospital and ambulance service revenue funding provided directly by the Department of Health and Children (DOHC) in the Republic of Ireland has increased significantly. Expenditure in 1991 was €25.8m and by 2003 expenditure has increased to €77m.



Policy on the development of emergency medical services in the Republic of Ireland is set out in a number of documents, including the Strategic Review of the Ambulance Services, 2001. The Department of Health and Children is committed to the on-going development of ambulance services in the RoI in line with the recommendations contained in the Strategic Review which noted - *“in order to give a clear commitment to the development of the ambulance services there should be a provision for at least £IR4 [€5.080 m] of development funds in real terms in revenue budgets year on year for the next five years”*.<sup>30</sup> It is understood that this requirement of over €25 million would be used to fund a range of initiatives to facilitate a significant enhancement in the level and the quality of services available from ambulance services across the country.

## 2.3 Other Specialised Land Transport Services

### 2.3.1 Northern Ireland Critical Care Transfer Service

In October 2000, the Northern Ireland Critical Care Transfer Service (NICCaTS) was established. The service, based at the Regional Intensive Care Unit (RICU), provides an Intensive Care Unit (ICU) doctor, full monitoring and ICU support for all critically ill patients requiring Inter-hospital Transfer (IHT) within Northern Ireland (NI). The longest transfers in NI are approximately 160 miles (round-trip). Criteria for the use of NICCaTS are listed in the box below.<sup>31</sup>

<sup>30</sup> Source: Acute Hospitals Division, DoHC, Dublin.

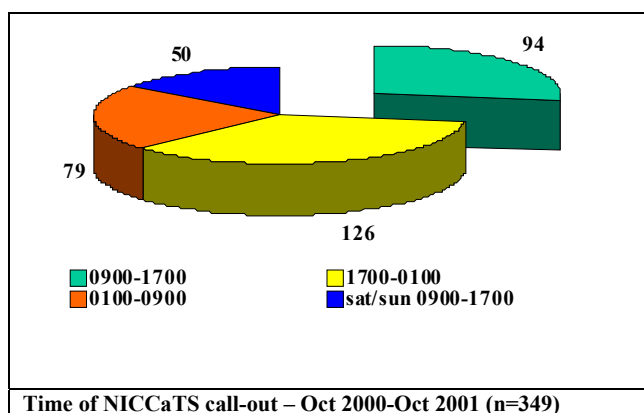
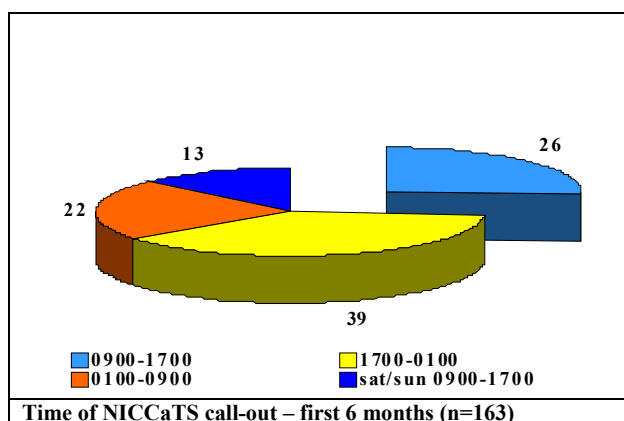
<sup>31</sup> Information on NICCaTS provided by Consultant Director / Co-ordinator NICCaTS, Belfast, November 2002.

**Criteria for NICCaTS transfer**

- Transfer is by road and within Northern Ireland.
- Patient requiring transfer is 12 (or more) years of age.
- Referring hospital will supply nurse escort for transfer.
- Patient destination is an ICU **or** operating theatre/scanning suite outside referring hospital **and** patient is intubated / ventilated.
- NICCaTS is not already involved in another transfer.

In its first 6 months, NICCaTS performed 163 IHTs between all 16 acute hospitals in NI. The figure for a full year October 2000 to October 2001 was 349; on average one per day.

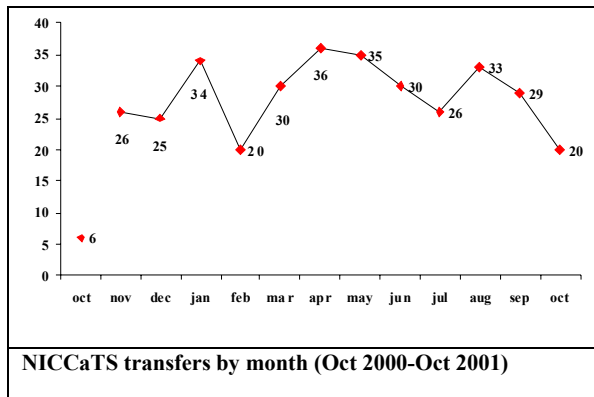
Seventy-four percent of all IHTs occurred outside normal working hours. All were conducted using ground ambulance. The mean time from activation of the service until return to base (RICU) was 145 minutes (range 50 – 355 minutes). Twenty (20) requests for NICCaTS were refused (i.e. approximately 11% refusal rate). The most common reason for refusal was that service was already in operation elsewhere (14) or patient did not fulfill the criteria for NICCaTS transfer (4).



All acute hospitals in NI used the service in 2000/01. Most transfers brought patients to one of the six main ICUs in NI. With the help of this service, the ICUs in NI can now network to maximise the use of ICU beds.<sup>32</sup>

The operators of NICCaTS believe that the system as now in use can be associated with a reduction in ICU and hospital mortality when compared to equivalent transfers previously audited in 1995/96. The most common reason for transfer was the need for combined ICU support / tertiary referral (regional) services - only available in Belfast in NI (39%). “No available ICU bed” was the indication for transfer in 37% of cases.

<sup>32</sup> Data from NICCaTS reveals that 37% of transfers were associated with the non-availability of an ICU bed. This also raises the question as to the ‘core’ role of NICCaTS, for example. It is understood that this reason would rarely be the justification for a transfer under the MICAS system in the RoI.



A degree of seasonal (monthly) variability was observed in the activity levels of NICCaTS for the year under review.

The system is by no means fully optimal and is still evolving. NICCaTS has achieved this performance despite having only 3 of the 5 specialist registrars (SpRs) required to provide a full service (i.e. 24 hours per day, every day of the year). It is understood that funding for the two remaining SpRs was agreed during 2002. The operators argue that NICCaTS still requires the establishment of an ICU nurse escort before it meets accepted standards for a critical care transfer service. NICCaTS continues to work with the NIAS to improve the service provided to critically ill patients and their families in NI.

Limitations of NICCaTS include:

- Single service with the number of transfers limited by duration of operations reflected in refusal rate due to the service (i.e. staff) being 'already engaged'
- Patients need to be intubated / ventilated before transport
- No patients under 12 years of age are transported
- Referring hospitals need to provide a nurse
- The outward journey time can mean a relatively low 'window of opportunity' for some key categories of patient, e.g. severe head injury etc.

### 2.3.2. Mobile Intensive Care Ambulance Service

Consistent with recommendations of the Ambulance Review Body (1993) and the Report on the Transport of the Critically Ill,<sup>33</sup> funding for the Mobile Intensive Care Ambulance Service (MICAS) started in the RoI as a pilot scheme in late 1996.<sup>34</sup> The Mission Statement of MICAS is:

*The MICAS facilitates the transfer of critically ill patients to referring hospitals for Intensive Care and other specialist health care services and it provides safe and optimum conditions during the transfer.*

<sup>33</sup> "Report on Transport of the Critically Ill", Intensive Care Society of Ireland, 1994.

<sup>34</sup> Information on MICAS obtained from "Report of the MICAS Management Committee to the DoHC" draft, October 2002.

The participating parties in MICAS are:

- Eastern Regional Health Authority (ERHA)
- Beaumont Hospital, Dublin
- Mater Misericordiae Hospital, Dublin
- AMNCH Hospital, Tallaght
- St Vincent's Hospital, Dublin
- Intensive Care Society of Ireland
- Irish Association of Critical Care Nurses.

The MICAS resources are as follows:

- 1 high specification ambulance vehicle including Intensive Care medical equipment, trolley
- 1 driver (equipment 'supervisor') – EMT B Grade
- 4 Senior House officers / Registrars (Anaesthesia / Intensive Care) (one week in four)
- 4 Staff Nurses (Intensive Care (one week in four).

Additional 'services' such as biomedical technician support, medical disposables, sterilisation services etc are sourced from the ERHA and the 4 participating hospitals.

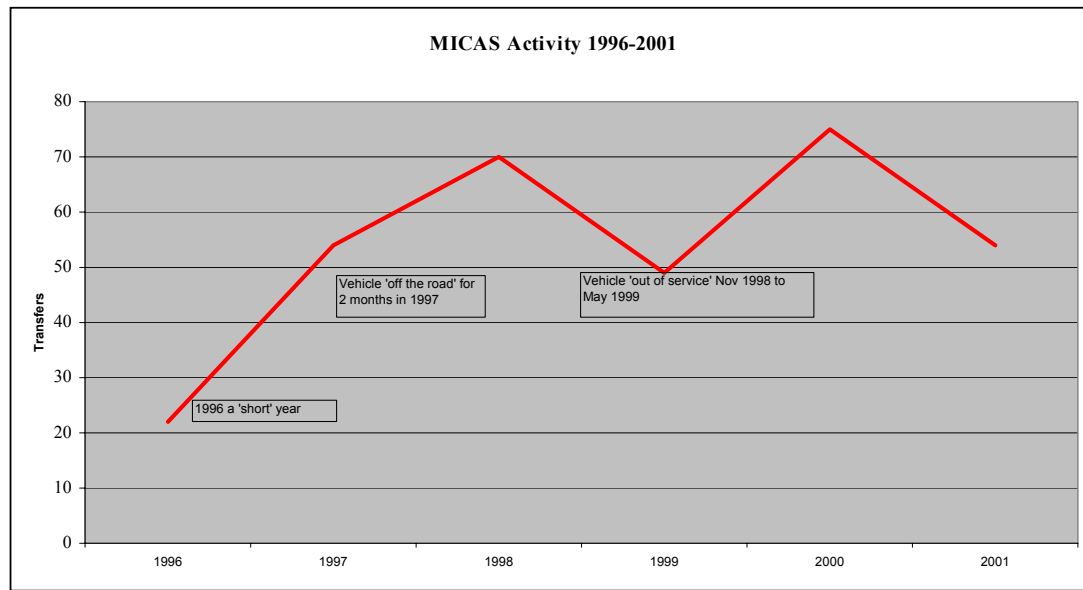
- *The Service transports critically ill patients from local hospitals to central Intensive Care Units.*
- *It operates as a pilot scheme commencing in 1996.*
- *The service operates country-wide during office hours i.e. 08.00-18.00 hrs (Mon-Fri).*
- *The service caters for adult patients. Non-neonatal paediatric patients are catered for at the discretion of the duty co-coordinating Consultant.*
- *The service supplements rather than replaces previous arrangements.*

A 5-year retrospective audit for the period September 1996 to December 2001 of all MICAS activity has recently been completed. The data in the figure that follows illustrates the variable activity levels (324 transfers in total); mostly dictated by poor reliability.<sup>35</sup>

The audit revealed that the clinical workload was reasonably evenly distributed among the four hospitals involved in clinical staffing of the MICAS.

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<sup>35</sup> There is no 'back-up' vehicle.



As an indication of the severity of illness of patients served by MICAS, the audit revealed that patients transferred by MICAS spent on average 13 days in hospital including 9 days in an ICU (this compares with an average ‘length of stay’ in RoI hospitals for approximately 6 days for all inpatients).<sup>36</sup> Two-thirds of all transfers involved a ‘journey’ between Dublin and a country hospital, the remainder being ‘within Dublin’ transfers. The vast majority of transfers take place in the afternoon. Transfer times vary widely; ranging from 25-35 minutes (one-way) for ‘within Dublin’ transfers to between 2 and 3 hours (one-way) for Dublin – Country transfers.

The patients transferred by MICAS are critically ill; almost 90% were intubated, almost 90% ventilated, just over 80% had an A-line (arterial or invasive cardiac monitoring), half required inotropes and just under one-in-five had suffered acute renal failure. The audit revealed no deaths during transfer over the period, but did reveal that the illness severity of patients being transferred was increasing. Unfortunately, there are no data on patients where MICAS was requested but was unavailable.

MICAS, albeit subject to limitations associated with capacity and availability, is providing an important critical health care service:

- High quality mobile Intensive Care is being provided thereby contributing appreciably to the overall quality and equitable provision of care available nationally for critically ill patients
- Reducing the burden of transferring patients from local hospitals not staffed or equipped for the added responsibility of transferring a critically ill patient

<sup>36</sup> In 1999, the average LOS for all hospital patients in the RoI was 6.3 days; for general hospitals it was 6.4 days and for special hospitals it was 5.7 days. For orthopaedic wards, the average LOS was 13.9 days.



- Affording the availability (where one was not previously available) of a high quality task-specific quality transport service for critically ill patients.

There is a strongly held view that the utilisation of MICAS would increase significantly if the hours of operation were extended and if weekend transfers were to be undertaken. Migration to a “24 / 7 “ operation would significantly add to the costs of the service; which in current values are estimated at €300,000 to €350,000 per annum full operating costs.<sup>37</sup>

Limitations of the MICAS include:

- Service duration – Monday to Friday and ‘business hours’ only operation
- Focus on adult patients almost exclusively
- Vehicle reliability / lack of suitable ‘back-up’
- Limited capacity to meet demand / need
- Due to the distances involved, the ‘outward’ journey in many instances can be wasteful of expert crew and equipment and may well constitute elapsed time that the patient cannot afford to have wasted
- As the illness severity of patients transported increases, the journey times associated with road transport will increasingly reduce the ‘window of opportunity’ for many patients.

### 2.3.3 National Neonatal Transport Programme

In March 2001, a 7 day per week (0900 to 1700) dedicated transport service for neonates (infants up to 6 weeks) was commenced – the National Neonatal Transport Programme (NNTP). The service is based on rotating ‘on-call’ teams located at 3 Dublin hospitals – Coombe Women’s Hospital, National Maternity Hospital and Rotunda Hospital.

The resources of the service include:

- Additional staff (including midwives) at the 3 neonatal ICUs
- A Neonatal Transport Coordinator
- A Medical Director
- A purpose-built ambulance vehicle
- Dedicated ambulance staff
- Incubators and other specialist equipment.

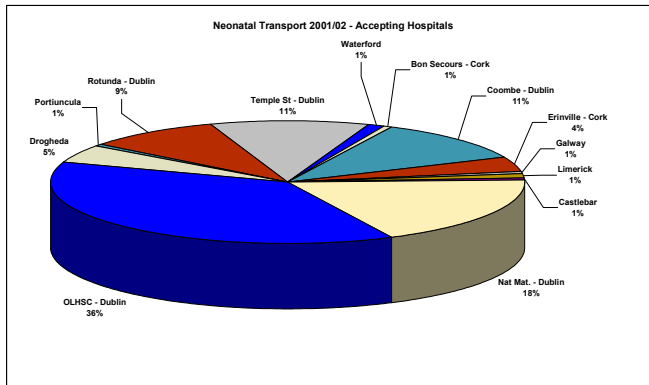
- *7 days per week service (09.00 – 17.00 hrs).*
- *dedicated to neonates (infants up to 6 weeks).*
- *based on three Dublin hospitals.*
- *commenced in March 2001.*

Over the period March 20, 2001 to March 20, 2002 a total of 174 transports were undertaken. The costs of the service to mid-2002 (including establishment costs) are estimated at €1.1 million.

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<sup>37</sup> Salaries and ‘on-costs’, disposables, vehicle operating costs and ‘contribution’ to asset renewals.

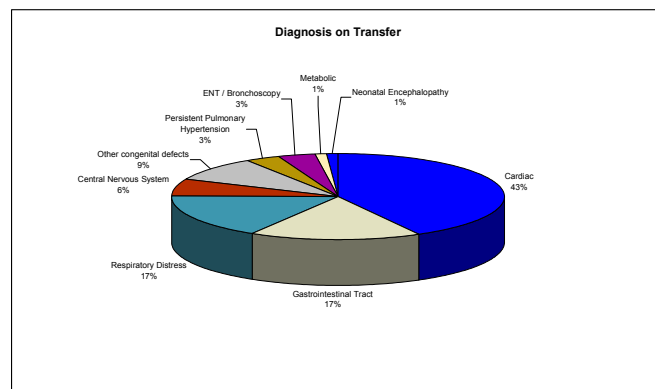
Morbidity and mortality data for the service was not available at the time this report was drafted.



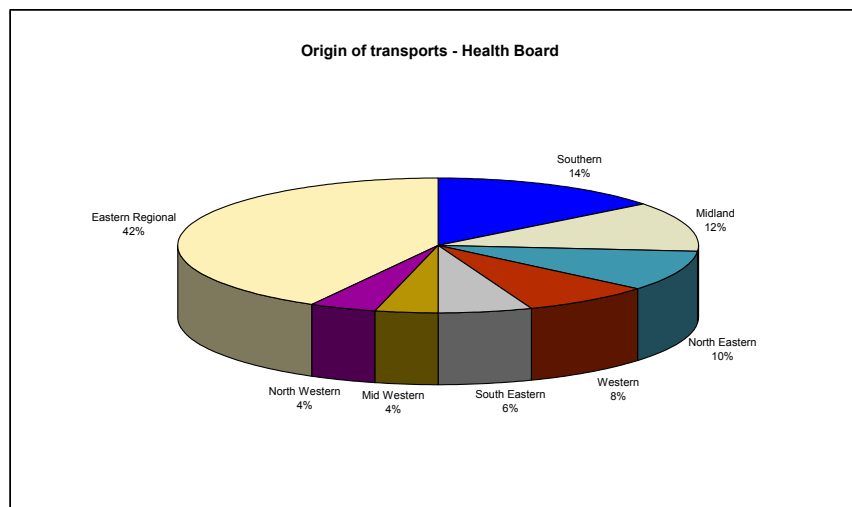
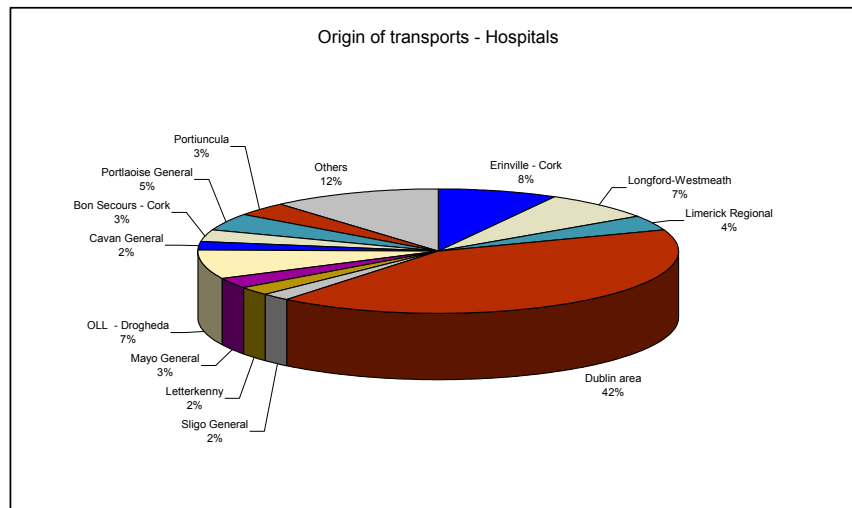
Forty per cent of transports were to the 3 Dublin hospitals providing the service. Over one-third of all transports were to Our Lady's Hospital for Sick Children (OLHSC), Crumlin (in Dublin).

The other significant transport destinations were: Temple Street (Dublin) 11% and Our Lady of Lourdes, Drogheda (5%).

Infants with serious cardiac problems accounted for 42% of transports. The mean weight of babies transported was only 1.84kgs (approx. 4 lbs). The mean gestation period of infants transported was 32 weeks and 85% of infants transported were ventilated.



The origin of patients transported by the National Neonatal Transport Programme indicates a wide dispersal across the Republic of Ireland.



Limitations of the NNTP include:

- Service duration – ‘business hours’ only operation
- Focus on neonates only (infants to 6 weeks)
- Limited capacity to meet increasing demand / need without additional resources.

## **2.4. Current Aviation Activity**

### **2.4.1 Overview**

Currently, within the island of Ireland there exist facilities and services that provide a range of emergency services involving the use of aircraft (both fixed wing and rotary). These are assets and resources associated with the Search & Rescue (SAR) functions undertaken within the UK and Ireland as well as medical flights undertaken by the Irish Air Corps.<sup>38</sup>

In the Republic of Ireland, the Air Corps undertake inter-hospital transfers of patients using helicopters from time-to-time whilst the helicopters dedicated to marine SAR activities will also transport injured persons to hospitals as part of a SAR mission. These two services are effectively rapid transport services (with occasional medical escort). They do not involve provision of full-time dedicated medical crew and specialist aero-medical equipment. In the case of SAR missions, the focus is one of search and rescue and is not necessarily clinically 'driven'. For example, with SAR the focus is on recovery / removal of persons from grave and imminent danger whereas with HEMS / Air Ambulance activity, the focus is on transport of ill and injured to hospitals. In the case of the Air Corps medical missions, the activity is clinically 'driven' in that the requesting agency will be a medical facility.

The Air Corps inter-hospital transfer activity peaked in 1995 and has since declined.

In Northern Ireland, occasional use has been made of military and SAR helicopters to transfer patients to specialist hospitals in Londonderry / Derry and Belfast (and on occasions to locations in Scotland and England).

### **2.4.2 Search & Rescue (SAR)**

In the UK, the Civil Aviation Division of the Department for Transport (DfT) has overall responsibility for civil aviation SAR and assigns appropriate SAR functions to the Ministry of Defence (MoD) and the Maritime and Coastguard Agency. The MoD has responsibility for providing SAR facilities for military operations, exercises and training within the UK and, by agreement, exercises responsibility for civil aeronautical SAR on behalf of the DfT. Where the coverage provided by military SAR assets meets the civil SAR coverage requirements, they are made available for civil maritime and land-based SAR operations.

The MoD has also established and maintains an Aeronautical Rescue Co-ordination Centre for the operation and co-ordination of civil and military aeronautical SAR.

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<sup>38</sup> *These air ambulance flights are often referred to as 'mercy missions'.*

The Marine and Coastguard Agency (MCA) is an executive agency of the UK's Department for Transport. The MCA provides a response and co-ordination service for maritime SAR, counter pollution and salvage. The MCA undertakes the SAR role and is responsible for the initiation and co-ordination of civil maritime SAR. This includes the mobilisation, organisation and tasking of adequate resources to respond to persons either in distress at sea or persons at risk of injury or death on the cliffs and shoreline of the UK. As part of its response, the MCA provides Auxiliary Coastguard Rescue Teams for cliff and shoreline search and rescue purposes.

Under these arrangements, a total of twelve (12) SAR helicopter bases, operated by the MCA<sup>39</sup> (4), the Royal Air Force (6) and the Royal Navy (2) provide full geographic coverage of the UK Search and Rescue Region. The protocols and communications arrangements in place ensure that the most appropriate SAR helicopter is tasked for each mission, whether this be a maritime, aeronautical, inshore or mountain rescue. The helicopters operated by HM Coastguard are Sikorsky S-61N, while the Royal Air Force (RAF) and the Royal Navy (RN) helicopters are Westland Sea Kings. Whilst both helicopter types are based on the same design, there are differences in mission endurance between the three operators, reflecting both different fuel tank specifications and differences between civil (coastguard) and military (RAF / RN) certification requirements.

Details of the operational capabilities of these helicopters, and of those used for SAR in the RoI are summarised in Table 2.1.

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<sup>39</sup> *HM Coastguard is part of the MCA.*

**Table 2.1: SAR Facilities – UK and RoI: A Summary**

<b>BASE</b>	<b>Controlling Agency</b>	<b>Operator</b>	<b>Type</b>	<b>Radius of Action (nautical miles - nm)</b>	<b>Endurance (hours)</b>	<b>Maximum Causalities</b>
Sumburgh Airport (Shetland)	HM Coastguard (HMCG) <sup>40</sup>	HMCG	S-61N	180 nm	4	20
Stornoway (Isle of Lewis)	HMCG	HMCG	S-61N	180 nm	4	20
Lossiemouth	UK Ministry of Defence (MoD)	Royal Air Force (RAF)	Sea King	300 nm	6	18
Prestwick	MoD	Royal Navy (RN)	Sea King	250 nm	5	18
Boulmer	MoD	RAF	Sea King	300 nm	6	18
Leconfield	MoD	RAF	Sea King	300 nm	6	18
Valley	MoD	RAF	Sea King	300 nm	6	18
Wattisham	MoD	RAF	Sea King	300 nm	6	18
Chivenor	MoD	RAF	Sea King	300 nm	6	18
Solent	HMCG	HMCG	S-61N	180 nm	4	20
Portland	HMCG	HMCG	S-61N	180 nm	4	20
Culdrose	MoD	RN	Sea King	250 nm	5	18
Sligo	Irish Coast Guard (IRCG)	Air Corps	S-61N*	180 nm	4	20
Dublin	IRCG	CHC	S-61N	180 nm	4	20
Shannon	IRCG	CHC	S-61N	180 nm	4	20
Waterford	IRCG	Air Corps	SA-365N	150 nm	3	6/7

\* Air Corps operating SA-365N at Finner, south of Sligo pending introduction of leased S-61N. Helicopter data for “Radius of Action” and “Endurance” are typically for day / VFR operations; night / IFR operations may be less / more limited.

Source: “Search and Rescue Framework for the United Kingdom of Great Britain and Northern Ireland”, Department for Transport, London, June 2002 and consultants’ interviews.

<sup>40</sup> HM Coastguard is part of the MCA



**Sikorsky S-61N** (The S-61N model first flew in late 1962 and production ceased in 1979. The helicopter has a flight crew of two. The main cabin is designed for seating between 26-30 persons. In SAR mode, the cabin seating is limited to 4-6 seats with a large floor area cleared for undertaking SAR activities and loading in persons recovered during SAR missions. The overall length of the aircraft is approximately 18 metres with a rotor turn area of approximately 22 metres).

The Aerospatiale Puma helicopter<sup>41</sup> based at RAF Aldergrove (NI) is not a declared SAR facility, but it is understood that this aircraft can assist with limited SAR activity.

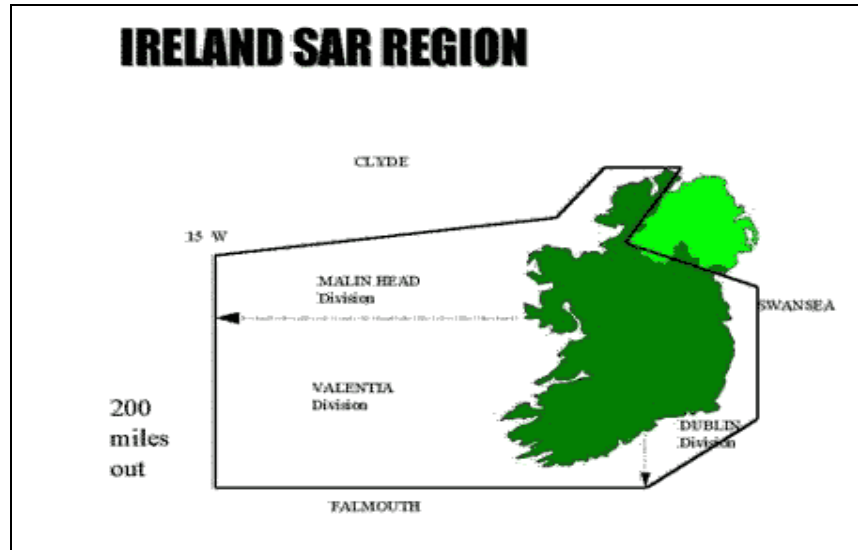
UK SAR agencies maintain close liaison with neighbouring countries for SAR co-operation purposes. In most cases, Memorandum of Understanding or Agreements have been agreed by UK and these neighbouring countries that provide the SAR co-operation details. In the case of the UK and Republic of Ireland, the Maritime Rescue Co-ordination Centre (MRCC) located at Swansea in Wales has liaison responsibility with the MRCC located in Ireland.<sup>42</sup> In practice, the SAR assets managed by the Department of Communications Marine and Natural Resources (DCMNR) in the RoI can also be used for SAR incidents in NI as the cooperative arrangements are in place between the UK and the RoI in this regard.

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<sup>41</sup> In 1967, Britain's Royal Air Force selected the SA330 Puma as its new tactical transport and the aircraft has been widely used across the British armed forces.

<sup>42</sup> The MRCC is currently located in Dublin with sub-centres Malin Head and Valentia.

In the RoI, the Irish Coast Guard (IRCG), an agency of the DCMNR, discharges the State's responsibility for maritime SAR and marine medical evacuation within the Irish Search and Rescue Region (200 nautical miles off the coast), inland rivers, lakes and waterways, the littoral area and cliffs of Ireland and the offshore islands to reduce loss of life.



The IRCG is responsible for, *inter alia*: -

- The saving of lives of persons belonging to a vessel in distress
- Maintaining a National Search and Rescue (SAR) Plan
- 24-hour monitoring of VHF and MF marine radio distress frequencies and the “Eircom” 999/112 telephone emergency system
- 24-hour monitoring of the VHF and MF marine radio frequencies for receipt of Vessel Trade Route (TR) and Recreational Craft Sail Plan reports
- Maintaining a 24-hour contact point for passenger ships and ferries, including passenger counting and the recording of reports
- Maintaining a 24-hour public contact point for reporting and requesting information on marine emergencies
- Assessing each marine emergency or potential emergency; developing an attainable incident search plan; selecting, mobilising and tasking the appropriate search and rescue facilities and co-coordinating the management of marine search and rescue incidents within the Irish Marine Search and Rescue Region, the littoral area and the cliff zones of Ireland
- Maintaining up-to-date information on the availability, readiness, capability and limitations of all rescue facilities and authorities that can provide assistance
- Developing, maintaining and exercising MoUs and liaison agreements with national marine and land emergency response organisations and authorities
- Organising and providing the prime communication link between the IRCG and other emergency services and shore-based authorities
- Co-operating with and providing facility assistance to foreign SAR authorities in the co-ordination of marine search and rescue outside the Irish SAR Region
- Maintaining computer-based search and rescue decision support and response models.



SAR services are provided under contract to the Department of Communications, Marine and Natural Resources. The Irish Air Corps operate from Sligo and Waterford using AS365 Dauphin helicopters (twin-engine mid-sized utility helicopter – maximum seating for 13) and CHC (a private operator) operate from Shannon and Dublin using Sikorsky S-61 helicopters (medium lift utility helicopter with seating capacity of 26-30) similar to those used by HM Coastguard in the UK. The map that follows indicates the location of SAR helicopter bases in the RoI.

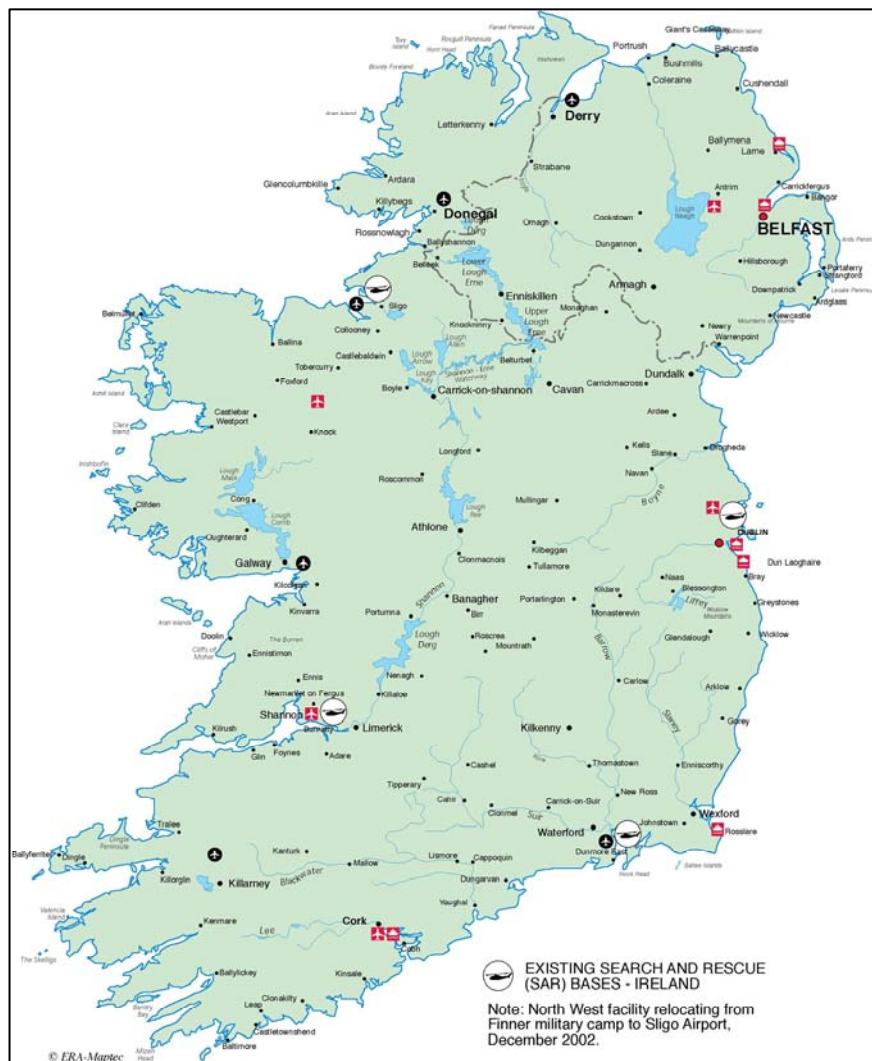
The SAR aircraft are not specifically aero-medically configured (with staff of limited emergency medicine training) and effectively provide only a ‘scoop and run’ service to the nearest hospital in cases where medical treatment is required.



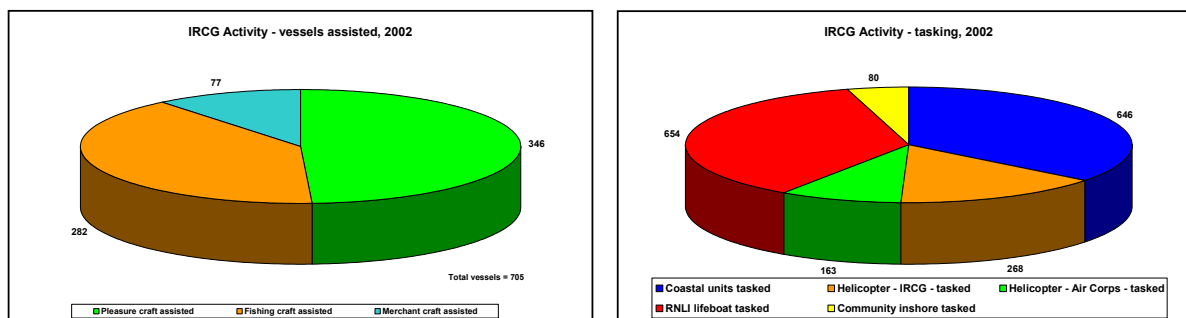
Sikorsky S-61 as operated by CHC in Ireland (source: CHC Ireland Limited)



Eurocopter AS365N Dauphin 2 operated by the Irish Air Corps for SAR missions in the RoI  
(source: IDF web site).



In 2002, the helicopter assets associated with SAR activities in the RoI were tasked on 431 occasions (up from 375 occasions in 2001). In total, in 2002, the IRCG responded to 1,772 incidents which involved the assistance / rescue of 8,389 persons. The figures that follow provide a breakdown of IRCG activity for 2002. This activity involved activation of helicopters, RNLI lifeboats, inshore units and coastal units.



It is understood that in the RoI where SAR helicopter assets are requested for a medical emergency (as opposed to a SAR mission *per se*) this is done usually as a 'next best alternative' to use of Air Corps non-SAR dedicated aircraft and is usually done via the ambulance service. For example, in the case of the Western Health Board area, if the Air Corps is unable to respond to a request for helicopter transport, a request may be made to the Irish Coast Guard based at Shannon. Should the Coast Guard be able to respond, a charge per flying hour of €1,200 is levied.<sup>43</sup>

<sup>43</sup> Charges for the use of Coast Guard assets / services is commonplace. For example, the charge to the Western Health Board for use of fixed wing assets responding to emergency calls (non-SAR) to the islands west of Galway is €440 per 'run' and for use of a RNLI lifeboat, €400 per call out. Source: correspondence with Western Health Board Ambulance Service, 2002.

Under existing MCA arrangements, operational protocols are in place for helicopter medevac and casevac as well as helicopter training and maritime rescues where the ambulance services may have a role.

The NIAS has developed a Memorandum of Understanding (MoU)<sup>44</sup> between itself and the Maritime and Coastguard Agency (UK) for the call out and co-ordination of helicopters for casevac<sup>45</sup> and medevac<sup>46</sup> uses. The MoU contains definitions, background information, objectives of the MoU, information on the MCA and the NIAS, definition of the jurisdiction, the method for helicopter call out, liaison details, roles under 'Major Incidents' and communication arrangements.

Key elements of the MoU include:

- Co-ordination of all SAR helicopters for maritime incidents on Lough Neagh and Lough Erne, at sea, on cliffs and shoreline will be co-ordinated by MCA
- The aim of the MoU is to formally agree the arrangements for the callout of SAR and Casevac / Medevac helicopters
- MCA will call out SAR and Casevac / Medevac helicopters on behalf of the NIAS
- In responding to emergencies, the NIAS will establish the hospital(s) to which injured persons should be taken....and to arrange expeditious transport of the right patient to the right hospital
- In requesting helicopter transport from MCA, the NIAS will provide details as follows (NIAS actions):
  - The name of the Control Officer and Control Centre making the request
  - Contact telephone number
  - Grid reference of the scene
  - Weather conditions at the scene
  - Terrain at the scene
  - Any obstructions at scene or landing site
  - Number of casualties
  - Priority of casualties, P1, 2 or 3
  - Destination of casualty, i.e. hospital
  - Requested role of the helicopter which should be:
    - Rescue – may require winching or difficult to access
    - Casevac no winching required
    - Medevac no winching required
- The MCA will provide the following information:
  - Confirm that helicopter has been tasked
  - Location the helicopter has been tasked from
  - Estimated time of arrival at scene.

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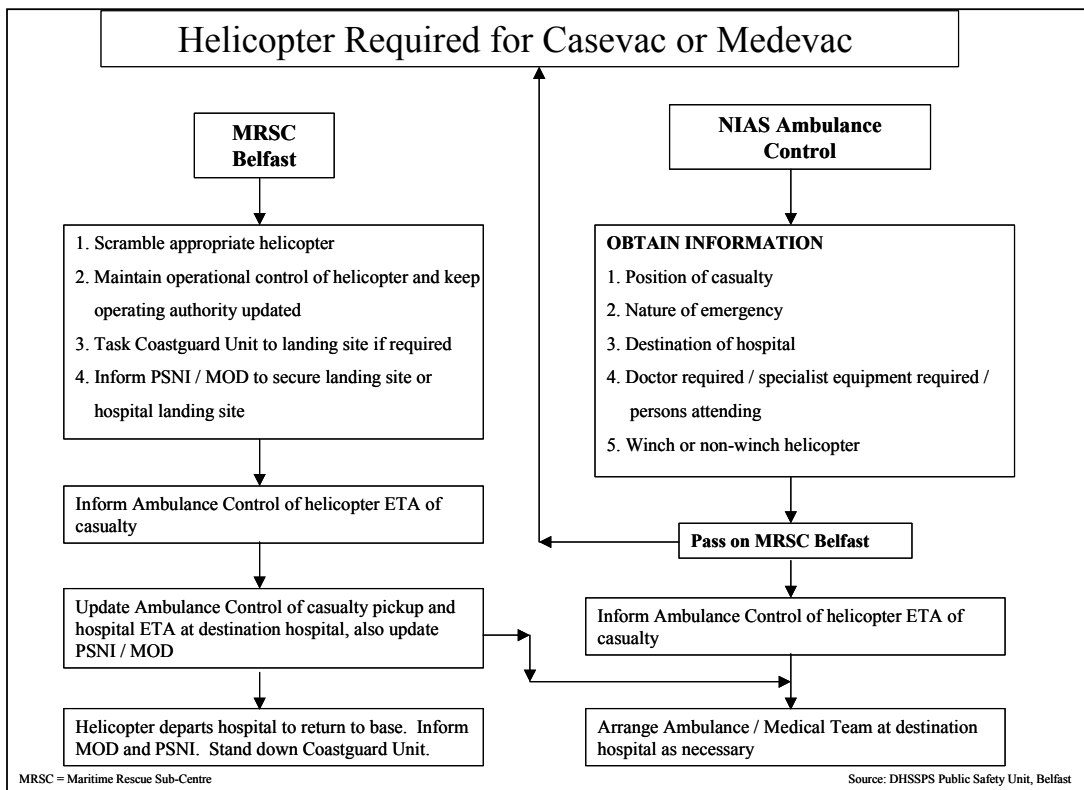
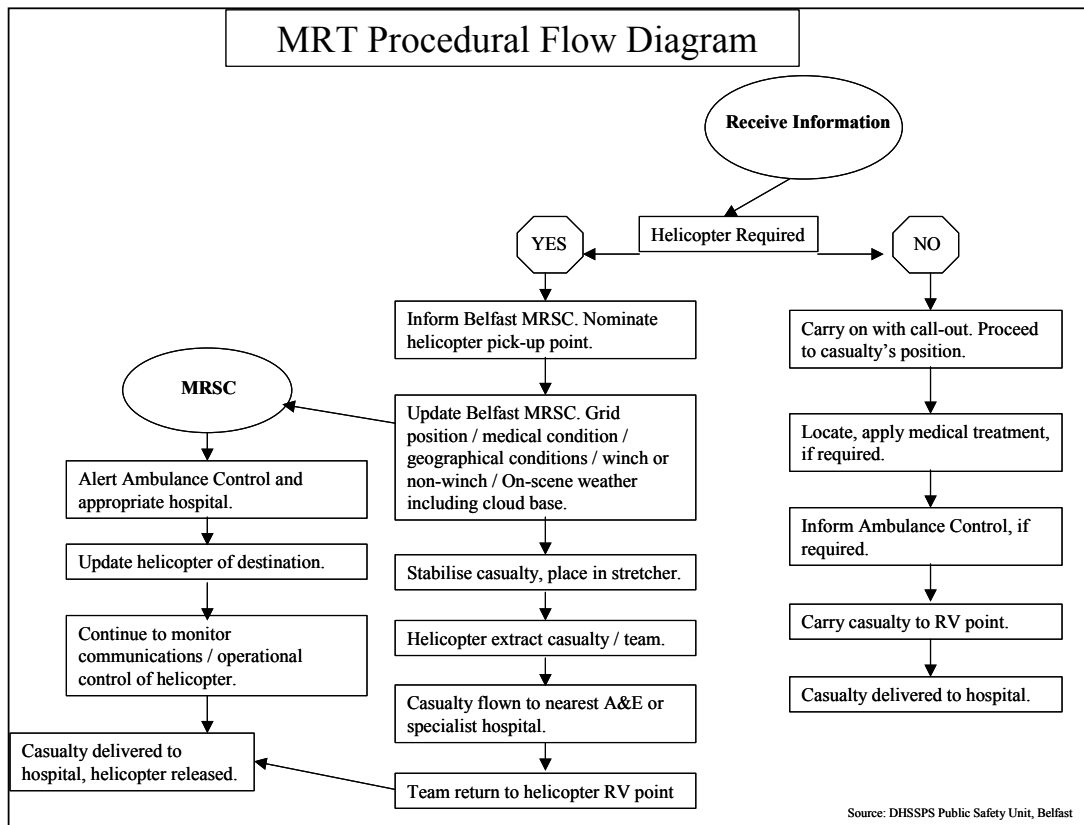
<sup>44</sup> The document developed during 2002 and 2003 is titled, "Memorandum of Understanding between The Maritime and Coastguard Agency and the Northern Ireland Ambulance Service for the Call Out and Co-ordination of Helicopters for Casevac and Medevac".

<sup>45</sup> Casevac is defined in the MoU as "evacuation from incident / home / vessel to hospital".

<sup>46</sup> Medevac is defined in the MoU as "transfer from hospital to hospital".

- NIAS will have no direct communication with air assets and they should therefore be effected through either Coastguard, Bangor or on scene or military personnel as is necessary.

The NIAS has developed procedures for helicopter activation for medical emergencies with MCA and other agencies (e.g. PSNI and MoD) and these are illustrated in the diagrams that follow, initially for activation of the Maritime Rescue Team (MRT) and then for activation of helicopters for casevac and medevac missions.



## 2.4.2 Irish Air Corps

Since the initiation of helicopter operations (primarily for the SAR role) in late 1963, the Air Corps has been providing air ambulance transport to Health Boards. This service has had secondary priority (after SAR) until the expansion of the use of helicopters to a broader range of military and civil assistance roles since then. The emphasis of Air Corps HEMS activity has been the transport of critically ill or badly injured patients between hospitals, particularly where road distances or geography indicate an appropriate use (in essence, the undertaking of a helicopter air ambulance flight as defined under JAR-OPS, i.e. a 'tertiary mission' or ordered inter-hospital transfer).<sup>47</sup> The capability, in terms of service quality, of the Air Corps to provide a helicopter air ambulance service (*albeit* only on a limited basis) has increased over recent years due to:

- Training of crew as EMTs
- Equipping aircraft with automated external defibrillators (to provide for pre-hospital cardiac emergencies and monitoring)
- Development of specialist stretchers (e.g. as per the specialist stretcher developed at the OLHSC, Dublin).

The Air Corps provide a limited air ambulance service in the Republic of Ireland that involves both rotary and fixed wing aircraft.<sup>48</sup> It is understood that protocols used for different types of patient transfer which are dependent upon the nature of the patient's injuries and the receiving hospital's requirements will be reviewed by the two government departments concerned, namely Defence (DoD) and Health and Children (DoHC).

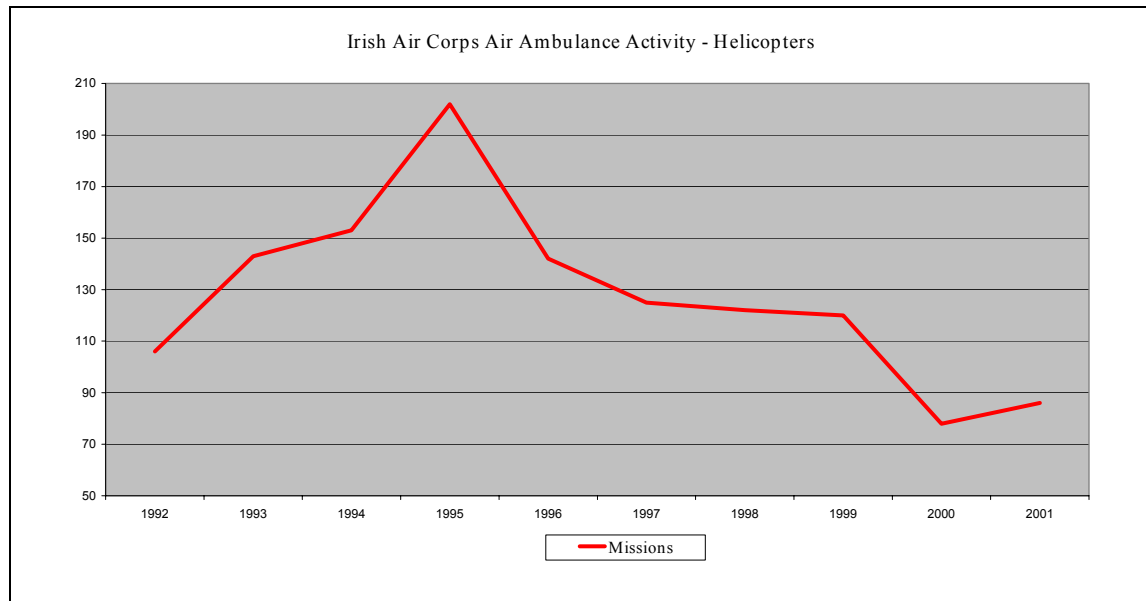
The level of service provided by the Air Corps has declined very significantly since the mid-1990s; in the main due to the unavailability of assets and other resources.<sup>49</sup>

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<sup>47</sup> There is also an amount of 'off island' tasking as well as 'organ harvesting'.

<sup>48</sup> The availability of aircraft is subject to operational and / weather conditions. Services are provided for emergency cases.

<sup>49</sup> The peak year was 1995 and 2001 represented a volume of 'work' of approximately 58% down on the peak volume in terms of missions and hours flown.



Irish Air Corps Air Ambulance Activity										
Helicopter missions										
	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
<b>Missions</b>	106	143	153	202	142	125	122	120	78	86
<b>Flying hours</b>	268	356	321	504	359	316	348	299	194	212
<b>average flying hrs/mission</b>	2.53	2.49	2.10	2.50	2.53	2.53	2.85	2.49	2.49	2.47
Note: Air Corps use two rotary aircraft - Aerospatiale Alouette III (light utility helicopter) and Aerospatiale Dauphin (mid size utility helicopter)										
Fixed wing missions										
	31	35	33	28	11	7	8	16	14	21
Fixed wing operations provided by mix of Beechcraft King Air 200 (13 passenger aircraft) and CASA 235 (45 seat regional airliner)										
In the past, a Gulfstream IV (long range corporate jet) had been used on a limited number of occasions										



It is interesting to note the average flying hours of the Air Corps on air ambulance missions. At about two and a half hours on average, this represents a significant average trip distance; typically in the range of 300 miles to 400 miles plus (as the ‘crow flies’) round trips. It is worth comparing this with average trip time for the MICAS on “Dublin to Country” transfers, which typically involve journeys of two to three hours one-way (round trip distances in the range of 150 miles to 200 miles). In essence, the helicopter is able to undertake journeys of twice the distance of road vehicles in half the time.<sup>50</sup>

The *White Paper on Defence* (February 2000) confirms that there is a role for the Department of Defence in the RoI to undertake air ambulance services “from time to time”. “Air Ambulance” is defined as a secondary role of the Air Corps as an aid to the civil community. The Air Corps utilise both fixed wing and rotary wing aircraft for ‘air ambulance’ missions as shown in the table above.

The Air Corps use two types of helicopter for air ambulance and HEMS missions; neither of which are dedicated to HEMS nor configured to a full HEMS specification in terms of internal fit-out: Aerospatiale SA 365 Dauphin II (shown earlier in this Chapter) and Alouette III (aircraft that entered service in late 1963 – shown in the section immediately following).<sup>51</sup> Fixed wing air ambulance missions are flown using either Beechcraft Super King Air 2000 aircraft (entered service in 1977 – passenger room for seven persons) or CASA CN235 (entered service in 1992 – room for four passengers and a crew of seven).<sup>52</sup>



**Beechcraft Super King Air 2000**

Source: [www.military.ie](http://www.military.ie)



**CASA CN235**

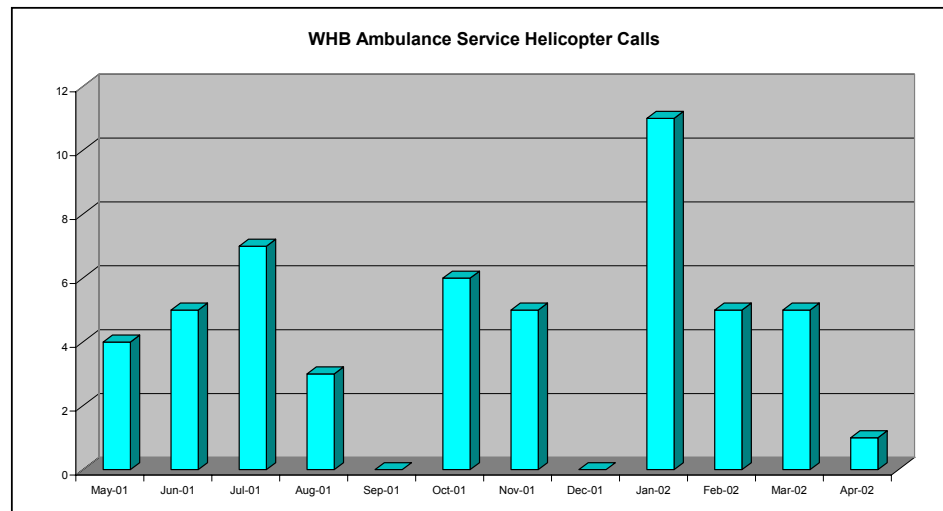
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<sup>50</sup> The maximum cruising speeds of the Air Corps helicopters are approximately 260 kmph (165 mph) for the AS365N Dauphin 2 and 195 kmph (120 mph) for the Alouette III.

<sup>51</sup> The Air Corps also fly helicopters on behalf of the An Garda Síochána, namely a Eurocopter AS 355N ‘Squirrel’ 2 and the recently acquired Eurocopter EC 135.

<sup>52</sup> This aircraft is fitted primarily for SAR missions and since their introduction to the Air Corps have flown over 12,000 hours and recorded in excess of 50,000 sightings.

As a proportion of total patient transports in Ireland, helicopter transports are minor. For example, in the year May 2001 to April 2002, the Western Health Board Ambulance Service (covering Galway, Mayo and Roscommon) undertook 10,938 'emergency' transports of which helicopter calls were involved on 52 occasions (37 in County Galway and 15 in County Mayo). For the same period, the ambulance service of the Western Health Board attended 1,015 'road traffic accidents' and 1,496 'cardiac incidents'. The seasonal distribution of the helicopter calls (which could include both Irish Coast Guard and Air Corps assets) is shown in the following figure.

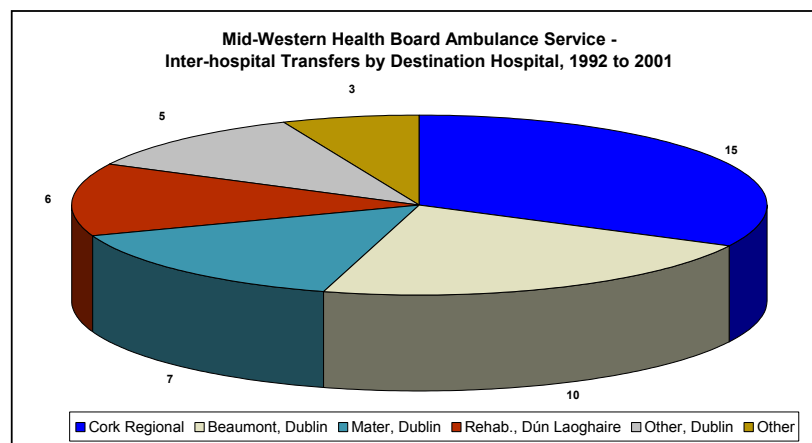
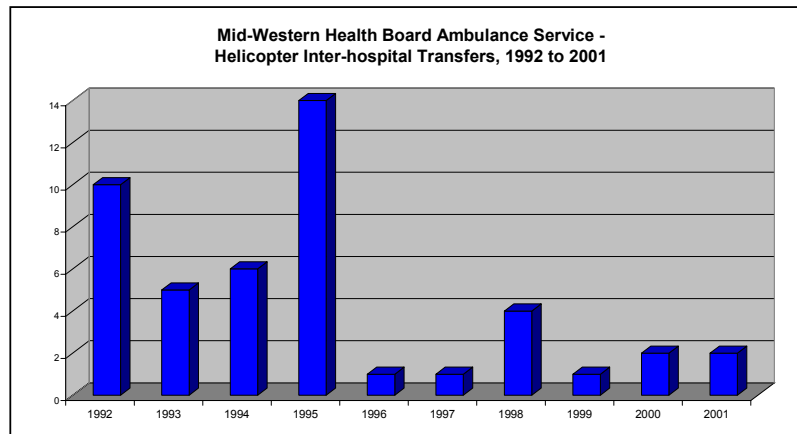


Source: WBH Ambulance Service unpublished data

Data for the Southern Health Board (Counties Cork and Kerry) for calendar year 2001 and YTD (July) 2002 shows a total of 41 helicopter call outs over the 19 month period. Of the total number of call-outs, 22 involved the Air Corps and the remainder involved Coast Guard assets. The most common nature of injury / illness recorded was 'spinal injury' (14 occasions, i.e. one case in three). Half of all transfers were to hospitals in Dublin, in particular to the Mater Hospital. Almost all (all except one case) transports were 'activated' by the Tralee General Hospital.

Data for the Midland Health Board Ambulance Service serving counties Laois, Offaly, Westmeath and Longford indicated no helicopter activity for the period May 2001 to April 2002 (inclusive).

Data supplied by the Mid-Western Health Board (Counties Limerick and Clare plus Tipperary North Riding) for the period January 1992 to December 2001 indicates use of helicopters on a total of 46 occasions as shown in the charts below. The majority of inter-hospital transfers originated from either the Regional Hospital Dooradoyle (28 of 46) or the Ennis General Hospital (15 of 46). The principal receiving hospitals were the Cork Regional Hospital, The Beaumont Hospital, Dublin and the Rehabilitation Centre in Dún Laoghaire.<sup>53</sup> Thirty-six (i.e. 78%) of the helicopter transfers were undertaken by the Air Corps.



<sup>53</sup> The spinal unit that was at Dún Laoghaire is now located at the Mater, Dublin.

Other than medical missions of the type discussed above, the Irish Air Corps are also, on occasions, requested to support the work of the fire services. This is particularly the case with the Dublin Fire Brigade and in relation to fires on vessels, for example, passenger ferries or merchant ships.<sup>54</sup> In such instances, the fire service would require transportation of a specialist crew of 4 or 5 persons equipped with a portable pump, hoses, breathing and other apparatus to board a vessel to undertake the task of dealing with incidents.

The process for requesting use of an Air Corps helicopter is via An Garda Síochána. If the Air Corps are unable to assist, a request may be made to the Irish Coast Guard via direct contact. There will also be occasions when the Irish Coast Guard will contact a fire service to provide assistance to it in cases where their particular skills may be required.

Discussions with the Chief Fire Officers Association representative on the Fire Services Cross Border Working Group revealed that there are currently no plans for a dedicated helicopter for use by the fire services either in NI or the RoI. However, the view was expressed that if additional helicopter assets were to be brought into operation on the island of Ireland that consideration be given to making these available to fire services as appropriate. The Northern Ireland Fire Brigade, like the NIAS, has also developed a MoU with the MCA with respect to helicopter activation.

A study undertaken on aviation transfers by the Air Corps to the Beaumont Hospital (Dublin) is one of the few in Ireland on helicopter air ambulance and / or related activity.<sup>55</sup> The mean length of stay at referring hospital is significant and may in part reflect the lack of availability of transfer teams and appropriate physical resources / aircraft.

► Study conclusion:

*"The extra cost of instituting emergency helicopter transfers compared to 'blue light' ambulances can probably be justified in order to achieve a shorter time spent in the unstable transfer environment. However, reliance on Air Corps helicopters from a Dublin base and the absence of a landing site within the grounds of Beaumont Hospital are continued reasons for the protraction of transfer times."*



Eurocopter AS365N Dauphin 2 and Alouette III used by Irish Air Corps

The mean length of stay at the referring hospital prior to helicopter transfer was 12.25 hours (range 3-98 hours for 55 patients between 1 Jan 1994 and 31 Dec 1996). 78% of patients attained 'full recovery' or moderate disability

The study identifies a benefit in HEMS use but sub-optimal operations and inadequacies with existing arrangements from a medical / patient outcomes perspective: in particular, the inability to avail of the time / speed advantages of HEMS by lack of a helipad at / near Beaumont Hospital and the reliance on a Dublin-based retrieval system

Travel times for Alouette and Dauphin helicopters transfers

An additional 20-30 minutes required for transportation from Dublin Airport to neurosurgical unit

	Alouette Outbound hrs	Alouette Inbound hrs	Alouette Total hrs	Dauphin Outbound hrs	Dauphin Inbound hrs	Dauphin Total hrs	blue-light' Ambulance hrs (travel time)	difference Alouette hrs	difference Dauphin hrs
Castlebar	1.17	0.83	2.00	0.83	0.92	1.75	3.50	-1.50	-1.75
Ennis	1.00	1.25	2.25	0.75	0.83	1.58	3.50	-1.25	-1.92
Galway	1.00	1.08	2.08	0.75	0.83	1.58	3.00	-0.92	-1.42
Letterkenny	1.50	1.42	2.92	0.92	0.83	1.75	4.00	-1.08	-2.25
Monaghan	0.75	0.67	1.42	0.50	0.50	1.00	3.00	-1.58	-2.00
Roscommon	0.75	0.83	1.58	0.50	0.58	1.08	2.75	-1.17	-1.67
Sligo	1.00	1.00	2.00	0.83	0.92	1.75	3.00	-1.00	-1.25
Tullamore	0.42	0.58	1.00	0.33	0.42	0.75	2.50	-1.50	-1.75
Westford	0.67	0.83	1.50	0.50	0.67	1.17	1.75	-0.25	-0.58

<sup>54</sup> Helicopters have also been used on occasions by the fire services in the RoI to transport crew and equipment to remote / difficult to access sites such as mountains or forests and for surveillance tasks (this latter area of activity usually involves use of the Garda Síochána helicopter which is flown by the Air Corps).

<sup>55</sup> "A Cost-Benefit Evaluation of Helicopter Transfers to the Beaumont Neurosurgical Unit" Dardis R, Roberts G and Phillips J, Irish Medical Journal, March / April 2000 vol. 93 no. 2, pp 50-51.

## 2.5 Long Distance Ambulance Transports

Data provided by the Southern Health Board (SHB) in the RoI indicated a significant number of 'long distance journeys' in 2001 among a total of 40,232 patient transports that year.<sup>56</sup> A total of 771 transports in 2001 were categorised by the health board ambulance service as 'long distance journeys' as follows:

- Cork to Dublin, 204
- Co. Kerry to Dublin, 128
- Co. Kerry to Cork, 412
- Co. Kerry to Limerick, 27.<sup>57</sup>

Furthermore, as shown in the figure that follows, the number of 'long distance journeys' has increased significantly (by 64%) over the past decade from 471 in 1991.<sup>58</sup>

Data supplied by the SHB Ambulance Service indicated that the average cost per mile of the ambulance service in 2001 was IR£6.30 per mile (€8.00 per mile or €5.00 per kilometre).<sup>59</sup> For a Cork to Dublin journey with a round trip distance of approximately 325 miles (520 kilometres) and journey time of approximately 4 hours each way, the implied cost is approximately €2,600 per round trip / per patient (as opposed to an average cost per patient transport overall of €203 for the SHB Ambulance Service). Assuming all trips were 'loaded up' and 'empty return', a cost of €530,400 could have been incurred for the transport of 204 patients between Cork and Dublin by the SHB Ambulance Service in 2001. The costs associated with staff and vehicles not being available for other calls and the additional costs associated with other personnel involved are not included in this estimate.

## 2.6. Other Relevant Data and Material

Transport of critically ill paediatric patients from various referring hospitals across Ireland is another significant element of the acute healthcare system.<sup>60</sup>

One in every four to five paediatric Intensive Care Unit (ICU) patients (typically children aged from 6 weeks to 16 years) are transported to Our Lady's Hospital for Sick Children (OLHSC) from outside the Dublin area. Retrieval teams comprise an anaesthetist, nurse and biomedical engineer with specialist equipment including a purpose-designed and built stretcher fitted with various medical instruments and monitors.

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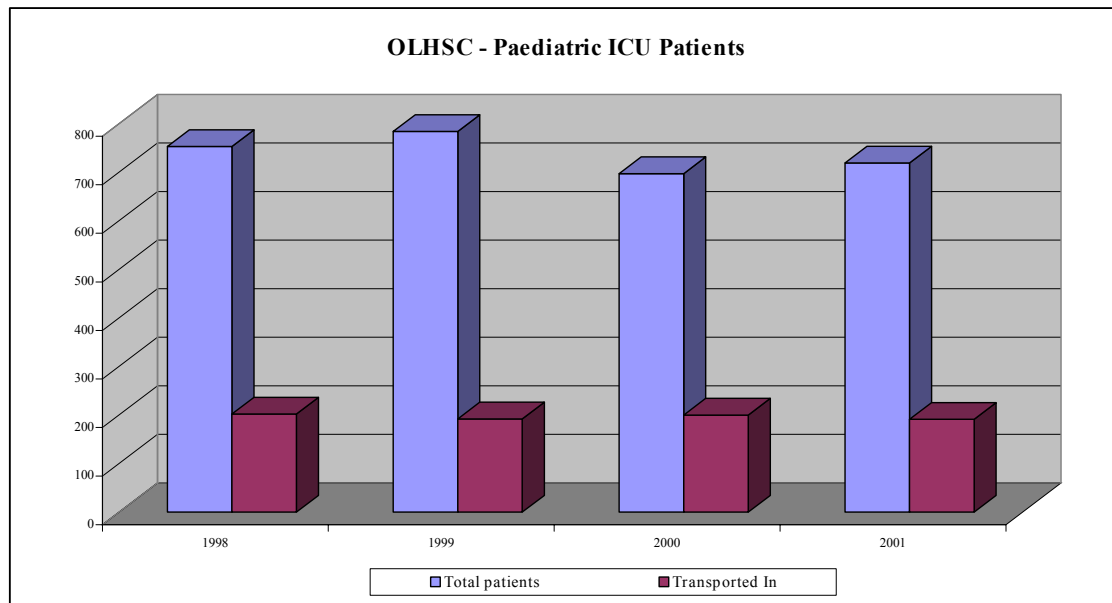
<sup>56</sup> 47% of all ambulance transports in the SHB area in 2001 were to Cork University Hospital. The next most significant hospitals were Tralee General Hospital (9%) and Midleton Community Hospital (8%).

<sup>57</sup> The data provided did not include a clinical classification or categorisation of patients transported.

<sup>58</sup> Data provided by Southern Health Board Chief Ambulance Officer, August 2002.

<sup>59</sup> Data for the Western Health Board Ambulance Service and the Midland Health Board Ambulance Service for the period May 2001 to April 2002 revealed average costs per kilometre of the ambulance service of €5.08 and €5.22 respectively.

<sup>60</sup> This service is not a full time dedicated service such as MICAS or NICCaTS.



An audit of inter-hospital transfers from Mayo General Hospital in the late 1990s reveals some useful information, particularly in relation to transfer times.<sup>61</sup>

**Findings:**

- 32 transfers between March 1998 and June 1999
- 24 by ground ambulance, 8 by helicopter
- 22 to neurosurgical unit at Beaumont Hospital, Dublin, 4 to OLHSC Dublin, 2 to National Burns Unit St James' Dublin, 1 to National Cardiac Surgery Unit Mater Dublin
- 18 transfers were 'out of hours'
- Total transfer times to Dublin were 9+/- 2 hours (range 5.5 hours to 16 hours)
- Use of helicopter halved the transfer time between hospitals
- Time that Mayo General was without an anaesthetist was significantly, but modestly reduced from 9.5+/- 2 hours to 7+/- 1 hours by use of a helicopter
- Mayo General 'lost' 50 working days over the period due to transfers
- CT scanning facilities at the Mayo General should reduce the need to transfer by a quarter
- The majority of neurosurgical patients will still need transfer to the Beaumont
- The use of helicopters reduced the time the patient spent out of intensive care
- Transfers are putting the limited staff resources of Mayo General under significant pressure.

<sup>61</sup> "An Audit of Interhospital Transfers of Critically Ill Patients from Mayo General Hospital 1998-1999" O'Brien J and Mulhall J, Dept. of Anaesthesia, Mayo General Hospital, (copy reviewed undated and unpublished).

A report on transport of critically ill patients by the Intensive Care Society of Ireland made some interesting recommendations including some related to HEMS.<sup>62</sup>

Recommendations (extracts) of relevance to HEMS:

- *A retrieval team should be located in all major receiving hospitals. The team should have a Director e.g. an Intensive Care or Accident and Emergency Consultant*
- *...the team should be ready at all times.*
- *It may be possible in a metropolitan area for hospitals / ICUs to provide the medical teams on a rota basis.*
- *Helicopters or aircraft may be required in particular clinical and geographical circumstances. They should be of adequate size and appropriately equipped to accommodate the personnel and allow the monitoring and therapy required for the transport of the critically ill.*
- *Communications: modern two-way communications between all participating parties is vital.*
- *Emergency interhospital transport. This is essentially interrupted primary transport and refers to patients brought to a local hospital but whose urgent need is transfer to a specialist receiving hospital. Appropriate facilities and staff trained in resuscitation and appropriate facilities should be available at the local hospital. ....*

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<sup>62</sup> Report on Transport of the Critically Ill" Intensive Care Society of Ireland, 1994 (including extracts of Kilkenny Conference of 2nd November 1991 on Transport of the Critically Ill. This is the report referred to with respect to the establishment of MICAS.

## 2.7 Summary of Patient Transfers

Table 2.2 provides a summary of the availability of patient transfers across the island of Ireland and in part, highlights, both the degree of similarity as well as noticeable ‘gaps’ in the current level of service provision to the critically ill and severely injured.

**Table 2.2: Summary of Availability of Patient Transfers (NI and RoI)<sup>63</sup>**

Type	Northern Ireland	Republic of Ireland
Public Ambulance Service	NIAS with 227 vehicles operated from 28 stations, under 4 control centres	Health Boards (7), the Eastern Regional Health Authority (EHRA) and Dublin Fire Brigade with 281 vehicles operated from 77 stations under 13 control centres.
Planned Patient Transfer	69% of all ambulance call-outs in 2000 (240,738)	Significant level of activity to/from specialist units in hospitals in Dublin and Cork. Operated by Health Boards in parallel with A & E activity
Urgent Calls	10% of all ambulance call-outs in 2000 (36,281)	47% of all ambulance call-outs in 2000 (approx. 179,000) (including calls categorised as “routine”); however, planned patient transfers are additional
Emergency Calls	21% of all ambulance call-outs in 2000 (71,382)	53% of all ambulance call-outs (approx. 179,000) in 2000.
Critical Care/Intensive Care Transport (Mobile CCU/ICU)	NICCaTS operating since October 2000. 349 transfers carried out in first year of operation involving all 16 acute hospitals in NI. The service operates throughout the day, and 74% of transfers occurred outside ‘normal’ working hours	MICAS, introduced as a pilot project in 1996, operates from 0800-1800, Monday-Friday. 324 transfers were carried out between 1996 and 2000. Review suggests that “24/7” availability would significantly improve this service.
Neonatal Transport	No dedicated service at present although work is currently underway with a view to introducing a service during 2004	National Neonatal Transport Programme commenced in March 2001 (7 days/week; 0900-1700). 174 transfers in the first year of operation.
Air Ambulance	Limited operations by military, as requested on a case-by-case basis. Occasional transfers between hospitals in NI and RoI by Air Corps helicopters	Operations by Air Corps, using SA-365N and SA-316B helicopters as requested by Health Boards (subject to availability). Fixed wing aircraft also used, particularly for transfers of transplant patients to UK hospitals. Peak year of operation in 1995, with 230 missions (202 by helicopter). (107 transfers in 2002).
SAR (Search & Rescue)	SAR requested through HM Coastguard. Helicopter tasked may be from Scotland, Wales or RoI. Occasional use of SAR helicopters for emergency/urgent patient transfer.	SAR provided by Irish Coast Guard. Available in a secondary role for emergency/urgent patient transfer without any specialist medical equipment, and on are-charge basis.

<sup>63</sup> The data presented in this table is derived from activity undertaken during 2000, 2001 and 2002. Also, as mentioned previously, definitional differences between the ambulance services of the RoI and the NIAS make direct comparisons of performance indicators in appropriate.



## 2.8 Possible Level of Activity

In assessing the potential level of activity that may accrue to dedicated HEMS, consideration has been given, *inter alia*, to the forgoing. Reviewing the nature of current air ambulance activity in Ireland, specialised transport / transfer activity and long distance ambulance transports indicates that the potential demand for a dedicated ‘tertiary-response’ HEMS would be of the ‘order of’ 400 to 600 missions annually. This level of inter-hospital transfer activity would translate to between 1,000 hours and 1,500 hours annual flying time.<sup>64</sup> The key factors in determining both the number of missions flown and the quantum of flying hours for a ‘tertiary response’ HEMS, for example, will be the modality decision based on clinical need and the geographical dispersion of critically ill and severely injured patients requiring rapid transport with skilled medical escort to specialist medical centres.<sup>65</sup>

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<sup>64</sup> As noted earlier, the Air Corps air ambulance missions average approximately 2.5 hours flying time per mission.

<sup>65</sup> With respect to dedicated ‘primary response’ HEMS and potential demand considerations, these services typically attend road traffic accidents, industrial accidents and falls as illustrated in data obtained for UK-based services discussed in Chapter 5 of this report. As noted earlier, data on road traffic accidents in the RoI and NI is provided in Appendix D.

### 3. PUBLIC SUBMISSIONS & RELATED DATA GATHERING ACTIVITIES

#### 3.1 Introduction

In order to obtain information from a broad range of stakeholders, a data gathering plan was implemented with the following key major elements:

- Public request for written submissions<sup>66</sup>
- Meetings with and / or presentations to various stakeholder groups.

This plan was designed to collect, *inter alia*, from stakeholders information that may not necessarily be readily available (e.g. information that may not be published or obtainable from agencies such as the Central Statistics Office in the RoI).

As well as the receipt of public submissions, discussions were also held with various individuals and organisations throughout the course of the feasibility study.

#### 3.2 Public Submissions

A total of 88 public submissions were received.<sup>67</sup>

The profile of respondents was as follows:

- 21 medical consultants / specialists
- 16 private individuals
- 15 elected public representatives
- 9 medical associations
- 8 local authorities
- 4 hospitals
- 4 health boards / agencies
- 3 helicopter operators
- 8 “other”.

Numerous key stakeholders across the island made submissions, namely:

- Association of Chief Ambulance Officers, Ireland
- CEOs of the Health Boards, Ireland
- College of Anaesthetists & The Association of Anaesthetists of Great Britain and Ireland
- Combined NI Health & Social Services Boards’ Chief Executives Group
- Intensive Care Society of Ireland
- Irish Association of Emergency Medicine – Royal College of Surgeons in Ireland
- Irish Patients Association Ltd

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<sup>66</sup> Submissions were received between September and November 2002 inclusive.

<sup>67</sup> All except one were in writing (one, from a Belfast-based medical consultant was by telephone late in the course of the study). A list of those persons / organisations from whom submissions were received is provided at Appendix B.

- Irish Society for Immediate Care
- Irish Medical Organisation
- Irish Hospital Consultants Association
- National Ambulance Training Board
- Pre-Hospital Emergency Care Council
- Royal College of Nursing Northern Ireland Board.

The general view of those making submissions is one of overwhelming support. However, issues of timing, funding (as additional to ambulance services, for example), integration with existing services (particularly ambulance services), separation of roles (and services) between NI and RoI and the capability of the health care system across the island to effectively accommodate HEMS were raised as important constraints on HEMS in the island of Ireland context.<sup>68</sup>

The following quotes have been drawn from the ‘medical’ submissions made to the consultants.<sup>69</sup>

- *“...32 county service with retrievals to either Dublin or Belfast based on geographic proximity and available resources*
- *dedicated team consisting of a senior experienced anaesthetist, paediatric ICU trained nurse and a suitably trained medical engineer...*
- *rapid access to appropriately equipped and staffed ambulance(s)...*
- *dedicated national co-ordinator to arrange individual retrievals, derive protocols and maintain audit of the service. ....*

Paediatric Anaesthesia Travelling Society of Ireland (Mr Brendan O’Hare, Paediatric Anaesthetist and Intensivist, OLHSC, Dublin)

*“Currently in excess of 250 patients per year are treated in the National Spinal Unit with significant spinal injuries. Greater than 40% of these are transferred from outside the Eastern Regional Health Authority. ....*

*Many patients who have spinal injuries have associated injuries, many of which are life threatening. ... At present an ambulance service brings a patient to the nearest hospital. We would subscribe to a Trunkay’s philosophy which is “get the right patient to the right hospital in the right amount of time”. “*

Mr John O’Byrne, Consultant Orthopaedic Surgeon, National Spinal Injuries Unit, Mater Misericordiae Hospital, Dublin

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<sup>68</sup> A selection of submissions from NI-based politicians sought consideration of separate NI / RoI HEMS with the NI service integrated with the service in Scotland (currently based in Glasgow and Aberdeen).

<sup>69</sup> These are not presented in any particular order – ordering is based on the date at which the submission was received by the consultants.

*"To date, there is no dedicated air ambulance or retrieval service available. This results in critically ill patients spending large amounts of time out of the intensive care service area. Not alone does this increase the risk to the patient but it also denudes the transferring hospital of both nursing and medical staff for the duration of the transfer. In our hospital the average length of transfer round trip varies from 12 to 16 hours and can cause serious problems for both patients and staff alike. ...*

*The only available retrieval service is the MICAS ambulance which is based in Dublin and only works on a five day basis and therefore is not appropriate for emergency or very urgent retrievals.*

*As the West of Ireland has neither a local Neurosurgical service nor a rapid transport / retrieval service this leads to compromise of patient care and the situation needs to be urgently addressed."*

Dr Michael Thornton, Consultant Anaesthetist, Mayo General Hospital

*"...The case for HEMS Inter-Hospital or Secondary Transfers / Retrieval Systems is very strong and research is there to prove this. ...Whilst the case for inter-hospital HEMS helicopter transfer is very strong, it is harder to prove on paper the major benefits of primary transfers because of the difficulty of getting randomised control groups. Nevertheless, these systems are successfully run in Germany and the USA, where HEMS has operated for 25 years. ...In the case of primary transfers there is no doubt that to get the physician on the scene quickly will save lives, and prevent disability. ...International research shows that the time spent in intensive care units can be reduced by one third without altering hospital care using HEMS for inter-hospital transfer. ...*

*Local hospitals, which must provide escorts under the guidelines .....are being left with inadequate cover presently (no surgical ops, no cardiac arrest cover, no epidural cover) resulting in longer waiting lists and a hazardous state of affairs. HEMS would solve this situation also and lead to greater efficiencies and shorter waiting lists and more appropriate deployment of essential staff. ...."*

Dr Jerry Cowley, TD, General Practitioner and Barrister

*"...the provision of HEMS (Helicopter Emergency Medical Service) for Ireland is an urgent necessity.*

*...to ensure a complete and effective and coordinated pre hospital and inter hospital transport system we need HEMS....This is because there are situations occurring every day when speed is of the essence and when it is inappropriate to use anything except HEMS, both for inter hospital transport and in certain prehospital crises. ...."*

The Rural, Island & Dispensing Doctors of Ireland (Dr Jerry Cowley, Chairman)

*"... On behalf of the Department of Neurosurgery, we would welcome the development and establishment of a Helicopter Emergency Medical Service which we believe would facilitate the management of trauma cases in addition to other neurosurgical patients and in the long run, believe that this service is the best way to deal with the demographic problems associated with providing modern neurosurgical care in Ireland."*

Daniel Rawluk, Consultant Neurosurgeon & Director of Neurosurgery, National Department of Neurosurgery for the Republic of Ireland

*"... Our concern is the lack of speedy transport to Dublin. Our patients are critically ill, many are on life support machines, with one to one nursing and medical care.....It is very difficult as an intensive care specialist to see this prolonged out-of-hospital exposure as anything but hazardous for our patients and it is even harder to accept when we all know there are much speedier alternatives.*

*....*

*In summary, we believe that if services are going to be concentrated on Dublin the access to these services must be vastly improved. It is extremely difficult to reconcile an ambulance based inter hospital transport with a modern health service. We need helicopter retrieval services that are not only going to minimise out-of-ICU time, but are also staffed by intensive care doctors and nurses who can come to our hospital, stabilise the patients and safely bring them to Dublin."*

James Mulhall, Consultant Anaesthetist, Mayo General Hospital

*"...we wish to put on record the following positions:*

- 1. The Society is strongly in favour of the use of helicopter transport for inter-hospital transfer of patients.*
- 2. The Society is also in favour of the use of helicopter transport in primary response situations but with the important caveat that this should not be at the expense of the development of existing services or other equally beneficial pre-hospital care initiatives."*

Irish Society for Immediate Care (Dr John Dowling, Secretary)

*"...I wholeheartedly support the need for this service on an all Ireland basis. ...  
This must be developed as part of an **integrated transport strategy** for all ages of patient. ...*

*There are many important "details" to be addressed such as funding, number and type of air and land vehicles, training of staff etc. However I believe the most important factor at present is to agree a "SERVICE MODEL" for the delivery of care as outlined above. ....*

*Summary;*

*An Integrated LAND and AIR based service for major prehospital and all interhospital transport could readily be provided for NI and the ROI. An all Ireland approach will be required to plan and implement this strategy."*

Dr Bob Taylor, Consultant in Paediatric Intensive Care, The Royal Hospitals – The Royal Belfast Hospital For Sick Children

*"...Based on our experience there is a definitive need for a helicopter Emergency Medical Service. ....*

*... The use of helicopter transport for ill neonates should be considered for transports greater than 110 miles as per recommendations of the American Academy of Paediatrics. ..."*

Helen Byrne, National Neonatal Transport Coordinator

*"...We believe that such a service can make a significant contribution to standards of health care throughout the island of Ireland. Many of our members live and practice in remote rural areas and they will welcome an initiative that has the potential to improve access to healthcare, particularly in accident and emergency services, for their patients. Whilst we accept that the scope of the service is not exclusively restricted to rural settings, there is no doubt that it is in these areas that the service will have its greatest utility. ...."*

Royal College of Nursing, Northern Ireland Board (Dr John Knappe, Public Affairs Adviser)

*"...We feel such a service could have enormous beneficial impact on the transport of seriously ill children to our institution, if combined with the implementation of a paediatric intensive care retrieval service. ....*

*... In a study performed at this hospital, we have documented that the current system of transport, whereby the transferring hospital must supply the staff and equipment for transport is not adequate. It results in excess morbidity for transported children. There have also unfortunately been deaths in transport, which may have been avoidable.*

*The paediatric intensive care consultants at this hospital, Temple Street Children's Hospital and The Royal Belfast Hospital for Sick Children, support the concept of a dedicated team. Staffs in all three institutions are prepared to contribute to running this service.*

*The combination of such a service with HEMS would result in faster, safer and more professional transport of seriously ill children. This has been documented in other centres to reduce morbidity of children during transport. ...."*

Mr Paul Kavanagh, Chief Executive Officer and Dr David Mannion, Director of Intensive Care, Our Lady's Hospital for Sick Children (Dublin)

*"... A case can be made for primary helicopter responses in countries where no land based response is feasible. This is very rarely the case in Ireland. ...*

*...given the Irish healthcare reliance on regional or national specialist centres, high quality retrieval systems are an absolute necessity. Unfortunately, this need has not yet been met and improved helicopter services may well offer a useful solution. ....*

*An aero medical tertiary retrieval option should be considered; reasonable evidence suggests that with adequate resourcing tertiary retrieval would bring benefits. ....*

*No rational argument can be made at this stage for a national primary response service – the case for any aero medical service may be damaged by the costs, in every sense, of such a choice...."*

Dr Gerard Bury, Professor of General Practice, University College Dublin.

*"...Summary:*

*There is a wealth of documentation advocating early intervention in specialist centres to ensure good outcome for trauma victims.*

*The mode of transfer includes road ambulance, helicopter and fixed wing airplane and should be dictated by the patient condition, the distance, and weather conditions.*

*HEMS is acknowledged to be of benefit to seriously injured patients when treatment is initiated in a specific time period. However, its lack of availability outside of daylight hours renders it useless during the periods when the majority of accidents are known to occur. ....*

Beaumont Hospital Trauma Committee (Mr Paraic Murray, Consultant Orthopaedic Surgeon, Dr Mark Logan, Consultant Radiologist and Mr Des O'Toole, Trauma Co-ordinator)

*"... The institution of a dedicated helicopter emergency medical service is broadly welcomed. ...*

*There are many potential benefits in patient care, such as rapid retrieval, especially in trauma victims, more equitable access to specialist healthcare services, by increasing rapid access to major centres and possibly reduced turnaround times for retrieval teams. ....*

*We welcome the opportunity to have a HEM service piloted and evaluated. ... The College is of the opinion that the current road ambulance should be up-graded to a twenty four hour, seven day service and that a HEMS would complement this. ...."*

College of Anaesthetists and the Association of Anaesthetists of Great Britain and Ireland (Jeanne Moriarty, Honorary Secretary)

*"This is a very important service that should be available all over the country.*

*....it should be available on an emergency call out for major accidents or at the request of existing ambulance services in the periphery area in case of major injuries.....*

*.... We have had incidences where patients have died on route to hospital where a helicopter service if rapidly available may have saved their lives.*

*...that an immediate helicopter service be available 24 hours per day for transport of acutely ill patients to major regional centres such as the Neurosurgical Centre, Burns Unit etc. In many cases this should be done within a matter of an hour or two after being received at the base hospital. ...."*

Mr P W Eustace, Chairman, Department of Surgery, Mayo General Hospital



*“... Council welcomes the commissioning of the HEMS Feasibility Study. Council, in consultation with its Clinical Care Committee and Medical Advisory Group, considers that the guiding principles outlined below are of fundamental importance in the consideration of any HEMS model(s) whether proposed for predominantly primary, secondary or tertiary patient transfer.*

- 1. The consultants should adequately look at the current availability and utilisation of helicopters for the transport of patients, and issues of access and cost should be clarified and nationally agreed policies and procedures developed.*
- 2. If funding is to be recommended for HEMS modes, that these funds must not be taken out of Ambulance Service allocations or be instead of future ambulance service enhancements.*
- 3. Any costings done should include costs of staffing, equipment and training.*
- 4. If there is a pre-hospital component to any HEMS modes proposed, that advanced trained Ambulance Personnel should be core clinical crew.*
- 5. Operational tasking and coordination of any HEMS models proposed should be the responsibility of the Ambulance Service and that the Ambulance Service should be resourced accordingly. Please note that 5 would need to be closely linked to 6 below.*
- 6. There must be adequate clinical co-ordination to ensure that appropriate patients gain access to any proposed HEMS models.*

**Pre-Hospital Emergency Care Council (Mr Paul Robinson, Chairman)**

*“... Assuming that a significant percentage of these patients shall be critically ill and require placement in appropriate intensive care facilities a number of issues arise:*

- 1. The ERHA is currently engaged in a review process on critical care access for patients. An analysis of proposed new patient intensive care bed utilisation arising from this service and its impact on current service would be appropriate.*
- 2. The Mobile Intensive Care Ambulance Service (MICAS) currently provides for 5 days per week, working hours transfers of stabilised critically ill patients. The extension of this service to a 7 day facility has previously been considered, and indeed whether nocturnal transfers are appropriate in certain circumstances, would merit consideration in the expansion of “emergency” transfer services. The MICAS Committee may be a useful resource in this area.*
- 3. Emergency retrieval teams based in the Accident and Emergency Departments and supported by appropriate trauma team and intensive care staffing are not as yet in place in the Republic of Ireland, and we suggest analysis of their impact on the targeted patient sub-groups.*
- 4. Analysis of the impact on intensive care facilities in non-ERHA regions.*
- 5. Analysis of impact of any proposed paediatric transfers on paediatric intensive care faculties / expertise in transfer of the critically ill paediatric patient.*
- 6. The ICSI welcomes this study with its potential for significant enhancement of patient care and associated rapid access to appropriate facilities.*

**Intensive Care Society of Ireland (Dr Brian Marsh, President)**

*"IAEM regards the development of a Helicopter Medical Service in Ireland as a positive step toward improving both patient care in the pre-hospital setting and inter-hospital patient transfer. ...*

*...IAEM believes that a Helicopter Emergency Medical Service is the gold standard and is obtainable for Ireland in the long term. Provision of expert medical team to the accident / incident site has major benefits. It allows resuscitation to occur at the critical period immediately post injury. It also enables the patient to be transported to the centre of definitive care de novo, which is known to improve outcome. This has knock on effects reducing the number of secondary transfers required. ....*

*In summary, IAEM welcomes the potential development of a helicopter medical service for Ireland. ..."*

Irish Association for Emergency Medicine (Stephen Cusack, Consultant in Emergency Medicine & Secretary of the IAEM, Dr Eamon Brazil, Member IAEM and Mr Patrick Plunkett, Member IAEM)

*"...There still exists two distinct camps; those in favour and those against, despite their wide-spread deployment in many parts of the world and indeed across the water in United Kingdom.*

*Debates and Reports lead to the conclusion that Air Ambulance assets are an extension of the traditional land ambulance responses. However, genuine concerns still exist that the introduction of such assets could harm the end beneficiary, if such assets redirect funds away from traditional land based services.*

*We are also conscious of the fact that we as an Island Nation whose geographic and demographic parameters would render HEMS a viable Pre-Hospital Emergency Care asset, do not have such a service already. .... Our land based service is at an early stage of development. ....While significant developments have been made, we still have a long way to go. Because of the level of funding being provided, there are many priority areas of service that have yet been fully addressed. ...*

*We recognize HEMS as an asset to Pre-Hospital Emergency Care but NOT at this time. ... We are not convinced that limited funding, particularly in the context of the current economic climate, will not be redirected to a HEMS development at the expenses of our core Service needs going forward for at least the next 5 years. To quote from Dr J. M. Fisher, Essex, England as far back as 1988 in reference to HEMS debate:*

*The helicopter service is only a small cog in the wheel of improved Pre-Hospital Emergency Care delivery and will only be maximally beneficial when the support ground base services and staff are available. The successes elsewhere in the world are not due to their helicopters but to the ever available highly skilled staff and aggressive resuscitation policies. Do not let us make the mistake of putting the cart before the horse."*

Association of Chief Ambulance Officers (P F Curley, Chairperson and Chief Ambulance Officer, Southern Health Board)

*"...We believe that these objectives can be realised for the for the Island of Ireland by having a Helicopter air ambulance service. ..The existence of a Helicopter service supports the terrestrial service by efficiently doing its job that the terrestrial service would be able to do in many scenarios. ....the service needs to be adequately resourced to accomplish the tasks that are expected of it ....*

*We believe that there is evidence to establish this service for the island of Ireland by looking at our UK neighbours....".*

Irish Patients' Association Ltd (Stephen A McMahon, Chairman)

*"...the Boards continue to support the recommendation in the NIAS Strategic Review, that given the present limited resources in the HPSS, we should prioritise the implementation of that review in the areas of increased fleet availability, staff training, Medical Priority Dispatch System and the introduction of rapid responders in the community. This along with the extension of the Northern Ireland Critical Care Adult Transfer service is currently the most effective mechanism for enhancing our emergency health care system. ....*

*The literature regarding HEMS for all types of trauma cases appears to be equivocal at best except for its utilisation in certain patient subgroups and certain types of missions flown. ..."*

Combined submission from the four NI Health and Social Service Boards' Chief Executives Group (Steven Lindsay, Chief Executive, Western Health and Social Services Board)

*"...This individual Trust may not necessarily benefit from a HEMS service in Northern Ireland. ...*

*Taking a wider view, there may be reasons to justify a HEMS service on a Northern Ireland Regional and all-Ireland dimension.*

*In addition to the obvious roles in different forms of patient transfer over long distances or inaccessible terrain, other roles may be:*

- *The rapid transport of health service staff to the ill/injured/trapped individual*
- *The rapid transport of health service staff to the scene of a major incident in sufficiently short time to make a difference. When such help is delivered to the scene, patients could have the minimum of stabilising treatment required for safe transport by land vehicle. Alternatively when critical time factors outweigh the risks of air transportation then the casualty could be removed from the scene by helicopter. It is important to see the helicopter not just as a patient carrier but also as a rapid delivery vehicle for medical aid or expertise. ..."*

Ulster Community & Hospitals Trust (Jim McCall, Chief Executive)

*"...You will note that the report contains recommendations for the continued development of facilities for the transport of the critically ill. These include recommendation to develop an air transport capacity for the critically ill and a recommendation for improved liaison with NI and other acute health care developments. It identifies an extension of current services to include a weekend service as the next priority. ..."*

MICAS Management Committee (Dr Dermot Phelan, Chairman)

*"...Conclusion*

- *The Chief Executive Officers welcome the HEMS feasibility study*
- *They recognise that a HEMS could provide service improvements, for example in trauma care, although overall improvement in morbidity and mortality have been difficult to demonstrate in other jurisdictions*
- *HEMS cannot guarantee response and would not therefore add to the resilience of current emergency response*
- *The land-based Ambulance Service requires significant investment, as set out in the 2001 Strategic Review. HEMS should not be developed at the expenses of the recommendations of this review*
- *The national hospital network has been the subject of extensive examination and much development has taken place or has been approved. HEMS should not be initiated at the expense of such agreed developments. Fixed hospital costs cannot be used to fund HEMS.*
- *HEMS governance and criteria-based protocols would need to be fully developed in advance. ..."*

Chief Executive Officers of the Health Boards (Dr Seán Conroy, Regional Manager, Western Health Board)

*"...I've been making representations to our Department of Health here for some time about a HEMS - type service for Ireland, so the first thing to say is that my consultant colleagues and I all support the development of such a service in principle. We believe that it should be developed on a whole-island basis, with a small number of aircraft covering the country. ...*

*...We think there are several roles. Firstly, a primary service to bring patients with life-threatening injury or illness (e.g., a child with meningococcal disease) from remote areas to major centres. Secondly, a service to transfer patients from peripheral to central units, after stabilization. This would tie in with the current (ambulance-based) patient retrieval service run by doctors from our regional ICU here, co-ordinated by Dr Gavin Lavery. Thirdly, to have a significant role in the management of disasters/major incidents, where it is necessary to move critical casualties rapidly to the trauma centres for rapid definitive care. This was well demonstrated after the Omagh bombing, when the army used their aircraft to take patients with major limb injury to the fracture service in Derry and to bring patients with head, chest and multiple trauma to the RVH here. ...."*

Mr Laurence Rocke, Consultant in Emergency Medicine, Royal Victoria Hospital, Belfast

*"...Although we have a wide range of inpatient specialties on this site, we refer significant numbers of patients to Belfast to the care of regional specialties. These would include cardiothoracic surgery, neurosurgery, inpatient and operative fracture surgery, plastic surgery, maxillofacial surgery and acutely ill children requiring paediatric intensive care.*

*...there is clearly ongoing difficulty in terms of the present arrangements for urgent ambulance transfer. In discussion with the present ambulance service I am informed that the ambulance service comes under intense pressure in seeking to cope with the demand for transfer whilst at the same time maintaining emergency cover within the Board area. ...Given the road distance of approximately 27 miles and the fact that the journey is almost completely motorway, it would seem to me that the most appropriate way to improve the present situation in terms of transfer from this site, would be to provide additional support in terms of road vehicles and personnel to the ambulance service in this area...."*

Charles R A Fee, Consultant in Emergency Medicine (Craigavon Area Hospital, A&E Department)

" ...

The IMO, which represents the entire medical profession in Ireland, has adopted several policy decisions at its annual AGM meetings since 1994, which are relevant to the development of a HEMS service. These include the following policies:

- That the IMO supports the establishment of a helicopter medical emergency service
- That the IMO seeks the development of a dedicated air ambulance service involving both helicopter and fixed wing aircraft for the purposes of providing primary and secondary transportation, organ retrieval missions, and international repatriation of critically ill patients. ....

...The Review will be aware that, at present, the Irish Air Corps since 1965 and the Irish Marine Emergency Services since 1991 provide the air ambulance service in Ireland. The Irish Coast Guard Service has also participated in providing a service since 1999 secondary to its primary task of search and rescue.

As the present complement of Irish Air Corps helicopters - Gazelles, Aluettes and Dauphins - have nearly reached their retirement dates, the procurement of at least two modern air ambulance helicopters is required urgently.

The IMO would recommend that in light of the gridlock traffic conditions around the greater Dublin area and the poor conditions of our national road systems that one of these would be based at Baldonnell for the East Coast and Dublin and the other based in the West Coast of Ireland (preferably in Sligo General Hospital or Knock Airport). As Sligo General will be adding an extension in the coming year taking in the present helipad it is a golden opportunity for the Department of Health and Children to fund a 24-hour all weather helipad based in Sligo. It would be the IMO recommendation that the Department of Health and Children should develop the existing air ambulance service to a 24-hour service in the first instance and that subsequently a HEMS service should be provided during daylight hours. The IMO welcomes the additional second helicopter for the Garda Air Support Unit, which raises the possibility of this helicopter also being utilised for emergency transport. ...

... **Specialist Paediatric Retrieval:** The urgent necessity for the establishment of a specialist paediatric retrieval team is also critical. This team could be based at Our Lady's Crumlin and would consist of a Specialist Registrar, ICU Nurse and Bioengineer Technician. ...."

Irish Medical Organisation (Mr Fintan Hourihan, Director, Industrial Relations)

"...As a consultant surgeon, I see the need for this service....

We have a major general hospital in Derry at Altnagelvin and already receive patients from the North Sea and inland in many emergency situations.

I strongly recommend the project...."

K J S Panesar, Consultant Surgeon, Londonderry

"...One of our major concerns is that any helicopter emergency service should not be at the expense of the development of the mobile intensive care ambulance service which has been running now for several years and has a proven track record in the safe transfer of critically ill patients.

We feel strongly that this mobile intensive care ambulance service should be extended to provide 24 hour 7 day a week cover.

While this does not preclude the development of a helicopter based emergency medical service, in practical terms it is a service, which will be used more frequently and is suitable for the majority of transfers done between hospitals. ..."

College of Anaesthetists R,C.S.I. (Dr Jeanne Moriarty, Hon. Secty.)

*...Retrieval HEMS model may be the most appropriate for the island of Ireland.*

*....HEMS aids in increasing the quality of pre-hospital care.*

*.....There is no helipad at the Royal Hospital in Belfast – a major concern*

*.....HEMS could be a catalyst for change in pre-hospital and acute health care – sends a strong message that pre-hospital care, in particular, is a key issue and warrants investment*

*....HEMS may result in increased activity at particular hospitals (receiving centres) and this will need to be recognized – a need for additional resources etc.....*

Mr Paul Bayliss, Locum Consultant A&E Department, Mater Hospital, Belfast  
(based on telephone conversation with consultants)

*“...It is accepted that it may not always be possible to state **definitively** that a time delay in the transfer of a patient was the overriding factor in a less than optimal outcome. **There is nonetheless a large volume of international literature and statistics to support the view that if one saves time, one also saves lives and ultimately saves costs.** ...*

....  
*Conclusion*

- *The present system of transporting patients is too slow in terms of optimising treatment and ensuring quality of life of such patients*
- *The cost, in terms of ambulances and manpower, is high when assessed against the less than optimal medical benefits*
- *The enormous cost both in terms of medical services, post acute hospital services, home care, legal action and compensation could all be significantly reduced were patients transferred to an appropriate hospital within a medically acceptable timeframe.*
- *As medical technology continues to improve, the time element involved in transfers will become even more crucial*
- *Our road infrastructure adds to the delays in transferring patients by ambulance*
- *There is little point in having the medical capacity to save lives if we do not have a parallel capacity to transport patients to hospitals within a timeframe that will allow them benefit to the maximum from the available medical technology.”*

Irish Hospital Consultants Association (Finbarr Fitzpatrick, Secretary General)



*"...The transfer of critically-ill patients between hospitals is a relatively common requirement with recognized risks. It is widely accepted that a formalized approach – often with a dedicated clinical team – reduces such risks. Intensive care and hospital outcomes have been shown to (sic) when inter-hospital transfers (IHT) are performed by a dedicated transfer service. Transportation of patients by helicopter has been used in other health systems to facilitate IHT and has been suggested as a potential project in Ireland as part of North-South co-operation. Helicopter emergency medical services (HEMS) appear to offer the prospect of rapid transfer and have particular advantages in areas with difficult road access either due to geography or traffic congestion. In addition, it may enable the immediate catchment area for tertiary referral services to be extended.*

*Unfortunately, the published experience suggests that many of the theoretical advantages are difficult to translate into reality. Studies, which claim benefit from the use of helicopters, use surrogates such as reduced time to hospital or earlier access to medical treatment. There is no doubt that in some (but not all) systems, the use of helicopter may reduce the period between request for transfer and arrival in hospital. However, studies have failed to demonstrate any significant benefit or change in outcome despite significant reduction in time required to reach hospital. ....*

*In Ireland, there are additional factors. We have poorly developed ground services for the transfer of critically-ill patients. This has been improved by the advent of the MICAS and NICCaTS services based in Dublin and Belfast respectively but both services are limited in what they are able to provide.*

*Given the issues outlined above and the high cost of HEMS, it seems an inappropriate development at this time in Ireland. For the same cost as a single helicopter-based service we could further develop the MICAS and NICCaTS services and initiate a further 2 (or even three) services based in other centres e.g. Galway and Cork. This would provide a high quality ground-based critical care transfer service to every hospital in Ireland and provide the capacity to move several patients simultaneously. In countries which have funded a HEMS service, a significant proportion of IHTs are conducted by similar ground-based services. ...*

*The development of several ground based critical care transfer services would seem to represent a more clinically effective, cost effective and equitable development at this time. In view of this, resources earmarked for HEMS might be reallocated."*

**Dr G G Lavery, Postgraduate Regional Advisor in Intensive Care Medicine, Intensive Care Consultant, Regional ICU, Royal Hospitals, Belfast**

*"...I would strongly support the concept of an air ambulance service, despite the obvious costs (which may not be that great in terms of the benefits). At present a great deal of anxiety permeates the rural population arising from the difficulty in maintaining the range of acute care including A&E services in rural hospitals. The greatest fear appears (from WHSSB research & DHSSPSNI work) to be the excessive travel times which would accompany any shift in acute services. I believe that this problem is not unique to Western Health Board, nor indeed to Northern Ireland. Air ambulance services can significantly reduce time to scene, and transport times, and when accompanied by trained paramedic+/- medical staff could provide specialist interventions in a timely way. This undisputable benefit when accompanied by the public relations effect of such an investment in pre-hospital care may well be the key to squaring the circle of improving care whilst paradoxically making access potentially more distant, and I believe that this should be the cornerstone of the Acute Service Review changes which without helicopter transport are unpalatable, unrealistic and potentially dangerous....."*

**Dr Alan McKinney, A&E Consultant, Altnagelvin Hospital, NI**

As noted earlier, a selection of submissions from NI-based public representatives sought consideration of separate NI / RoI HEMS with the NI service integrated with the service in Scotland (currently based in Glasgow and Aberdeen). Whilst outside the scope of this all-Ireland feasibility study, these views are addressed specifically in discussions presented in section 5.4 of this report.

Set out in the following sections are extracts for a number of other submissions that fall outside the generalisation of ‘medical’ submissions presented previously.<sup>70</sup>

*“...All around the coast of South Down to Carlingford are many sea-based activities.... It is a key factor that when someone is injured whilst undertaking one or other of these activities, they need medical help immediately. ...Should someone suffer a heart attack or stroke whilst up a mountain, they need appropriate help immediately. If a boat sinks at sea, those on board need help immediately.*

*South Down is a rural area and the use of agricultural machinery regarded as dangerous. If a farmer was injured on the farm, the isolation factor is a problem and medical services require a quick and immediate option.*

*The only way to be sure that someone has immediate help and quick transfer to hospital is by helicopter medical services and I firmly believe that South Down would be a natural choice for such a facility to be based.”*

Cllr Eamonn O Neill MLA, SDLP Assembly Member for South Down

*“...In addition the Mapping the Road to Change document outlines a major improvement plan. Funding has yet to be made available to enable its full implementation. I would argue that in comparison to a helicopter service there are many more basic improvements which could be made and which would be more beneficial to a greater number of patients. I would argue that many more patients would benefit by improving the existing ambulance.*

*My constituency – East Antrim, and indeed much of Northern Ireland is geographically much closer to the west of Scotland (for example Prestwick Airport), than a service that might be based in Cork, Dublin, Limerick or Galway. ....*

Roy Beggs MLA

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<sup>70</sup> As with the ‘medical’ submissions, these extracted quotations are presented in the order in which submissions were received by the consultants.



*"...a single helicopter would be of little benefit over the entire island as much of the community would remain outside the desired 'Golden Hour' response time. ...*

*In the North West we concluded that, considering hospital locations, the remote areas of Donegal, Sligo, Fermanagh, Tyrone, Enniskillen and Derry were particularly at risk. In the North East, the extremities of Ards Peninsula, Antrim, Armagh and Monaghan might also benefit from a HEMS facility.*

*Whilst an airport location is not necessary, ideal locations for maintenance, access, fire cover etc., were the airports at Eglinton, Antrim, Belfast and Newtownards. ....*

*.... This is a most necessary and long overdue facility for Ireland, and I would hope that your Study will convince the Authorities to act quickly and sensibly."*

R J B Cummings, Londonderry

1. *"Craigavon Borough Council welcomes this initiative as research shows that where investment is made in providing an air ambulance service, the mortality rates for patients with a higher injury severity score are lower in comparison to the use of ground ambulances.*
2. *The initiative would have a distinct benefit over a ground ambulance service during times of bad weather particularly in rural locations.*
3. *Craigavon Area Hospital is currently home for Ireland's only recompression chamber accessed by its own Helicopter landing pad. The siting of this service in Craigavon is due in part to the Acute Hospital, Craigavon's central location and skills on site.*
4. *Council would further recommend that if the service were All Ireland then it should be funded on that basis as well.*

Craigavon Borough Council (Stephen Fraser)

*"...May I, on behalf of Derry City Council, give our full support to such an initiative, which will enhance emergency medical cover for the entire island.*

*Although Derry is Northern Ireland's second largest city, it also has a huge rural hinterland stretching from the North Antrim Coast to the West Coast of Donegal. The City is ideally located to provide a service to both the east and west coasts of the northern part of the island. ....*

Councillor Kathleen McCloskey, Mayor, Derry City

*"...May I, on behalf of the Airport Authority, give our full support to such an initiative, which will enhance emergency medical cover for the entire island.*

*I would strongly recommend that the City of Derry Airport be considered as the base for this type of operation in the north of the island. The City is ideally located to provide a service to both the east and west coasts of the northern part of the island and has the full range of airport facilities required to provide the operational back up service. ....*

City of Derry Airport (J Devine, Airport Manager)

Note: several letters were received from individuals residing in Letterkenny, Co. Donegal expressing the view that.."an air ambulance at the City of Derry Airport is an excellent idea and you have my full support" or words to that effect.

*"...Members unanimously agreed to support the conduction of a Feasibility Study on HEMS for the island of Ireland, to include options for the location of such a service. ...."*

Strabane District Council (Sharon Maxwell, Business Manager)

*"I am writing to inform you that my husband .... of ...Co. Sligo was injured in a farm accident and as a result sustained spinal injuries.*

*He was admitted that day to Sligo General Hospital. The Consultant informed us that he would be transferred to the Spinal Injuries Unit in the Mater Hospital Dublin by Helicopter.*

*I waited and to my surprise and horror an ambulance arrived. My husband said that he was most uncomfortable on the journey to Dublin.*

*I am staying at a B&B near to the Mater...."*

Mrs F(Co. Sligo)

*"As one fortunate enough to have dwellings in both Derry and Donegal (Ranafast) I appreciate at first hand the problems associated with emergency medical services, in fact having had a family member who needed urgent medical hospitalisation. It is my opinion that the services should be provided as follows:-*

- (i) Greater Dublin, including East coast area from Dundalk to Cork and Athlone.*
- (ii) Corresponding mirror image from perhaps Ennis as far North as Sligo.*
- (iii) Remainder of inland with perhaps a central base in Magerhahelt/Cookstown.*

*Each of the above zones would I believe be covered within the 'Golden Hour' catchment although some thought should perhaps be given to population, remoter islands, as well as sea faring usage. ..."*

Mr Paul Gillespie, Derry

*"... The provision of such a basic emergency medical facility is long overdue for an island of mixed population density ranging from remote to congested. The fact that this is now being considered following the previous introduction of helicopter live traffic reports must bear some soul searching...*

*..It has often occurred to us just how remote certain parts of the Island are and how difficult it could be for emergency services to access in time. Canada has long recognised the problems of coping with emergencies and introduced flying emergency response years ago...*

*Perhaps now circumstances in Ireland will dictate that a Helicopter Emergency Medical Service is a fundamental life saving necessity. The availability of such a service would be a comfort and reassurance to us and to others in similar circumstances. ...."*

Isobel Turner, Newtownards

*"... It is my view that Northern Ireland and the Irish Republic should have separate services directly controlled by the Department of Health and Children in the case of the Republic and the DHSSPS in Northern Ireland. ..."*

James H Wells MLA (Assemblyman for South Down)

*"... Such a service would provide greater accessibility to the residents, particularly the elderly, young families, farmers and fishermen... Many of the fishermen in the island of Ireland are concentrated on the east coast, particularly Counties Down and Louth.*

*It would also ensure that all local residents, both domestic and those employed in the farming, fishing and industrial enterprises would be accessible to medical and health services on all Ireland basis.*

*I would suggest that the South East of Ireland would be a suitable location for the Helicopter Emergency Medical Services."*

Eddie McGrady MP MLA (South Down)

*"The bulk of the benefits of HEMS are likely to prove illusory. Any necessary HEMS in Ireland's small airspace may be provided by extending the role and intensifying the use of marine helicopter rescue services, or by using rail for transfers of critical cases. ..."*

Green Party NI (Andrew Frew, Chairman)

*"Persons who sustain a head injury in Carlow town or County are initially taken by ambulance to the casualty unit in Kilkenny County Hospital, and later if decided upon transferred by ambulance to Beaumont hospital Dublin. The total distance involved is approximately 110 miles."*

[Bridget] Rita Mulchrone (former ambulance nurse)

*"... On a purely financial basis who will pay for the all Ireland service, will the 26 counties pay pro rata against the six counties or will CROSS BORDER Bodies pick up the whole tab. Will this be fair? Where will the base be situated near the border? Will staff be recruited in a 50 /50 basis, North South basis, Protestant Catholic basis considering the Strict Equality Laws which apply here but do not apply in the South. Maintenance will one week be carried out in the South next week in the North.*

*If a crisis develops say a serious accident in Tralee and one in Londonderry which one will receive primary attention.*

*Will pilots be trained in the U.K. or South, will the helicopters be sourced North or South giving much needed employment.*

*Yes Helicopter Services are needed but let each country supply their own."*

D.U.P. Councillor John Smyth, Antrim Borough Council

*"... The Council recently considered this correspondence and agreed to advise you we would fully support the introduction of such a service. ..."*

Newry & Mourne District Council / Comhairle an Lúir & Mhúrn (Eddy Curtis, Director of Administration)

*"... Council welcome an all Ireland Helicopter Emergency Medical Service.*

*Council believes that Bishopscourt in County Down which has a ready-made runway would be a suitable location as would Warrenpoint which could also provide set down and pickup facilities.*

*The hazards associated with agriculture and the fishing industry as well as recreation activities associated with the Mourne Mountains would justify the location of the Helicopter Emergency Medical Service in the Greater County Down area.*

*Council also consider that the Ambulance Review currently being undertaken by the Department of Health should incorporate reference to the Helicopter Emergency Medical Services."*

Down District Council (G M McBride, Policy & Co-ordination Officer)

*"... Elected Members would welcome further information on matters such as the benefits of a helicopter emergency medical service against those of a territorial (sic) service. ....*

*It is widely recognised that we are already suffering the symptoms of an under-funded Health Service and members felt that an option has to be considered of using such money in a better way. ...*

*Finally some members also expressed the view that given the geographical arrangement with Scotland, that it would not be unreasonable to consider the inclusion of Scotland in such an arrangements should it come to fruition. ...*

Castlereagh Borough Council / Stye Braes o Ulidia Burgh Coouncil (Heather M Moore,  
Environmental Health Manager)

*"Regions such as the North West have had many difficulties in relation to perceived and real access problems which pertained to many issues. The co-operation between Derry and Donegal has helped in no small way to overcome some of these troubles and this relates very much to the health sphere. ..*

*Any project which will bring a patient and a hospital closer is obviously to be sought and fought for and I fully back the need for such a service into our region. ... "*

Cecilia Keaveney, TD MCC, Moville, Co. Donegal

## **4. INTERNATIONAL SURVEY AND LITERATURE REVIEW**

### **4.1 Introduction**

In order to gain a better insight into HEMS and the possible applicability to Ireland, two supplementary (to the request for public submissions and discussions with stakeholders) data collection activities were undertaken:

- i. A survey of international HEMS operations
- ii. A review of academic literature.

These elements are discussed in the sections that follow.

### **4.2 Survey of HEMS Operators**

There are HEMS operations worldwide, predominantly in the developed and more affluent 'Western' nations:

- HEMS systems operate across Europe, including:
  - Austria
  - Belgium
  - Czech Republic
  - France
  - Germany
  - Hungary
  - Iceland
  - Italy
  - Luxembourg
  - The Netherlands
  - Norway
  - Poland
  - Portugal
  - Spain
  - Sweden
  - Switzerland
  - The UK<sup>71</sup>.
- HEMS systems operate in many other parts of the world, including:
  - Australia (6 States and Territories incl. Tasmania and the Australian Capital Territory)
  - Canada
  - Hong Kong
  - Mexico
  - New Zealand
  - South Africa
  - The USA (every State).

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<sup>71</sup> *Involving 16 helicopters in England and Wales (operated by independent charitable trusts) and 2 helicopters in Scotland (funded by the National Health Service).*

The application of HEMS varies considerably from country to country and within countries, for example:

- In the USA, the emphasis on HEMS varies from ensuring fast and effective inter-hospital transport thereby extending the service area of the individual trauma centre through to primary tasking to incidents (e.g. RTAs)
- In Asia, HEMS are used mostly in transport missions from peripheral hospitals to urban specialized centres (inter-hospital transfers)
- In the UK, HEMS as a form of primary response dominates with limited inter-hospital transfer activity, principally due to the system of regional (as opposed to national) specialisation in the Trust hospitals under the National Health Service (NHS)
- In Norway, in a coastal and sparsely populated area, a 'primary response' helicopter service is often used in the absence of an effective ground based service
- In Australia, the pre-dominant role is as 'primary response' although inter-hospital transfer activity using retrieval teams at tertiary hospitals is also widespread (including a dedicated "ChildFlight" neonatal and paediatric service operating in New South Wales / Australian Capital Territory).

A survey form<sup>72</sup> was developed in order to obtain data on issues such as:

- Type of aircraft used<sup>73</sup>
- Hours of operation
- Staffing and crew levels
- Call out procedures
- Co-ordination
- Locations
- Activity levels and profile
- Response times
- Costs
- Funding arrangements.

Survey forms were distributed to 38 operators worldwide. Responses were received from 21 operators - operating from 64 bases and utilising 74 helicopters. In terms geographical spread, responses were received from:

- UK (9 operators)
- Netherlands (2)
- Australia (2)
- USA (5)
- South Africa (1)
- Germany (1)
- Switzerland (1).

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<sup>72</sup> A copy of the survey instrument is provided in Appendix E.

<sup>73</sup> A sample of aircraft used in HEMS operations is provided at Appendix F.

The survey revealed a wide range of HEMS ‘models’ operating across the world. The type of aircraft (make, model and size) used for HEMS operations varies widely. Both “Daylight only” and “24 hours” operations are common.

All HEMS operations in England and Wales are ‘daylight only’.<sup>74</sup> Those operations that also involve SAR and Law Enforcement Support activities typically operate on a 24-hour basis.

The use of volunteers is extremely limited with the emphasis on full-time professional staffing. Operational crews vary and cover the following options:

- 2 pilots, 1 doctor, 1 paramedic (e.g. London HEMS)
- 1 pilot, 1 doctor, 1 EMS nurse, 1 paramedic (e.g. CareFlight in Australia)
- 1 pilot, 1 doctor and 1 paramedic (e.g. Rega in Switzerland, Germany)
- 1 pilot, 1 doctor and 1 EMS nurse (e.g. The Netherlands)
- 1 pilot and 2 paramedics (e.g. most UK operations).

Most operations use an emergency services ‘call out’ activation system, e.g. “999” etc.

Whilst there are various ‘models’ of HEMS in operation worldwide, many common features exist. HEMS aircraft appear to be well utilised - on average, the operations surveyed are undertaking approximately 715 missions per aircraft annually. However, the average number of mission flying hours recorded, at approximately 412 hours per aircraft, could be deemed modest.<sup>75</sup> Average flying hours per mission was just over 0.5 hours. Average response times ranged between 2 and 15 minutes (often dependent on hours of operation and the focus of activity and tasking).<sup>76</sup>

Funding ‘models’ varied significantly, for example:

- Private hospital / healthcare provider owned and operated (e.g. USA)
- Community-based charity trusts (England)
- Fully State funded (e.g. Scotland and Queensland Emergency Services)
- Major ‘commercial sponsor’ with mix of community support (e.g. London HEMS)
- Automobile association and motor insurances (e.g. Netherlands and Germany)
- Non-profit NGO (e.g. Red-Cross’ Rega in Switzerland)

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<sup>74</sup> Based on data for 14 of the 16 helicopters in England and Wales operating in 2001, helicopters were unavailable for approximately 27 days per annum (approx. 9% of normal flying time) due to various reasons including weather limitations and mechanical problems. (*A Review of the Costs and Benefits of Helicopter Emergency Ambulance Services in England and Wales, Final Report to the Department of Health, Medical Care Research Unit, University of Sheffield, July 2003*).

<sup>75</sup> The range was 284 hours to 846 hours for a single helicopter.

<sup>76</sup> Survey data from a recent UK study for most of the HEAS services in England and Wales reported average call-out time from ‘999’ call to airborne of 4.5 minutes with a response time to the scene of 12.2 minutes and an additional average time to hospital of 9.5 minutes (i.e. 16 helicopters in England and Wales are able, on average, to respond to incidents across the country in 17 minutes and after delivering at-the-scene-care transfer patients to hospital in under 10 minutes). (*A Review of the Costs and Benefits of Helicopter Emergency Ambulance Services in England and Wales, Final Report to the Department of Health, Medical Care Research Unit, University of Sheffield, July 2003*).



- Mix of State-support and commercial / public sponsorship (e.g. NRMA CareFlight and RACQ CareFlight, Australia).<sup>77</sup>

### 4.3 Literature Review

A review of academic papers and articles (34 in number) and studies / reports<sup>78</sup> was undertaken to explore the arguments “for” and “against” HEMS, identify some of the costs and benefits associated with HEMS, as well as to determine whether there are potential ‘lessons’ for Ireland in terms of appropriateness or otherwise.

The academic literature<sup>79</sup> reviewed predominantly focuses on medical outcomes and offers, in the main, a generally supportive view of helicopter use for inter-hospital transfers (helicopter air ambulance or ‘tertiary mission’ HEMS) with a much less unequivocal view for primary-response HEMS. However, there does appear to be a general view that ‘primary response’ HEMS can deliver clinical benefits in cases involving the severely injured. The question as to the effectiveness of ‘primary response’ HEMS on grounds of unequivocal positive or negative outcomes on medical grounds is still subject to considerable debate, even within the medical professions. Indeed, various studies have clearly questioned the clinical value of ‘primary response’ HEMS. The issue of triage appropriateness and effectiveness often arises in considerations of the benefits of ‘primary response’ HEMS.

Each particular study focuses on specific aspects (e.g. morbidity and / or mortality outcomes) as well as operational factors such as crew configurations and skill levels. The wide variety of HEMS ‘models’ means, *inter alia*, that ‘like-for-like’ comparisons and the transferability of study outcomes (and indeed methodologies) across jurisdictions and internationally, is at best, limited. The heterogeneity in severity and nature of injury across studies also limits the transferability of findings.

What has been particularly useful is the identification of possible limitations associated with ‘models’ as well as ‘lessons learned’ that may provide useful guidance in considering the feasibility of HEMS for the island of Ireland. Studies reviewed involved HEMS operations in the UK, the USA, Australia, Norway, Sweden, The Netherlands, Spain, New Zealand and Hong Kong.

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<sup>77</sup> NRMA and RACQ are ‘motoring organisations’ in Australia similar to the AA in the UK and the Republic of Ireland. The RACQ is a Queensland based organisation whilst the NRMA is predominantly a New South Wales based organisation. Both are diversified organisations that, *inter alia*, also provide comprehensive insurance services to the public.

<sup>78</sup> A list references is provided at Appendix C and a summary of some of the key findings of the articles / studies reviewed is presented in Appendix G.

<sup>79</sup> The academic articles reviewed were published in the following journals: British Medical Journal; Journal of Public Health Medicine; Air Medical Journal; Academic Emergency Medicine; Pre-Hospital Immediate Care; Australia New Zealand Journal of Surgery; The Journal of Trauma, Injury, Infection and Critical Care; Journal of Public Health Medicine; British Journal of Hospital Medicine; The Lancet; European Journal of Emergency Medicine; Connecticut Medicine; Annals of Emergency Medicine; Irish Medical Journal; Current Opinion in Anaesthesiology; New Zealand Medical Journal; Prehospital and Disaster Medicine; Journal of Burn Care Rehabilitation; and Hong Kong Medical Journal.

The balance seems to be in favour of HEMS in the ‘tertiary response’ role and potentially for the use of helicopter in the ‘primary response’ role to severely injured patients and / or where terrain and geography as well as hospital and medical skills dispersal indicate a *prima facie* justification.

In general, where ground ambulance services are incapable of attending to an emergency call within 30 minutes, a need for additional ground ambulance resources is indicated in terms of a wider and more intense dispersal of capabilities. A ‘primary response’ HEMS helicopter could be indicated in the absence of such an enhanced ground ambulance service. In the case of inter-hospital transfers, transfer journeys deemed clinically excessive by road are potentially sub-optimal and helicopter transfer is preferable. Where inter-hospital transfer and ‘primary response’ HEMS are established, an evolution of the service into the provision of secondary transfers has developed in some jurisdictions (e.g. Scotland, Switzerland, Wales, England, New Zealand and Australia). This involves the combined use of ground ambulances and helicopters (or fixed wing aircraft in some locations) at designated and approved landing sites to facilitate patient transfer both to reduce the overall transfer time and to allow the ground ambulance to return to its designated area of cover. Each type of helicopter use is clearly defined and controlled, with ‘primary response’ capable of being operated generally only during daylight hours, while ‘secondary response’<sup>80</sup> and inter-hospital transfer roles can be provided on a 24-hour basis. All operations are however, subject to weather conditions.

In the island of Ireland context, and in light of the review of the literature, the comments provided by Irish Society for Immediate Care to this feasibility study (refer section 3.2) would seem to go close to striking an appropriate balance in terms of suggesting a case for:

- The use of helicopter transport for inter-hospital transfer of patients, and
- The use of helicopter transport in ‘primary response’ situations but with the important caveat that this should not be at the expense of the development of existing services or other equally beneficial pre-hospital care initiatives.

However, it is worth noting that the literature indicates that the clinical case for ‘tertiary response’ HEMS is relatively robust and substantially stronger than that for ‘primary response’ HEMS. The literature indicates that the clinical case for ‘primary response’ HEMS is not unequivocal and the debate about cost effectiveness continues.

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<sup>80</sup> Subject to the availability of designated landing sites.

## 5. OPTIONS DEVELOPMENT

### 5.1 Introduction

The determination of ‘Minimum Requirements’ has underpinned the development of feasible options for a possible dedicated ‘all of the island’ HEMS.<sup>81</sup> The ‘inputs’ to the options development have been sourced as follows:

- From the survey of international HEMS operators
- From consultation with operators
- From the public submissions received
- From discussions with a range of representatives from medical, aviation, military and community groups and agencies
- From the experience of the consultants
- From the literature review.

Options development has involved consideration of various key characteristics for dedicated HEMS:

- Location(s)
- Capability
- Availability
- Population coverage
- Funding / financing
- Ownership and management
- Role and integration with other EMS providers and other emergency services.

Framing feasible options has involved consideration of a range of factors to ensure that the possible options are effective, sustainable and financially responsible.

Key factors considered in framing options have been:

- Population dispersal across the island of Ireland
- Potential role(s) of HEMS (covering the range of, and mix of, ‘primary’, ‘secondary’ and ‘tertiary’ operations as defined by European aviation regulations under JAR-OPS)
- Potential level of HEMS activity, i.e. the ‘missions’ to be carried out by the service (number of tasks / missions as well as annual flying hours)
- Location of aircraft – both in terms of regional location and specific site, e.g. airport / airfield or hospital etc
- The number of aircraft to meet particular criteria
- Aircraft capability and availability – patient / crew configuration and hours of operation
- Financing / funding – ‘out sourced’ contract, State-ownership, community-based, ‘hybrid’ public / private ownership, role of sponsorship, cross-border arrangements
- Management – healthcare sector or other emergency services agency or military.

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<sup>81</sup> Whilst outside the scope of the study, there may well be merit in considering a dedicated fixed wing service(s) for two reasons: (i) fixed wing is currently utilised (via the Irish Air Corps) on a limited basis; and (ii) fixed wing is used in other not dissimilar locations e.g. Scotland.

## 5.2 Definitions of HEMS Activity

Consideration of the nature of potentially feasible dedicated HEMS for the island of Ireland has been based on potential demand / tasking and roles. Two principal uses of dedicated HEMS for the island are appropriate for consideration in terms of feasibility:

- i. A retrieval service (regulated as helicopter air ambulance flights)<sup>82</sup> based in the city with the most significant capability for treating a wide range of acute / critically ill patients across all age categories requiring specialist care
- ii.
- iii. One or more helicopter services primarily undertaking 'primary response' missions, i.e. attending scenes and providing medical assistance and a rapid transport to the nearest appropriate hospital.<sup>83 84</sup>

## 5.3 Supporting Systems for HEMS

In determining feasible options, it has also been necessary to consider a range of peripheral but important issues. Effective implementation of dedicated HEMS on the island of Ireland will not be possible without various institutional arrangements being in place, such as:

- Inter-agency arrangements in terms of education / awareness training, HEMS training capability, tasking training, hospital and medical personnel familiarisation training prior to commencement of each service, availability of appropriately skilled and experienced medical staff / specialists
- A communication system that operates via the existing emergency call system, e.g. "999"
- A communications and co-ordination system to facilitate a 'single air desk' tasking process integrated with both the NIAS and the ambulance services in the RoI and 'linked' to hospitals and other emergency services and health care agencies including, for example, NICCaTS, MICAS and the National Neonatal Transport Program
- A system of clinical co-ordination
- Protocols for tasking and co-ordination with other emergency services agencies<sup>85</sup>
- Agreements between agencies such as, the Department of Health and Children (Dublin), The Department of Health, Social Services and Public Safety (Belfast), the NIAS, Health Boards (RoI), Health and Social Service Boards (NI), Health and Social Services Trusts (NI), PSNI, MCA, IRCG, An Garda Síochána, etc. as appropriate

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<sup>82</sup> Consistent with the JAR-OPS "Helicopter Air Ambulance Flight" definition ("Tertiary Mission") and most likely incorporating a "Secondary Mission" function.

<sup>83</sup> Consistent with the JAR-OPS "Helicopter Emergency Medical Service" definition ("Primary Mission").

<sup>84</sup> Secondary transfers (consistent with JAR-OPS "Secondary Mission" under the broader "Helicopter Air Ambulance Flight" definition) could be involved and / or evolved at a later time.

<sup>85</sup> 'Primary response' HEMS requires well managed co-ordination with other emergency services agencies, particularly policing agencies. Policing agencies are required to supervise and manage sites for 'primary response' HEMS to ensure safe operations, often in public areas (e.g. roadside locations).

- Approvals to operate HEMS by civil aviation authorities in each jurisdiction (e.g. Irish Aviation Authority and Civil Aviation Authority)
- A system of clinical auditing to ensure the medical / clinical appropriateness of HEMS
- A system of operational auditing to ensure safe and appropriate aviation activity.

The issue of developing communications across jurisdictions would need to be considered and systems put in place to facilitate effective operations. Currently, a ‘model’ from which to draw lessons exists in the well-developed cross-jurisdiction arrangements in place for SAR activities. Furthermore, the emergence of various cross-border working parties such as the Cross-Border Working Group on Emergency Care and the Fire Services Cross-Border Working Group could provide ‘vehicles’ through which the development of increased levels of understanding about systems, protocols and other relevant matters and policies across jurisdictions could be facilitated. It will be critical to the effectiveness of any dedicated HEMS system on an island of Ireland basis to have in place reliable communications systems underpinned by clear lines of ‘command and control’ in terms of asset use and authorities.

## 5.4 Location Issues

In framing feasible options, the location of ‘bases’ could be determined by geographical coverage of population as well as on consideration of ‘logistical’ factors. Potential locations for a ‘retrieval service’ (i.e. inter-hospital transfer service) would include the principal cities on the island, in particular Dublin, Belfast and Cork.<sup>86</sup> On the basis of the strength, breadth and depth of skills, resources and services available, as well as population coverage within the so-called ‘Golden Hour’ time band,<sup>87</sup> a Dublin-based ‘retrieval service’ would most likely ‘rank’ the most appropriate location for an all-island inter-hospital transfer service, if one were to be implemented.

Potential locations for ‘primary response’ services, assuming such are justified, would vary with the number of services involved. As each additional service is added, bases for individual operations would most likely alter in seeking an optimal coverage pattern to meet a criterion of ‘maximum population coverage’. Furthermore, consistent with the intent of the “Good Friday Agreement” in terms of development of strengthened cross-border services, any initial ‘primary response’ service should reasonably have significant ‘cross-border’ capability. Consistent with international practice, a response time of 30 minutes would be a reasonable assumption for such operations.<sup>88</sup>

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<sup>86</sup> Factors such as the cost implications in terms of flying hours, particularly ‘dead running’ would need to also be considered in location decisions.

<sup>87</sup> The concept of the ‘Golden Hour’ is not universally accepted (refer reference 12 Appendix C, for example) and typically applies to consideration of HEMS in the ‘primary response’ role.

<sup>88</sup> As noted in the data reported for services in England and Wales, these services are able to be airborne and to the scene of incidents in 17 minutes on average and in a further 10 minutes on average to a receiving hospital.

A number of submissions were received which argued that a case may well exist for serving NI from assets based in southwest Scotland. Whilst outside the scope of this study, it is worth noting that the nearest HEMS operation to NI is based in Glasgow; approximately 50-60 minutes away from Belfast (and potentially 80-90 minutes from Enniskillen) in terms of practical HEMS response time. This operation is the NHS-funded Scottish Ambulance Service Air Wing.<sup>89</sup> In order to effectively access the population of NI, significant water crossings would be involved, therefore, the helicopters will need to be fitted with flotation devices and rescue equipment (as the Glasgow helicopter has), which in practical terms, could add approximately 100kgs to the aircraft's weight and reduce 'operational capability without refuelling' by approximately 30 minutes.

Whether the aircraft would be available to serve NI from the two existing air ambulance helicopter bases in Scotland (currently Glasgow and Inverness, as shown in the map that follows) would need to be determined, as increasing the radius of action as such would dramatically reduce effectiveness of a single helicopter operation.



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<sup>89</sup> The Scottish Ambulance Service Air Wing is the only publicly funded ambulance service in the UK. The co-ordination of the Air Wing is under control of the Scottish Ambulance Service Air Desk. The tasking of all air ambulances in Scotland and access to non air ambulance (SAR) helicopters is accomplished by the Air Desk. The Air Desk is a 24 hour operation. The Scottish Ambulance Service has a mix of rotary and fixed wing aircraft available to it: EC135 helicopters are based in Inverness and Glasgow (each has a medical crew of 2 paramedics / technicians). Four fixed wing aircraft are available as follows: Islanders at Lerwick, Kirkwall and Glasgow and a Beechcraft Super King Air at Aberdeen.



**UK Helicopter Air Ambulance locations** (source: NAAAS)<sup>90</sup>

<sup>90</sup> The NAAAS (National Air Ambulance Association) has recently (during 2003) been restructured and is now known as the Air Ambulance Foundation.

Discussions with the Scottish Ambulance Service Air Wing<sup>91</sup> indicated that the current Glasgow base would not enable effective HEMS for NI. In order to effectively provide a dedicated Scotland / NI dedicated HEMS based in Scotland, it would be necessary to locate a new base in South West Scotland nearer NI (for example, in Dumfries & Galloway). This may be slightly less costly from an NI-perspective than a contribution to an all-Ireland service as much of the requisite infrastructure and supporting systems are currently in place in Scotland. However, there would still be a need to develop landing sites (including helipads) and fund on-going aircraft operations and medical crew costs. However, some 'economies' could reasonably be envisaged.

If the aim were to achieve 'total population coverage' across the island of Ireland with a network of 'primary response' HEMS operations, four aircraft would be required.

Based on maximization of population coverage (subsequent to the initial 'cross-border' criteria), the following indicative locations have been identified as possible options for dedicated 'primary response' HEMS:<sup>92</sup>

- 1 helicopter only – based in the north west of the island of Ireland (approximately 50-55% of the island's population within a 30 minute response time)
- 2 helicopters – based in north west and the south east of the island of Ireland (approximately 80-85% population 'coverage')
- 3 helicopters – based in north west, the south east and the mid west of the island of Ireland (approximately 90-95% population 'coverage')
- 4 helicopters – based in north west, the south east, the mid west and the south west of the island of Ireland (approximately 100% population 'coverage').

In the context of dedicated 'primary response' HEMS, the appropriateness of four helicopters for the island of Ireland would be debatable. Concerns associated with inappropriate tasking of assets would clearly exist given the population and geography involved.

Other factors to be considered in 'location' determination include:

- Existence of ambulance service base / depot and other infrastructure (e.g. call centre)
- Proximity to mountainous areas
- Proximity to hospital(s)
- Availability of sufficient skilled medical crew to ensure service continuity
- Availability of audit services, debriefing services and medical direction / supervision.

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<sup>91</sup> The Scottish Ambulance Service Air Wing facility and headquarters in Aberdeen were visited as part of this feasibility study.

<sup>92</sup> The location of these aircraft is indicative – the dispersal of cities and towns across the island of Ireland means that in many cases more than one or two towns could be as 'well placed' within the nominated locations and still meet basic location criteria. Maps illustrating the 'catchment' of these indicative locations are presented in Appendix H.



The development of a dedicated helicopter retrieval service could constitute an appropriate initial phase of any possible dedicated HEMS for the island of Ireland, subsequent to various other initiatives as discussed later in this Chapter under the heading, The Base Case. Having a dedicated retrieval service as the initial phase of dedicated HEMS development would be considered sensible on the basis of, in part, seven reasons:

- i. It would be a reasonable evolution and complementary to the existing ground-based specialist transfer services currently in operation across the island (e.g. NICCaTS, MICAS and NNTP), particularly if these are further developed and upgraded
- ii. There is currently in place a limited 'tertiary missions' HEMS service (helicopter air ambulance) provided by the Irish Air Corps
- iii. There is currently in place a limited HEMS-type service provided by the SAR resources of the MCA and IRCG
- iv. The NIAS has in place (and is further developing / refining) operational protocols and procedures for helicopter activation for emergency flights and for the call-out and co-ordination of helicopters for casevac and medevac missions
- v. The *White Paper on Defence* (February 2000) confirms that there is a role for the Department of Defence in the RoI to undertake air ambulance services
- vi. Introduction would constitute an additional element in the healthcare systems across the island that would assist in the provision of an equivalent level of critical care regardless of one's location
- vii. Numerous submissions from medical consultants and associations identified and / or argued for the need for a retrieval service on the island for neonates, paediatric and adult patients with severe injuries or who are critically ill, including:
  - Irish Association for Emergency Medicine
  - College of Anaesthetists
  - Association of Anaesthetists of Great Britain and Ireland
  - Beaumont Hospital Trauma Committee
  - Department of Anaesthesia & Critical Care Medicine, OLHSC, Dublin
  - National Spinal Injuries Unit, Ireland
  - Consultant Anaesthetists, Mayo General Hospital
  - Irish Society for Immediate Care
  - National Department of Neurosurgery, RoI
  - Consultant in Paediatric Intensive Care, RBHSC, Belfast
  - National Neonatal Transport Programme, RoI
  - Professor of General Practice, University College Dublin.

## 5.5 Facility Requirements

Depending on the site(s) for dedicated HEMS aircraft, various issues would need to be considered vis-à-vis operational support systems / facilities in terms of practical feasibility. Fixed bases<sup>93</sup> should, most likely as a minimum, have the following facilities (and this requirement would be expected in any 'out sourcing' contract):

- Maintenance Hangar
- Workshop / Stores
- Fuel Bowser / Storage
- Support / Towing vehicle
- Resident Engineers' Office
- Resident Pilots' flight planning area
- EMT / Paramedic Office
- EMT / Paramedic Store Room
- Crew toilets / washing facilities
- Crew Rest Room, fridge/ microwave/ toaster and kettle
- Telephone/ fax /e-mail communications system
- Television/ video, tea/coffee-making facilities.

There does not appear to be a case for basing helicopters at hospitals in the context of an all of Ireland system. Fixed bases at established airports / airfields (public or private) would provide sufficient facilities for HEMS operations. For example, a 'tertiary-response' HEMS could operate effectively with the basing of an aircraft at an airport or airfield within close proximity to the medical centre(s) supplying the retrieval team(s). This would involve re-positioning to the nearby hospital to collect an appropriate retrieval team for each mission as necessary.<sup>94</sup>

In the case of a 'retrieval service', it is not deemed necessary to locate aircraft at a particular hospital during 'daylight hours' as the time involved from call activation to retrieval team readiness and the inherent planned nature of inter-hospital transfers (*albeit*, often at relatively short time notice, e.g. measured in hours) would avail effective operation.

In some countries (including Ireland, where a limited service is available) fixed wing aircraft are used for retrievals. It is worth considering that a helicopter (e.g. twin-engine medium utility aircraft) would offer many of the operational advantages of fixed wing (e.g. long distance operation across the island of Ireland and missions from either NI or RoI into SE England) and be able to operate hospital-to-hospital as opposed to airport-to-airport as is the case for fixed wing services. Aircraft based at hospitals would also (highly likely) require special fire fighting equipment as well as a two-person fire crew 'on stand-by' during hours of operation. Furthermore, hospitals in Dublin (or any other city on the island) may well be subject to 'environmental' and 'aviation operational' restrictions limiting the opportunities to base an aircraft at a particular hospital.

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<sup>93</sup> Office and associated facilities can be suitably provided using pre-fabricated / modular structures / buildings.

<sup>94</sup> The appropriate medical crew / team for different categories of patient (e.g. neonatal, burns, spinal injury etc) should be determined by clinical co-ordination. It is unlikely that a 'standard' medical team would be sufficient to undertake the full range of inter-hospital transfers that could be reasonably envisaged.

Use of HEMS for ‘secondary missions’ (e.g. ground ambulance to helicopter at a designated site) and ‘tertiary missions’ (e.g. inter-hospital transfers) would bring with it implications for infrastructure. Use of secondary and hospital landing sites requires:

- Inspection/certification of secondary landing sites for approval by aviation regulatory authorities
- Design, construction and certification of hospital landing sites where they do not currently exist (and / or enhancement to existing sites due to the expected possible increase in activity levels).
- Cataloguing (e.g. descriptions, grid references, cross-referencing to road maps / atlases etc, photographs, regular updating of information etc)
- Dissemination of site data to various parties
- In the case of secondary sites, it may also be necessary to put in place ‘local’ volunteer arrangements to ensure basic upkeep as well as nighttime activation (e.g. to turn lights on etc).

## 5.6 Crewing Issues

Crew complements and standards have to be consistent with European aviation standards and regulations. HEMS (‘primary response’) operations are normally restricted to “dawn to dusk” operations, and require a minimum of a qualified pilot assisted by a “HEMS crew-member” as defined in JAR-OPS. This crew may operate under the Single-pilot IFR (Instrument Flight Rules) standard. Night operations are normally limited to ‘tertiary missions’ requirements, using approved landing sites at both departure and arrival points (whether at hospitals or otherwise). The establishment and use of approved (by the Irish Aviation Authority – IAA - in RoI and the UK’s Civil Aviation Authority – CAA - in NI) secondary landing sites (as is the case in the Scottish Ambulance and other UK operations) can greatly broaden the scope of the HEMS operation while retaining appropriate safety standards.

Based on practice in other jurisdictions, and in light of the findings of previous studies, the following medical crew would constitute a reasonable standard:<sup>95</sup>

For ‘tertiary response’ missions (i.e. inter-hospital transfers) and secondary missions:

- 1 doctor (anaesthetist / intensivist / emergency physician)
- 1 nurse (Intensive Care Unit training).

For ‘primary response’ missions:

- 2 appropriately trained ambulance personnel or 1 appropriately trained ambulance person and 1 doctor (anaesthetist / intensivist / emergency physician).<sup>96</sup>

In either a ‘primary response’ or ‘tertiary response’ role, the medical crew should be dedicated and full time to the service. In the case of ‘primary response’ HEMS, the medical crew is required to be ‘on active stand by’ in close proximity to the helicopter (i.e. based at the same location with helicopter and flight crew). The crew must be ready to activate immediately in order to facilitate a ‘launch time’ from receipt of a call to dispatch that can be as little as one to two minutes. The planned nature of most inter-hospital transfers will mean a less immediate activation time in many instances. However, there will also be a number of instances that will require that the medical team be ready to task at very short notice. The medical team in a ‘tertiary response’ situation will need to be dedicated to the HEMS service and time not on missions would be used to undertake associated HEMS tasks such as checking medical equipment, restocking medical supplies, updating patient records / databases, writing up mission notes, following up previous transfers for patient outcome information, undertaking activities used to facilitate clinical and operational audits and HEMS related research.

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<sup>95</sup> The issue of ‘appropriate crew’ is one of the key areas of debate with respect to the effectiveness or otherwise of HEMS, particularly in the ‘primary response’ role. As was revealed in the survey of international operators, various crewing configurations are used for this type of operation. In England, where operations are almost exclusively ‘primary response’ HEMS, a medical crew of 2 paramedics is used in most situations (noting that one contractor does provide a significant proportion of services in Great Britain). The London HEMS operation has a medical crew of a doctor and a paramedic and is also almost exclusively a ‘primary response’ operation.

<sup>96</sup> The ‘ambulance only’ medical crew model has been adopted for operation cost estimation purposes. With the ambulance-only crewing, it should be understood that on occasions 1 ambulance crew member would be replaced by a doctor on an ‘as required’ basis subject to determination via the clinical co-ordination process and appropriate tasking protocols. This could have cost implications for this ‘model’ as some proportion of the doctor’s costs may need to be directly associated with the service. Reference is also made to section 4.2 of this report that highlighted the variety of medical crewing models adopted worldwide. This would be an issue should implementation occur, in terms of determining the appropriate model in the Ireland context.

The crew involved would need to have received internationally recognised training associated with HEMS operations such as Advanced Trauma Life Support, Medical Management of Major Incidents, Care of the Critically Injured, Pre-hospital Trauma Life Support and Advanced Paediatric Life Support.

In the all-Ireland context, issues associated with professional indemnity and issues associated with professional registration may present some operational obstacles that would need to be resolved in order to facilitate the effective inter-jurisdictional operation of HEMS. This would most likely emerge in the case of a ‘tertiary response’ HEMS, in particular, where it is reasonable to envisage cross- border activities.

## 5.7 Ownership and Management

Ownership and management of dedicated HEMS services varies considerably across jurisdictions. Funding and management ‘models’ vary significantly, as noted earlier:

- Private hospital / healthcare provider owned and operated (e.g. USA)
- Community-based charity trusts (England)
- Fully State funded (e.g. Scotland, QES Australia)
- Major ‘commercial sponsor’ with mix of community and State support (e.g. London HEMS)
- Automobile association and motor accident insurers (e.g. Netherlands and Germany)
- Non-profit Non-Government Organisation (e.g. Red-Cross’ Rega in Switzerland)
- Mix of State-support and commercial / public sponsorship (e.g. CareFlight, Australia).

## 5.8 Service Procurement

When investigating the feasibility of a service provided by aircraft, the issue of leasing needs consideration.<sup>97</sup> Leasing involves a single contract being let for the availability of an asset. Payments are therefore made in return for the use of the asset, which includes the cost of financing it. Leases are usually matched to the life of the asset, though in the case of assets with relatively long life spans, such as aircraft, terms may be as short as three years.<sup>98</sup>

Aircraft leases may include a number of additional elements, such as maintenance and crew provision. The two most common types of aircraft lease arrangement are known as “dry lease” and “wet lease”; “dry leasing” involves availability of the asset only, with the lessor being responsible for its operation, while “wet leasing” includes the provision of crew, maintenance, training etc.<sup>99</sup> Under a lease arrangement, the private sector supplier would be responsible for ensuring that the aircraft meets a predetermined output specification that would ideally include minimum standards of availability and performance.

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<sup>97</sup> Most HEMS operations involve either use of leased aircraft or the use of an operating contract and a service provider. It is not common for helicopters to be purchased outright by sponsoring agencies. The annual operating costs include the costs of helicopter operations provided by a contractor incorporating both a ‘standing charge’ (usually a monthly charge) and a charge per flying hour.

<sup>98</sup> In England, most of the HEMS contracts are for periods of 5 or 7 years duration.

<sup>99</sup> Most of the UK HEMS services involve “wet leases”.

From a risk perspective, leasing transfers the risks associated with owning, maintaining and operating a helicopter away from the Government. Depending on the lease arrangement, it may also transfer risks associated with recruiting and managing crew to the private sector. These arrangements usually centre on the definition of an output specification as the basis for a defined level of service to be purchased from a supplier, rather than the specification of physical inputs, as envisaged under traditional procurement arrangements.

In a Public Private Partnership (PPP) environment, the supply, finance and operation of an asset usually involves a single contract being executed, with the private sector taking responsibility for the provision of financing for the project in addition to supplying and maintaining the asset and operating the service. In return, the promoter (e.g. Government Department / Agency) would make availability payments to the operator, subject to abatements determined by a performance-monitoring regime (this regime is to ensure that the private sector operator has sufficient incentive to provide the required level of service).

Issues surrounding private sector involvement through PPPs therefore include, the allocation of responsibility for functions of asset ownership and capital investment between the public and private sectors. Specific structures will therefore vary according to the level of risk transfer to the private sector.

Various procurement strategies exist for dedicated HEMS. However, the predominant 'model' is one of contracting out of aircraft operations. The aim of the Government agencies is for dedicated HEMS to deliver an improved level of health care (including consideration of issues of accessibility and equity). With this in mind, the need for the public sector to own assets as opposed to procuring services is, at best, limited. Most dedicated HEMS operations are characterised by contracted-out operations. In many situations, Government provides medical crews via the hospital system and ambulance services.<sup>100</sup>

The key benefits of 'out sourcing' the aviation aspects include:

- Transfer of risk to those best able to deal with it
- Ability to 'tap' into existing experience and economies from established providers, including access to established maintenance facilities and 'back-up' aircraft and crew to ensure an uninterrupted service
- Ability to effectively implement a performance regime
- Reasonable certainty of future costs: most contracts are for periods of between 5 and 7 years incorporating a two-part payment mechanism, with a monthly standing charge for aircraft, base, communications, training, maintenance etc and an 'hourly flying charge' directly related to tasks undertaken.

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<sup>100</sup> This is the case with dedicated HEMS operating across Scotland and England.

## 5.9 Aircraft Type

The specification of the aircraft capability and operational equipment can be complicated but certain ‘minima’ have emerged in developing dedicated HEMS options.

The HEMS helicopter should be twin-engine and should provide accommodation for pilot(s), HEMS crewmembers, as well as the required additional medical team-members, with space and fittings for either one or two stretchers. The helicopter should be equipped to operate under Instrument Flight Rules (IFR). This requires a defined level of navigation and communications equipment, including an autopilot.

The communications suite for a HEMS helicopter is required to maintain communications with the dispatching authority and possibly directly with hospitals as well as providing full and switch-selectable interphone among all members of the operational and medical crew, in addition to the full requirements of Air Traffic Control (ATC). High/protected tail rotor system (including NOTAR – No Tail Rotor) as opposed to aircraft with low / exposed tail rotor should be a preference. Skid undercarriage, as opposed to wheels, is considered highly desirable.<sup>101</sup>



London HEMS – MD Explorer – a NOTAR helicopter

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<sup>101</sup> Slide undercarriage is deemed almost an essential item for dedicated ‘primary response’ aircraft, particularly where landings need to be routinely made on sites that are not designated helicopter landing sites, e.g. fields, road sides, shore lines, beaches etc.

## 5.10 The Base Case

An important consideration in the feasibility of dedicated HEMS for the island of Ireland is that of the so-called Base Case. Development of dedicated HEMS, if undertaken, would not be done in a vacuum; there is a range of existing EMS and related services available, albeit somewhat fragmented and in many respects of limited capacity. Obviously, the EMS systems that have developed are reflective of there being two national jurisdictions on the island of Ireland. This, *inter alia*, means differing stages of institutional development, differing priorities, differing perceptions of need and differing levels of historical investment. As detailed earlier in this report, there are currently a mix of dedicated specialist ground services and aviation-based arrangements in place in both NI and the RoI. Furthermore, the view that consistently emerges from discussions with key stakeholders is the concern at sub-optimal standards of care available to some patients depending on geographical location.

There is also recognition by stakeholders that dedicated HEMS would need to ‘build on’ existing services and be a complementary service as opposed to a substitute service. Stakeholders also expressed the need to consider the inclusion of the longer-term costs of rehabilitation and institutional care and loss of income associated with poor clinical outcomes.

The Base Case is sometimes referred to as the ‘do nothing option’ on the assumption that if a project is not progressed, no incremental costs (or benefits) will be incurred. However, this is not necessarily the case, as the maintenance of the *status quo* will invariably involve ongoing expenditure, particularly, for example, the implementation of funding commitments and approved strategies and investment plans. Therefore, strengthening the existing institutional and operational arrangements to increase effectiveness of existing emergency services and other agencies for air ambulance HEMS missions should be considered as part of the Base Case.

The Base Case would include various changes, identified elsewhere,<sup>102</sup> in the current emergency medical services sector necessary to bring about an enhanced and more consistent level of service across all categories of ground-based retrievals. All so-called ‘with project’ options such as establishment of dedicated HEMS should be viewed as incremental to the Base Case and will need to be assessed for costs and benefits ‘over and above’ the Base Case.

In essence, the Base Case could involve, but not necessarily be limited to:

- Funding of NICCaTS to a full 24 hours 7 days per week service<sup>103</sup> and subsequent expansion of the service across the island with ‘centres’ established in major cities, for example, Galway and Cork<sup>104</sup>
- Funding of neonatal transport services on a 24 hours 7 days per week operation basis for both the RoI and NI<sup>105</sup>

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<sup>102</sup> Refer to *Strategic Review of the Ambulance Service (2001)* and *Mapping the Road to Change – A Strategic Review of the Northern Ireland Ambulance Service (1999)*.

<sup>103</sup> It is understood that the additional funding required to achieve this is now in place following recent deliberations in NI.

<sup>104</sup> Refer to the submission from Dr G G Lavery, section 3.2 of this report.



- Funding of MICAS to enable a 24 hours 7 days per week service
- Creation of 24 hours 7 days per week paediatric transfer services for both the RoI and NI.

Developing the existing specialist ground-based services in such a way would result in a higher quality ground-based critical care transfer service to every major hospital on the island of Ireland and provide the capacity to transport several patients simultaneously.

It is also envisaged that under the Base Case, funding would continue to be provided in the RoI to meet the recommendations of the *Strategic Review of the Ambulance Service* (2001) and to continue on-going progress in implementing the recommendations of the earlier (1993) Report of the Review Group on the Ambulance Service, including:

- Progressing with the establishment of two-EMT crews on emergency ambulances
- Training of crews under the upgraded EMT training programme including the development and implementation of the EMT – A programme<sup>106</sup>
- Focusing on response time reduction etc.

Under the Base Case, it is also envisaged that the implementation plan based on the recommendations contained in *Mapping the Road to Change – A Strategic Review of the Northern Ireland Ambulance Service* (2000) is adopted and guides the delivery of initiatives including:

- Improvements to response times
- Enhanced priority dispatch systems
- Implementation of first responders.

Under the Base Case, the development and adoption of well-designed operational protocols, such as those developed by the NIAS for helicopter casevac and medevac, should be put in place with the appropriate agencies. For example, in the RoI, this would involve finalisation of the development of formal and auditable arrangements for aircraft activation and use between health boards, hospitals, the IRCG, An Garda Síochána and the Air Corps.

## 5.11 Costs and Benefits

### 5.11.1 Costs

Development of dedicated HEMS would involve both capital and annual operational costs / recurrent expenditure. Whilst the concept of dedicated HEMS in either / both NI and RoI is not new, this current study represents arguably the most comprehensive attempt to assess the feasibility of such a service, in particular an all-Ireland service. Whilst in essence a discrete project, there could reasonably be expected to be implications for other projects / future investments should dedicated HEMS be implemented.

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<sup>105</sup> Based on the existing National Neonatal Transport Programme.

<sup>106</sup> This programme was recommended to commence with a pilot trial in late 2001 and it is now understood to have commenced in 2003 with an expectation of initial graduates in mid-to-late 2004.

The key capital cost items<sup>107</sup> associated with establishing a dedicated HEMS will include:

- Landing sites; potentially helipads at one or more major trauma centres / acute hospitals. For example, a study of the costs of developing a helipad (and associated infrastructure) for Beaumont Hospital in Dublin (WS Atkins, 2001) indicated capital costs of the order of €2.0 million.<sup>108</sup> Costs for a ground level site would be significantly lower and are estimated in the range €200,000-300,000 for an inner city / urban site<sup>109</sup>
- Secondary sites – identification, preparation / upgrading, cataloguing, aviation authority approvals etc
- Modifications to existing hospital infrastructure / sites and service capability to accommodate HEMS (and potentially additional admissions volumes, in some cases) - for example, building redesigns and additional ward space / beds, personnel, monitoring, treatment, diagnostic and surgical equipment etc<sup>110</sup>
- Communications systems upgrade / expansion: for the costs of a single ‘air desk’ communications system for dispatch and co-ordination of HEMS activity
- Ground support vehicles. At least one dedicated road vehicle would be required by each service.<sup>111</sup>

Under the reasonable assumption of ‘out sourcing’ of service provision, costs of aircraft, base, associated communications will be annual recurrent costs (usually paid monthly) as a ‘standing charge’ component of a two-part charging mechanism.<sup>112</sup> Based on experience elsewhere, and from discussions with existing operators, it is reasonable to expect an elapsed time from ‘decision to proceed’ to activation of a dedicated HEMS operation of up to 3 years. This time would be sufficient to enable the ‘interim tasks’ to be performed: such as staff training, site determination and cataloguing, procurement process (under the EU OJEC process), education and awareness programmes, management arrangement establishment, aviation authorities approvals etc.

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<sup>107</sup> These costs are resource cost estimates and are not risk adjusted. These costs are likely to be influenced by the operational and institutional arrangements adopted as well as the by the procurement process.

<sup>108</sup> It is understood that the helipad mentioned has been designed to accommodate existing SAR aircraft including the Sikorsky S-61, an aircraft that has a main rotor dimension of approx. 19 metres (an EC 135 – a widely-used helicopter for HEMS - has a main rotor dimension of 10.2 metres). Whilst fire-fighting services would be catered for, fuel would not be stored at these sites. Fuel would only be stored at approved sites – these will invariably be the aircraft bases. In some circumstances, remote secure fuel dumps for en route refuelling could be possible (refer section 5.5).

<sup>109</sup> It is understood that the new developments for the Mater hospital in Dublin incorporate a rooftop helipad.

<sup>110</sup> Whilst HEMS will result in a re-distribution of inpatients across the hospital network, the net effect should, on the whole, be a ‘netting out’ effect. However, some ‘additional’ costs for additional equipment and staff should be prudently allowed for major hospitals across the island.

<sup>111</sup> The vehicle would most likely be an estate car and be equipped with items such as ventilators, monitors, defibrillator, infuser and pumps.

<sup>112</sup> Costs estimates for new rotary aircraft (subject to variation, negotiation, ‘fit-out’ and configuration as well as prevailing market conditions) suitable for HEMS include: MD902 / Explorer €4.0 - 4.5 million; EC135 €3.5 - 4.0 million; Augusta 109 €3.5 - 5.0 million; EC-145 €4.7 - 5.2 million; AS 365 N2 – Dauphin €6.0 - 7.0 million. Estimates derived from discussions with UK operators and Conklin & de Decker – The Aircraft Cost Evaluator, 2002.

Most dedicated HEMS operations across Europe (all in the UK, for example) and elsewhere utilise a service contract approach for supply of aircraft (and often pilots and medical crew or a mix thereof). Where a service contract approach is adopted, it is normal practice for the 'operator' (service provider) to supply aircraft, base, associated communications and training services. Standard practice is to adopt a two-part charging mechanism: a 'standing charge' (usually annual, but paid monthly) and a 'flying hours charge'.

The key recurrent / on-going cost items associated with dedicated HEMS will include:

- Following establishment / set-up, agency / secretariat costs for the day-to-day administration and other support functions (accounts payable, data collection etc)<sup>113</sup>
- On-going procurement / contract management costs
- Monthly standing charge for aircraft, aviation crew, base, maintenance and communications (including training and aviation certification etc)
- Hourly flying charges for undertaking HEMS activities
- Medical crew costs
- Consumables
- Training / new courses and upgrades / refresher courses for a wide range of personnel including flight crew, medical crew, hospital staff etc.

Other considerations vis-à-vis an implementation timetable for a dedicated HEMS will include the time required to 'bed-in' the existing specialist ground based services; the time required to introduce and implement staff training courses; the availability of skilled medical professionals and the establishment of operational and clinical co-ordination and audit protocols and procedures. For these reasons, *inter alia*, up to 3 year elapsed period could be viewed as potentially optimistic in the island of Ireland context, particularly with respect to a 'primary mission' HEMS operation as opposed to a helicopter patient retrieval / inter-hospital transfer service.

The survey of international operations indicated that a single aircraft dedicated HEMS costs approximately €1.8 (Stg£1.2) million annually in terms of direct costs<sup>114</sup> There may also be costs associated with noise and amenity impacts associated with operation of dedicated HEMS, particularly in urban / built up areas, e.g. sound proofing neighbourhood areas etc. The survey of international HEMS operators revealed that each aircraft in service was involved in approximately 700 'missions' annually and the average 'engines operative' time per mission was approximately 30 to 40 minutes.

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<sup>113</sup> The change in the distribution of patients / victims may require a redistribution of resources across the health care systems. However, the incidents involved are currently being 'accommodated' within the existing health care system. The introduction of dedicated HEMS should not necessarily increase the resource requirements 'over and above' those recurrent items identified above. A degree of resource rationalisation and redistribution will be required to facilitate dedicated HEMS.

<sup>114</sup> An average across 21 services in the survey and only the direct costs associated with the helicopter operation. As a comparison, the recently published Sheffield University review of services in England and Wales mentioned earlier in this report found an average direct annual cost (combined standing and variable charge, fuel, staff and training costs, deployment costs and miscellaneous costs) per helicopter of Stg£834,899 (2001 values) (approx. €1.3 million in 2003 values) across 11 operations.

The survey included a mix of operations dominated by ‘primary response’ HEMS activities. It needs to be recognised that a service primarily involved in inter-hospital transfers would expect to experience longer average ‘mission’ times. This is based on a combination of both the nature of the task and the wider geographical coverage typically involved.

A summary of the major capital, recurrent costs and assumptions associated with dedicated HEMS is set out in Tables 5.1 and 5.2.<sup>115 116</sup>

**Table 5.1: Indicative Unit Capital Costs Items – dedicated HEMS<sup>117</sup>**

Item	Cost estimate (2003 €)	Cost estimate (2003 Stg£)
Hospital roof-top helipad	2.05 million	1.41 million
Hospital ground helipad	256,000	177,000
Secondary helipad (“24/7” operation)	26,000	18,000
Medical equipment in major hospitals	102,500	71,000
Single ‘air desk’	1.54 million	1.06 million
Estate car	31,000	21,500

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<sup>115</sup> The costs associated with insurance (other than those of the contracted operator) have been deemed to be covered by ‘self insurance’ on behalf of the DoHC and DHSSPS – the agencies assumed to be responsible for HEMS.

<sup>116</sup> An estimate of €750,000 (Stg£502,500) would be a prudent allocation for establishment costs – training, meetings, education / awareness, initial secretariat activities etc as well as for medical equipment to support additional ICU beds in the Dublin area, for example, associated with an inter-hospital transfer service.

<sup>117</sup> All costs converted from Euro at €1.00 = Stg£0.69. Original estimates prepared in 2002 factored by 2.5% to derive 2003 estimates. In considering these cost estimates, it is important to recognise that inflation associated with specific sectors of the economy of the RoI, for example, has been significant and at variance to the ‘head line’ CPI. For example, construction price inflation in the building sector has consistently been significantly higher than ‘head line’ CPI in recent years. Furthermore, the adoption of the findings of the public sector benchmarking review may also impact upon labour cost inflation in the RoI causing costs to rise at a rate greater than CPI. Rounding to nearest thousand or five hundred € and / or £ where appropriate.

**Table 5.2: Unit Recurrent Expenses / Annual Costs Items – dedicated HEMS**

Item	Cost estimate (2003 €)	Cost estimate (2003 Stg£)
Doctor / anaesthetist	123,000	85,000
EMT / paramedic	41,000	28,000
Clinical co-coordinator (part-time)	61,500	42,500
Administrator / clerical officer	31,000	21,500
Medical disposables / consumables and additional ICU costs	154,000	106,000
Office and related equipment	51,000	35,000
Office and ‘air desk’ operations including VoCs <sup>118</sup>	102,500	71,000
Helipad maintenance: (annual)		
▪ Hospital rooftop	26,000	18,000
▪ Hospital ground	1,025	707
▪ Secondary ground	256	177
Fire services (hospital roof-top helipad) <sup>119</sup>	231,000	159,500
Helicopter operations:		
▪ Standing charge (per month) (new aircraft) <sup>120</sup>	128,000	88,500
▪ Flying charge (per hour) <sup>121</sup>	584	403

<sup>118</sup> VoCs = vehicle operating costs, based on a AA Ireland estimate of €0.52 per km for a vehicle in the 1.75l to 2.0l engine size category.

<sup>119</sup> Based on a “24/7” operation and assumes two person crew on site at all times.

<sup>120</sup> Cost estimates are based on use of a new aircraft. It is possible that significantly lower costs would be associated with the use of second-hand aircraft. For example, some of the HEMS services in the UK operate using second-hand Bo 105 DB / DBS aircraft. Approval for use of second-hand aircraft would be subject to the appropriate regulatory authority. Second-hand aircraft may however warrant consideration where a ‘pilot’ / trial implementation was contemplated.

<sup>121</sup> These estimates are based on existing UK operations using a new EC 135 ‘new generation’ helicopter and have been checked against the Fall 2002 Conklin & de Decker Aircraft Cost Evaluator (Fall 2002) model used by Booz Allen Hamilton for Total Direct Costs per Flight Hour for the following aircraft: EC 135 T1 (US\$538), A109 Power (US\$577), MD 902 Explorer (US\$587), AS 365N2 - Dauphin (US\$873) and EC 145 - (US\$684) – the latter two aircraft, whilst not uncommon in HEMS operations, are significantly larger than most aircraft used for HEMS work. It would be reasonable to expect that competitive tendering, inter alia, would result in lower costs. For example, one significant operator consulted suggested that a flying charge of €500+ per hour would be a reasonable expectation for a new generation twin-engine helicopter, for example, an EC 135.

Depending on the scope of dedicated HEMS established across the island of Ireland, it would be necessary to determine the number of helipads (roof-top and ground) required, the number of secondary landing sites required, the quantity of supplementary equipment required as well as the staffing and skill levels necessary. For example, if a system that involved a dedicated inter-hospital transfer service and two 'primary response' HEMS was to be implemented, this could involve as a 'minimum' the development across the island of Ireland of 2 hospital roof-top helipads, 16 ground helipads, expanded medical equipment in 10 hospitals as well the need to recruit 13 doctors / anaesthetists,<sup>122</sup> 13 EMTs / nurses / paramedics, 5 clinical co-coordinators (part-time)<sup>123</sup> and 3 clerical officers / administrative personnel.<sup>124</sup>

In terms of the scale of investment that might potentially be involved for an effective dedicated inter-hospital transfer HEMS operation, new helipads would be required at the major hospitals,<sup>125</sup> examples of which include: Beaumont Hospital (rooftop); Belfast Royal (rooftop); Castlebar (ground); Cork Regional (ground); Crumlin (ground); Erne / Enniskillen (ground); Galway Regional (ground); Letterkenny (ground); Limerick (ground); Mater Dublin (ground);<sup>126</sup> OLL Drogheda (ground); St James (ground); St Vincents (ground); Sligo (ground); Tralee (ground); Tullamore (ground); Waterford (ground) and Wexford (ground).<sup>127</sup>

As an indication of the quantum of costs involved in the establishment of dedicated HEMS for the island of Ireland, Table 5.2 sets out capital cost estimates and annual recurrent cost estimates for the following operational configurations as illustrative examples:

- i. Dedicated helicopter inter-hospital transfer (IHT) service only
- ii. Dedicated helicopter inter-hospital transfer service, plus one 'primary response' helicopter

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<sup>122</sup> In order to provide a "24/7" 'tertiary response' HEMS, 5 medical crews would be required and 3 medical crews would be required to provide each 'daylight only' 'primary response' HEMS providing sufficient allowance for annual leave, study leave and other periods away from the service.

<sup>123</sup> The role would not necessarily require a dedicated position but would need to be provided so that each operational shift was provided with cover. The nature of this role would necessitate that a consultant perform this role.

<sup>124</sup> This role would include day-to-day administrative tasks as well as records keeping, supply tasks, inter-agency liaison etc.

<sup>125</sup> Inter-hospital transfers could operate landing-site to landing-site with road transfers at either end and thereby reduce the capital cost requirements (and potentially, the time required to establish a service). This is what currently occurs with transfers undertaken by the Irish Air Corps. However, this 'model of operation' would only be considered interim in terms of a dedicated inter-hospital transfer service and does not represent 'best practice' with respect to inter-hospital transfers.

<sup>126</sup> It is understood that with the redevelopment at the Mater Hospital a rooftop helipad could be available in 2009.

<sup>127</sup> There are existing helipads at most of these locations. However, IAA or CAA certification will be required to use these for dedicated HEMS activity as opposed to 'emergency missions'. Importantly, an effective dedicated HEMS focussing on IHT activity cannot be commenced based on Dublin until at least one major hospital, in particular, the Beaumont is equipped with a 24-hour operational helipad. The Irish Air Corps maintains a register of landing sites at hospitals (39 in total) across RoI and has categorised sites in terms of type of site (e.g. helipad, grass etc), lighting facilities, hours of availability (e.g. day only, night time etc). It is understood that the MCA maintain a similar register for sites in NI. A helipad is currently available at Altnagelvin Area Hospital in Londonderry. The current location was established in 1998 and the helipad is immediately adjacent to the A&E entrance for the transfer of patients by trolley.

- iii. Dedicated helicopter inter-hospital transfer service, plus two ‘primary response’ helicopters
- iv. Dedicated helicopter inter-hospital transfer service, plus three ‘primary response’ helicopters
- v. Dedicated helicopter inter-hospital transfer service, plus four ‘primary response’ helicopters
- vi. Dedicated ‘primary response’ helicopter only.

**Table 5.2: Indicative Capital and Annual Operating Costs for HEMS Options<sup>128</sup>**

<b>HEMS service description</b>	<b>Capital Costs (€ million)<sup>129</sup></b>	<b>Capital Costs (Stg£ million)</b>	<b>Annual Operating Costs (€ million)<sup>130</sup></b>	<b>Annual Operating Costs (Stg£ million)</b>
1 x IHT service only <sup>131</sup>	<b>11.5</b>	<b>8.0</b>	<b>4.1</b>	<b>2.8</b>
1 x IHT service plus 1 x ‘primary response’	<b>11.7</b>	<b>8.1</b>	<b>7.4</b>	<b>5.1</b>
1 x IHT service plus 2 x ‘primary response’	<b>11.9</b>	<b>8.2</b>	<b>10.6</b>	<b>7.3</b>
1 x IHT service plus 3 x ‘primary response’	<b>12.0</b>	<b>8.3</b>	<b>13.9</b>	<b>9.6</b>
1 x IHT service plus 4 x ‘primary response’	<b>12.2</b>	<b>8.4</b>	<b>17.2</b>	<b>11.9</b>
1 x ‘primary response’ helicopter only	<b>2.6<sup>132</sup></b>	<b>1.8</b>	<b>3.0<sup>133</sup></b>	<b>2.0</b>

Note: The base capital cost estimate of €11.5 million (Stg£8.0 million) for a single dedicated inter-hospital transfer HEMS includes: 2 rooftop helipads; 16 ground helipads; an ‘Air Desk’ / communications system; 1 motor vehicle and €102,500 / Stg£71,000 in additional medical equipment / ICU equipment for receiving hospitals. The annual operating / recurrent costs for a single dedicated inter-hospital transfer HEMS includes: salaries for 5 doctors, 5 EMTs/paramedics, 3 clinical co-ordinators and 1 administrative / clerical officer as well as €154,000 / Stg£106,000 for medical supplies, €102,500 / Stg£71,000 for Air Desk operations and the provision of manned fire protection services at two hospitals.

<sup>128</sup> Rounded to nearest one hundred thousand euro and pounds sterling.

<sup>129</sup> Includes a ‘one-off’ cost to establish a dedicated all-of-Ireland HEMS. Aircraft are assumed to be leased; therefore, these costs are recurrent as opposed to capital. Includes the initial capital costs for items such as helipads, communications systems, motor vehicles and medical equipment.

<sup>130</sup> Includes an annual ‘standing charge’ for new helicopter(s) and an assumption that each helicopter would perform 1,250 hours annually. The annual costs associated with direct helicopter operations are estimated to account for between 65% and 75% of total annual operating expenses associated with dedicated HEMS. Other costs involved include motor vehicle operations, medical crew salaries, fire services, administrative costs, helipad maintenance etc.

<sup>131</sup> It would be possible to develop a dedicated inter-hospital service without necessarily having helipads on hospitals or at hospitals with road vehicles used at either end. This could be done as an interim measure and would reduce the capital cost significantly, but would not be viewed as ‘best practice’.

<sup>132</sup> Assumes the development of 4 surface landing sites at hospitals and no rooftop helipads at hospitals. Aircraft would be based at airfield / airport and not at a hospital. An ‘Air Desk’ / communications system would be needed as would a motor vehicle.

<sup>133</sup> Assumes a medical crew of two appropriately trained ambulance personnel (e.g. EMT-A / paramedics with aero – medical training).

These costs would be incremental to any current planned and recurrent expenditure of the health authorities in the RoI and NI. There may be some 'economies' at the margin but essentially, the costs estimates outlined above would be additional to current and planned expenditures.

#### 5.11.2 Benefits

Various studies have endeavoured to assess the merits or otherwise of HEMS. The key benefits associated with dedicated HEMS could include:

- Enhanced clinical outcomes for severely injured / critically ill patients due to a range of factors including: reduced time of transport to hospital / reduced pre-hospital time; treatment at scene by specialist medical crew; on scene stabilisation and 'en route' procedures available
- Enhanced accessibility to high level health care services for a wider proportion of the population
- Improved equity in terms of pre-hospital care and EMS as well as timely access to primary care centres across the island
- Operational benefits / savings to rural and provincial ambulance services via the ability to provide 'cover' whilst ground services are under availability pressures via use of HEMS for 'secondary missions'
- Operational benefits / savings to provincial and rural hospitals with limited specialist medical resources (human and equipment)
- Savings in hospital resources due to ability to reduce, for example, Average Length of Stay (ALOS) for some categories of patients.<sup>134</sup>

The beneficiaries from HEMS can vary with the type of service provided. 'Primary response' missions typically involve dispatch of a skilled medical team to the scene of an incident / accident. Depending on the skills of the medical crew, patients can be stabilised, airways can be cleared, drugs administered and even have evasive procedures performed both 'at the scene' and *en route* to the nearest appropriate hospital.

'Secondary missions' typically involve a HEMS team meeting a ground ambulance at a designated site and the transfer of a patient to the helicopter for on-carriage to hospital. As necessary, and depending on the skills available, treatment of the patient can either continue and / or proceed at a more advanced (medically) stage 'at the scene' or *en route*. Furthermore, the local ambulance is able to return to the home community without an extended period of absence.

'Tertiary missions' are inter-hospital transfers that involve a retrieval team of specialists flying to a hospital to, if necessary, stabilise and then transfer a patient to a primary care centre such as a spinal unit, neuro-surgical unit or other specialist intensive care unit.

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<sup>134</sup> The ALOS for the RoI (all hospitals) in 2000 was 6.3 days at an average cost per case of €2,455. In NI for 2000/01, ALOS was 5.5 days for acute services / inpatient admissions.



Research strongly suggests that the key beneficiaries of HEMS are the severely injured / critically ill.

There is also a particular view that those who may well have been admitted to an 'inappropriate' hospital initially and subsequently transferred (or not as the case may be) to a definitive tertiary care centre would also be beneficiaries of HEMS.

Values of life (or 'value of preventing a statistical fatality' – VPF) applied to the avoidance of premature death and non-fatal injuries could be used, in part, to highlight and indicate the potential benefits that may accrue from dedicated HEMS. In the UK, the value of a fatal casualty prevented is Stg£1.22m (in 2003 prices). The equivalent value adopted in the RoI is €1.36m (in 2002 prices). Values for serious and slight casualties are also valued in both the UK and the RoI and are as follows:<sup>135</sup>

*UK*

- Prevention of a serious injury £137,000
- Prevention of a slight injury £12,000

*RoI*

- Prevention of a serious injury €169,000
- Prevention of a slight injury €16,000.

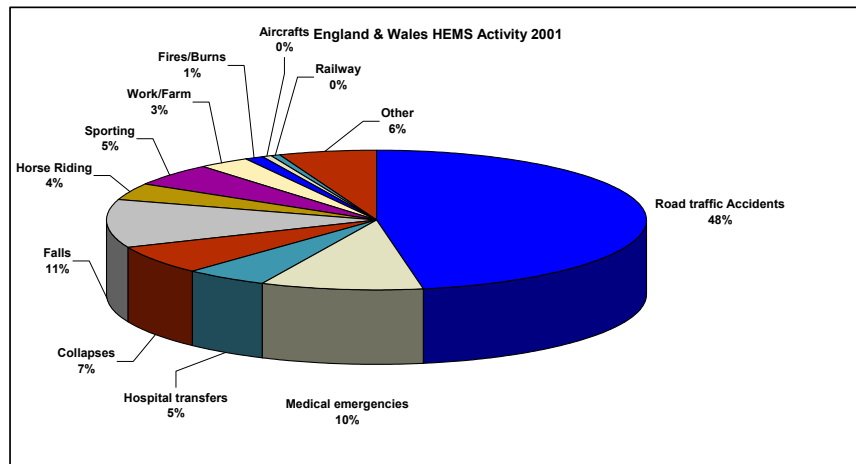
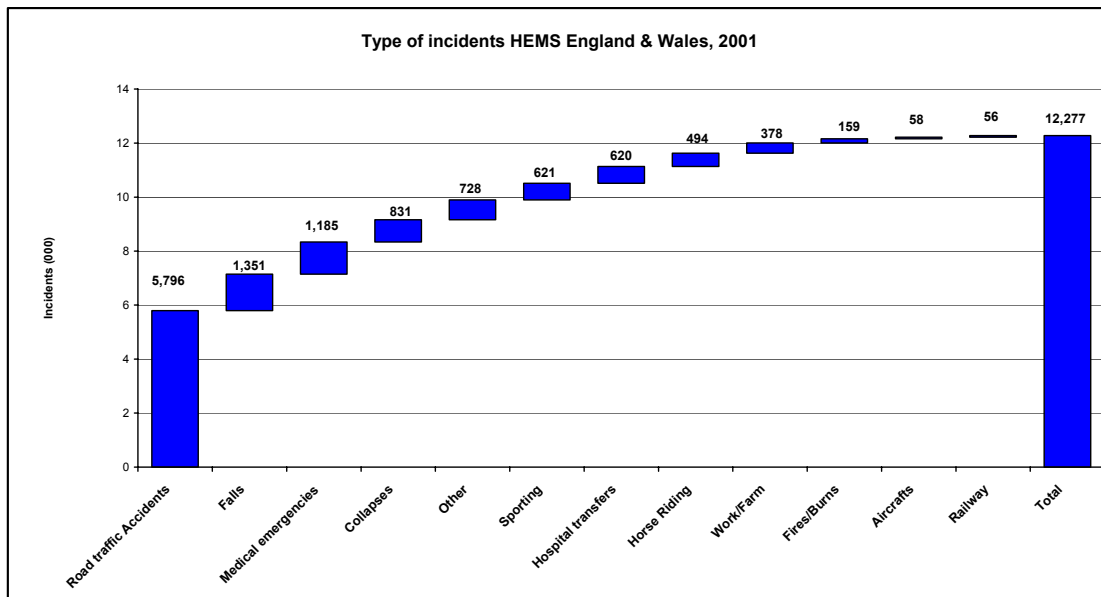
In the year 2002, there were 376 road fatalities involving 346 accidents in the Republic of Ireland. Thirty per cent of these fatal accidents occurred between 10 p.m and 5 a.m and just over half (55%) occurred between 7 p.m. and 7 a.m. One-third of all fatal accidents in the RoI in 2002 occurred in the five counties of Dublin, Louth, Meath, Kildare and Wicklow.<sup>136</sup> In 2001, there were almost 7,000 road accidents where injuries were recorded in the RoI resulting in 411 fatalities. The comparable fatality figures for NI are 153 fatalities in 2001/02 and 158 fatalities in 2002/03.<sup>137</sup> Attendance to RTAs could be one of the major tasks of 'primary response' HEMS if it were to be established for the island of Ireland. Data for the UK HEMS operations (which are almost exclusively used for 'primary missions') shown in the figures that follow indicate that almost half of all missions were to RTAs.

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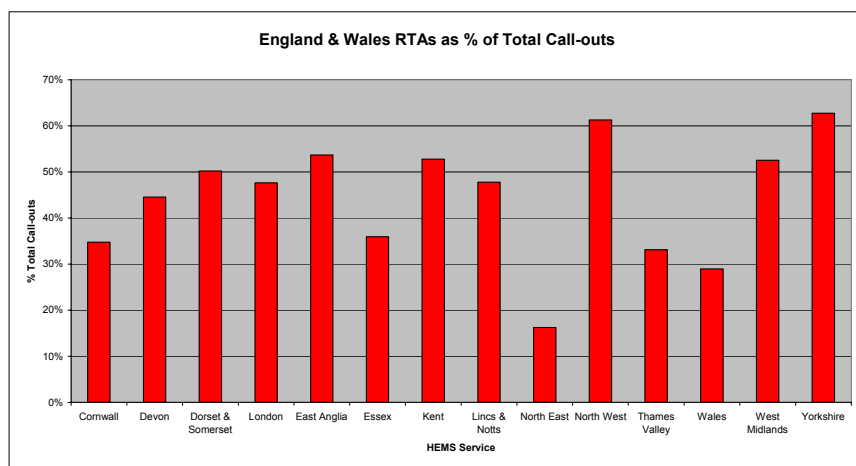
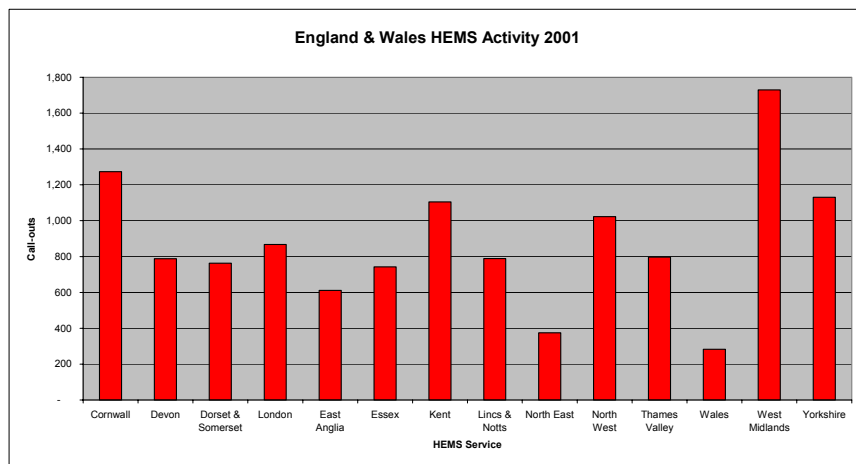
<sup>135</sup> Values are 2002 values and rounded to the nearest '000. Sources: National Roads Authority (RoI) and Department for Transport (UK).

<sup>136</sup> Road Accident Facts Ireland 2002 report of the National Roads Authority in the RoI (November 2003) based on information recorded by An Garda Síochána.

<sup>137</sup> Source: PSNI web site: <http://psni.police.uk>



**HEMS Activity by purpose – England and Wales 2001**



### Summary Data for HEMS Activity – England and Wales, 2001

Whilst subject to on-going debate within the medical professional internationally, there is a degree of support for the argument that dedicated HEMS focusing on inter-hospital transfers results in each transfer patient spending less time in acute care wards in hospitals and potentially less time in the health care system overall.<sup>138</sup> The much more contentious benefit ascribed to 'primary response' HEMS, in particular, is the claim that lives are saved by such operations.<sup>139</sup> The particular circumstances in which dedicated 'primary response' HEMS is operated and the availability of specialist trauma centres with appropriately skilled staff and the various 'supporting' facilities (communications systems and other pre-hospital care services etc) will all, *inter alia*, be expected to impact on the clinical outcomes that might accrue for such a service over time.<sup>140</sup>

A key focus for dedicated HEMS must be on the services required. In order to maximise the potential benefits, it is important that the services required to deliver HEMS are clearly defined in the form of an 'output specification'. The specification should set out the specific services to be delivered. This should be the starting point for determining an appropriate procurement strategy and process, ongoing management arrangements and for assessment of value for money regarding the services procured. An advantage of an output specification is that it focuses on a defined level of service and not on a range of inputs. The risks associated with management of assets and recurrent costs are therefore taken into account when considering the overall service to be procured.

A range of options for the provision of a HEMS service has been identified. Some of the key variables identified include the following:

- Duration of service – 24-hour basis or 'daylight' operation
- Scope of service - primary missions or inter-hospital transfers
- Range of service - landing at approved, manned sites only or at a range of unmanned sites
- Capacity of service – number of patients and ancillary medical equipment.

The above variables, *inter alia*, should be grouped into a set of sub-options to be evaluated as a short list of options, with an output specification set out for each to reflect the level of service required of the operator.

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<sup>138</sup> Various references reviewed alluded to benefits of this nature for primary response missions and / or for tertiary missions.

<sup>139</sup> The review of the London HEMS by Nicholl, Brazier and Snooks in 1995 estimated that 13 extra patients annually with major trauma could have survived due to use of London HEMS. London HEMS is a dedicated service almost exclusively focussing on 'primary response' missions to RTAs, falls, industrial accidents and personal injuries. It is clearly not a claim of this report that a) the London HEMS data / experience is directly transferable to the island of Ireland context nor b) that there is unequivocal evidence that 'primary response' HEMS results in the saving of lives. There is a significant body of research that questions the value of 'primary response' HEMS.

<sup>140</sup> It needs to be recognised that dedicated HEMS systems take a period of time (often measured in years as opposed to months) to become fully effective, particularly in terms of appropriate tasking.

In considering the level of service offered by dedicated HEMS, it will be essential that the associated risks be identified and quantified. They are likely to include the following.

- Procurement
- Ownership / Management
- Maintenance
- Operation of the asset (helicopter)
- Crewing
- Utilisation
- Level of demand / usage rates
- Appropriate activation / use / dispatch of helicopters.

The extent and probability of risks materialising in the procurement, maintenance and operation of dedicated HEMS assets should be quantified and allocated to the parties best able to manage them. Implicit in the transfer of risk away from the public sector is a degree of private sector involvement in the form of operators and contractors with specialist skills and resources. The ultimate allocation of varying levels of risk between the public and private sectors should be shaped by how project and operational risks are distributed between the parties responsible for the provision of the required services.

## 6.0 FINDINGS AND RELATED ISSUES

### 6.1 Introduction

Various key findings and related issues for the healthcare authorities of both the RoI and NI (and other stakeholders) vis-à-vis the feasibility of dedicated all-island HEMS have emerged from the Review.

These have been categorised into the following broad headings:

- Operational
- Strategic Issues.

### 6.2 Findings - Operational

- There are currently no dedicated HEMS operations on the island of Ireland. The valuable and much needed service provided by The Irish Air Corps in the Republic of Ireland is a limited air ambulance service<sup>141</sup> (a form of ‘tertiary response’ HEMS) provided on a ‘request and availability’ basis. Furthermore, Search & Rescue (SAR) operators based in the Republic of Ireland and the UK provide emergency ‘scoop and run’<sup>142</sup> services as a low priority to core activities that focus primarily on marine rescue. These two services, whilst highly regarded and contributing benefits to the community are effectively rapid transport services (with occasional medical escort). They do not involve provision of full-time dedicated medical crew and specialist aero-medical equipment.
- The dedicated ground-based specialist transport services (e.g. MICAS, NICCaTS and NNTP) are providing a recognised service across the island. The scope and capacity of these services is limited and various groups within the community do not fall within the ‘core’ patient profile. The capability of these services is limited and ‘impacted’ by the distances and time of transfer involved in many cases. The matching of resources available (equipment and crew / medical team expertise) may preclude using the ‘dedicated’ services more often. However, collectively they do provide a platform from which to develop a more comprehensive inter-hospital transfer (IHT) capability across the island and would be complementary to any future dedicated helicopter ‘air ambulance’ operation.
- There are dedicated HEMS operating in many countries worldwide, including across England, in Wales and in Scotland.

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<sup>141</sup> Resources and availability are limited, and in recent years this position has worsened.

<sup>142</sup> Only basic medical assistance can be provided. The focus is on collecting persons and depositing them to the nearest land site (which could be a hospital if appropriate).

- “Air ambulance is not a substitute for a ground ambulance service”.<sup>143</sup>
- HEMS is not a substitute for current activities and expenditure (other than at the margin and possibly in place of some current activity / practices associated with the transport / transfer of the critically ill and seriously injured); HEMS is about an incremental improvement, expanded capability and enhanced accessibility not a replacement service.
- The NIAS and the public ambulance services in the Republic of Ireland combined currently ‘attend’ in excess of 250,000 ‘emergency’ incidents annually and undertake a significant number of planned patient transport tasks, including numerous ‘long distance journeys’.<sup>144</sup>
- The NIAS and the ambulance services across the Republic of Ireland are currently implementing significant investment programmes designed to upgrade the quality and the effectiveness of services:
  - As part of the Stg£2 billion Strategic Investment Programme over the 5 years to 2007/08 announced in February 2003, funding of Stg£29.1 million has been ‘earmarked’ for the further development the Northern Ireland Ambulance Service. Part of this funding has been allocated to investments in the reconfiguration of ambulance control and communications systems and the balance has been assigned to the implementation of the modernisation and improvement of ambulance services as recommended in the 2000 Strategic Plan. Additional to these funds, a further Stg£9 million has been allocated between 2001/02 and 2004/05 to implement a pilot Rapid Responders Project as well as fund the purchase of 57 A&E ambulances, 18 Patient Care Service vehicles (non-emergency) and other assets / facilities.
  - Since 1991, pre-hospital and ambulance service revenue funding provided directly by the Department of Health & Children (DoHC) in the Republic of Ireland has increased significantly. Expenditure in 1991 was €25.8 million and by 2003 expenditure has increased to €77 million. The funding requirement over the five year period to 2006 is set out in the Strategic Review of the Ambulance Service 2001 which recommended: “in order to give a clear commitment to the development of the ambulance services there should be a provision for at least £IR4 [€5.08 million] of development funds in real terms in revenue budgets year on year for the next five years”. Among the key priorities to be progressed is the introduction of an EMT-A training programme for ambulance personnel.

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<sup>143</sup> *Audit of London HEMS by Clinical Evaluation Sciences and Department of Medicine, University of Toronto, quoted in “Examination of the need for a dedicated air ambulance service by the Standing Committee on Air Ambulance Services”, Ireland 1996.*

<sup>144</sup> *Of the total, approximately three-quarters were in the RoI and one-quarter in NI.*

- There are three relatively distinct HEMS operations available:
  - ‘Primary response’ – transport of personnel and equipment direct to the scene (or nearby) of an incident /accident (e.g. RTA, fall, train derailment etc) and the transport of patient(s) / victim(s) to hospital (most people recognise HEMS in the ‘primary response’ role)
  - ‘Secondary response’ – direct to a designated site<sup>145</sup> to meet a road ambulance(s) coming from either a hospital or incident site to facilitate rapid on-carriage of patient(s) by helicopter to a hospital<sup>146</sup>
  - ‘Tertiary response’ – planned urgent and rapid transfers of critically ill patients requiring specialized care between hospitals (inter-hospital transfers – the often referred to ‘air ambulance’ role).
- Within each of the HEMS categories of activity there can be crucial nuances, particularly in relation to the skill of the medical crew utilised. There appears to be a strong correlation between improved health outcomes and the skill level of those involved in the particular HEMS activities.
- Where the time interval between the identification of a particular patient condition and the delivery of the appropriate treatment or procedure is considered material to patient outcome, the use of HEMS can shorten this interval, except where short distances (e.g. within 30 miles / 50 kilometres) or intra-city transfers are involved because in such circumstances road transport may be as rapid and effective except where clinical requirements dictate otherwise.
- Options for the availability of aircraft will be a function of the role(s) for dedicated HEMS across the island:
  - ‘Primary response’ HEMS operations (e.g. call to the scene of an RTA) are virtually exclusively a daylight only activity (the exception often being with aircraft which have a joint SAR and EMS capability).
  - ‘Secondary response’ (e.g. helicopter meeting ground ambulance to take critically ill patient(s) to hospital) can involve both daylight and night time missions, depending on the availability of approved landing sights (with appropriate site lighting in the case of night operations).

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<sup>145</sup> Designated sites would need to be identified, recorded, mapped / charted and entered into a database available to clinical co-ordinators, HEMS operational crew and emergency service agencies. Such sites will need to be ‘monitored’ to ensure that they maintain operational integrity (i.e. remain free from obstructions etc), and if required for “24/7” operation, sites will need appropriate lighting facilities.

<sup>146</sup> ‘Secondary response’ missions can be either a response to an incident / accident and transport to an appropriate hospital via an intermediate designated site or a planned transport from one hospital to another hospital via an intermediate designated site.



- ‘Tertiary response’ (e.g. inter-hospital transfers of critically ill patients) can be undertaken at night provided the dispatching and receiving hospitals have adequate infrastructure (alternatively ground ambulances can be used at each or either end to undertake transfers to / from airports and / or approved designated landing sites).
- Any development of dedicated HEMS for the island of Ireland should be fully integrated within the broader healthcare system and should ‘evolve’ from existing services for pre-hospital emergency care and critical care. However, the implementation of dedicated HEMS, particularly in the ‘tertiary mission’ role (i.e. inter-hospital transfers), does not necessarily need to be contingent on implementation of all elements of current strategies for public ambulance services and specialist patient transport services.
- The Base Case should not be viewed as a ‘no investment’ / ‘do nothing’ option as a significant amount of enhancement is currently planned for the ambulance services of both Northern Ireland and the Republic of Ireland. Furthermore, specialist ground-based transport / patient transfer services exist that could also be readily expanded and developed further in order to increase the level of critical care services across the island. The existing limited air ambulance functions provided by maritime SAR operators and the Irish Air Corps, in particular, are evidence of need and the perceived deficits in dedicated facilities for tertiary transfers. These could be enhanced, particularly in terms of establishing an integrated all-island system for activation. Dedicated HEMS will not necessarily alter the number of patients requiring transfer, simply the manner and time involved to access definitive care (if done in a timely fashion).
- Development of dedicated HEMS would require a considerable time frame. The key elements involved would include, *inter alia*: recruitment and training of appropriately skilled staff; development and implementation of education awareness programmes; identification, development and certification of landing sites (including planning processes such as environmental impact studies as well as construction) and the procurement of a service provider(s). Various institutional arrangements would also need to be put in place, including cross-border funding / payments transfers agreements, hospital resources and staffing arrangements and protocols and ‘memorandum of understanding’ with various other agencies, particularly those in the emergency services sector. The establishment of linkages between the pre-hospital emergency care services and the hospital services will be essential. The time needed to complete the wide range of activities required would be up to 3 years from the date of any decision to proceed.

- Any decision to introduce dedicated HEMS on an all-Ireland basis will involve significant capital investment and annual operating costs. For example, due to the need to provide landing sites and other supporting infrastructure to ensure an effective service, a single helicopter inter-hospital transfer HEMS would cost up to €11.5 (Stg£8.0) million in capital costs and incur annual operating costs of €4.1 (Stg£2.8) million. However, the nature of the capital investment associated with establishing an initial HEMS operation as an inter-hospital transfer service would mean additional helicopters could be added at limited additional capital cost (between €150,000 and €200,000).<sup>147</sup> The annual operating expenditure requirement for each additional aircraft and service would be approximately €3.3 (Stg£2.3) million. Of this additional annual operating cost, approximately two-thirds to three-quarters would be associated directly with helicopter operations (including a base for the aircraft and operational crew) and the remainder associated with medical staff salaries and asset maintenance.
- If the aim were to achieve 'total population coverage' across the island of Ireland with a network of dedicated 'primary response' HEMS operations, operating within a 30 minute response time band, four aircraft would be required.
- In the context of dedicated 'primary response' HEMS, the appropriateness of four helicopters for the island of Ireland would be debatable. Concerns associated with inappropriate tasking of assets would clearly exist given the population and geography involved and the existing and planned enhancements to the pre-hospital emergency care services.
- Evidence from other countries indicates that the major function of 'primary response' HEMS is attendance to road traffic accidents and falls.<sup>148</sup> Other missions would include responses associated with persons collapsing, sporting injuries, horse riding, work and farm incidents.
- Based on historical data on air ambulance activity in Ireland, long distance ambulance journeys and the activity levels of the specialist road-based transfer services operating across the island of Ireland, an estimated level of demand in the order of 400 to 600 missions is envisaged for a dedicated inter-hospital transfer HEMS. This would translate to annual flying hours in the range of 1,000 hours to 1,500 hours. This would indicate demand for a single dedicated HEMS operation in the inter-hospital transfer role (albeit at the high end of activity levels for a single aircraft). A single helicopter dedicated inter-hospital transfer HEMS would have the capability / potential to perform the equivalent of 4 to 5 times the current air ambulance activity undertaken on a limited basis by the Irish Air Corps and SAR operators.

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<sup>147</sup> The establishment of HEMS initially in the 'tertiary response' (inter-hospital transfer) role would mean that investment would have been made in the provision of landing sites across the island; this being the major initial investment required to commence an effective service. It is assumed that an expanded service would involve a number of additional 'secondary' landing sites to supplement rooftop and ground landing facilities provided at hospitals, and additional medical equipment to support the service.

<sup>148</sup> Data for 2001 for all HEMS in England and Wales indicated that almost half (47%) of the HEMS activity was associated with road traffic accidents and 11% associated with falls (figures in excess of 60% of all call-outs 'to RTAs' were recorded for each of the Yorkshire and North West HEMS in England). These operations are all 'daylight only'.

- Key considerations in assessing the most appropriate location for a dedicated ‘tertiary response’ HEMS will include the quality, depth and breadth of medical skills, resources and services available for the treatment of ‘incoming’ critically ill and / or severely injured patients.<sup>149</sup> Potential locations for a ‘retrieval service’ (i.e. inter-hospital transfer service) would include the principal cities on the island, in particular Dublin, Belfast and Cork.
- Provision of an NI dedicated HEMS via services based in Scotland is unlikely to provide a satisfactory service to NI. Such a proposal may also meet with resistance from Scottish authorities as such an arrangement would lead to a diminution of services in Scotland as a whole (without additional resources). Sound practical reasons also suggest that such an option would be a sub-optimal arrangement for much of the population of Northern Ireland unless a new base closer to NI than the current nearest base in Glasgow is established.
- In England and Wales (except London HEMS), the choice of daylight operations appears to be more a function of the ability of the fund-raisers to raise sufficient money to meet monthly standing and flying hour charges than one of a matching of capability and availability with pre-determined estimates of the levels of likely demand.

### 6.3 Findings – Strategic Issues

- The economic and financial case for HEMS generally, and in an island of Ireland context, is equivocal and may always be so. A key concern with ‘primary response’ HEMS relates to inappropriate use, both in terms of modality and / or skills provided to the scene of incidents. The debate as to the effectiveness and appropriateness of HEMS has been on-going since the late 1970s.<sup>150</sup> However, there does appear very real potential for HEMS to deliver significant benefits to healthcare outcomes for critically ill patients across the island, particularly in the inter-hospital transfer role.

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<sup>149</sup> The helicopter does not need to be located at a hospital, but an aircraft base within close proximity to the site of the specialist medical crew is required.

<sup>150</sup> For example, Air Medical Journal, October – December 1998, “New Order of Things: An International Overview of Air Medical Transport” concludes: “We must develop effective air medical research models for proper and reliable evaluation of the cost-effectiveness of HEMS and air medical transfer. If researchers fail to define the optimal functions of the system and allow opinion and dogma to drive the type of care being rendered, our opportunity to identify the importance and impact of HEMS and air medical interhospital transfer may disappear.”

- The consideration of dedicated HEMS reveals a range of claimed ‘advantages’ and ‘disadvantages’ (or limitations) from other jurisdictions that may be relevant in the all-Ireland context. The literature reviewed predominantly focuses on medical outcomes. It offers, in the main, a generally supportive view of helicopter use for inter-hospital transfers (‘tertiary’ and ‘secondary’ response roles) with a much less unequivocal view for ‘primary-response’ HEMS.<sup>151</sup> The question as to the effectiveness of ‘primary-response’ HEMS on grounds of unequivocal positive or negative outcomes on medical grounds is still subject to considerable debate, even within the medical professions. Indeed, various studies have clearly questioned the clinical value of ‘primary-response’ HEMS while others indicate advantages to certain injury patterns and mechanisms and stress the importance of effective triage.
- A ‘primary response’ HEMS mission will typically involve an immediate response of specially trained medical personnel to the scene of an accident / incident. Treatment of the patient commences immediately and continues while the patient is rapidly transported to the nearest appropriate hospital.
- Appropriately staffed and equipped helicopters can facilitate early response in the ‘primary response’ situation as well as facilitate rapid transport to an appropriate hospital and thereby facilitate early administration of pre-hospital trauma and life support, often where not readily available otherwise.
- Among the various issues, questions of efficacy raised, and limitations identified with HEMS, particularly in the ‘primary response’ role, are:
  - Helicopters are costly to procure and to operate
  - Weather and other environmental conditions can limit the operation of helicopters (fog, low cloud or falling snow can keep HEMS on the ground, high winds and rain will not usually prevent a normal service)
  - ‘Primary response’ HEMS, which is almost exclusively a ‘daylight’ only capability, is potentially a diversion of funds from more cost effective investment in the pre-hospital emergency care system
  - Incidents of inappropriate tasking of helicopters are not uncommon in the ‘primary response’ role, particularly in terms of the severity of the injury being attended to by, in many instances, highly qualified medical crews
  - Data on mortality and morbidity benefits to all patients transported by HEMS in the ‘primary response’ role, *per se*, and relative to ground ambulance services is inconclusive.
- HEMS requires effective coordination with other emergency services agencies, particularly in the ‘primary response’ role where the policing services are necessary to supervise and manage incident sites in a safe manner.

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<sup>151</sup> A ‘secondary response’ mission can be a variation to a ‘tertiary response’ mission except that the pick-up site for the patient by the aircraft is not a hospital and the operation incorporates a road ambulance journey from the dispatching hospital or it could be a variation to a ‘primary response’ mission except that the pick-up site by the aircraft is not an incident site but is a designated site and initial transport is by road ambulance.

- ‘Secondary response’ involves the combined use of ground ambulances and helicopters (or fixed wing aircraft in some locations) at designated and approved landing sites to facilitate patient transfer to reduce the overall transfer time and to allow the ground ambulance to return to its designated area of cover.
- ‘Tertiary response’ missions differ in the main from ‘primary response’ missions, in two ways: the transport is planned and the medical crew and equipment can be ‘tailored’ to the specific needs of the patient to be transported. In this ‘air ambulance’ role, the air transport task is usually initiated (in accordance with appropriate clinical protocols) by the dispatching hospital in consultation with the specialist receiving hospital. HEMS in the ‘tertiary response’ role is analogous to the services currently provided by MICAS, NICCaTS and the NNTP in that transport is planned and involves transfers of critically ill patients between hospitals.
- Reduced residual disability / enhanced long term health outcomes and enhanced survival rates, particularly in critically ill patients requiring inter hospital transfer is a claimed benefit of HEMS in the ‘tertiary response’ role.
- In the ‘tertiary response’ role, HEMS offers fast long distance transport without dangerous and destabilising transfers, particularly for the critically ill requiring specialist tertiary care.
- It is claimed in some quarters that ‘tertiary response’ HEMS increases the overall quality of healthcare with a complementary service for ground ambulance services.
- There are implications for receiving hospitals under some HEMS ‘models’ (particularly in the ‘tertiary response’ role) in terms of additional facilities and staffing requirements.
- Effective HEMS (in any response role) requires an integrated (as opposed to fragmented) pre-hospital emergency care system and the development of a significant amount of (usually new) ‘institutional’ mechanisms including a system of clinical co-ordination, and implementation of an effective operational and clinical audit regime.
- HEMS should not be viewed as a panacea for shortcomings in the current EMS / pre-hospital systems operating in NI and RoI. The focus on enhancing these as outlined in current strategic plans should be maintained and where possible expedited.
- A feasible role for dedicated HEMS in an all-Ireland context appears to be:
  - The rapid inter-hospital transfer of critically ill or severely injured patients escorted by appropriately skilled and trained medical professionals.

However, significant investment would need to be made into, *inter alia*, supporting assets (e.g. helipads, communications systems) and systems (e.g. skills training, operational and management arrangements, pre-hospital emergency care and related systems integration) in order for HEMS to be effective and exploit the potential societal and financial benefits that could reasonably accrue.

- The case for HEMS in the ‘primary response’ role in particular (and to a lesser extent, in the ‘secondary role’) is significantly less obvious, particularly in terms of cost-effectiveness. Also the potential that may exist to divert funds from existing plans and initiatives associated with development of ground ambulance services and other elements of critical care transport is raised as a concern regarding ‘primary response’ HEMS.
- The health care sector (hospitals and Health Boards etc) produces a significant volume of operational and financial data. However, the feasibility study has revealed that much of the data on costs, activity levels and performance (particularly in the RoI) is fragmented and in many cases not readily available or adequately ‘captured’. There needs to be a systematic method for collecting, storing, analysing and distributing a wide range of basic data to support decision-making, including (but not limited to):
  - Disaggregated activity statistics, including response times, staff availability, trip data, delay data and exceptions reporting etc
  - Fleet availability and reliability data
  - Infrastructure availability and reliability data
  - Systems availability and reliability
  - Incident data (e.g. delays, failures, accidents etc) supported with ‘impact measures’
  - Asset condition data (including quality statistics)
  - Work activity recording.

- A common theme that emerges when reviewing the performance of HEMS and discussing practical operational, as well as clinical matters, with service providers is the need to focus, *inter alia*, on the following:
  - Operational integration with existing ground ambulances
  - HEMS as complementary to ground ambulance (and other elements of the pre-hospital care system) and other parts of a national healthcare system<sup>152</sup>
  - Appropriate tasking of assets
  - Training of dispatchers in aircraft use
  - Clinical co-ordination as the key to modality determination
  - Well developed communications systems / networks and operational protocols
  - Strong links (physical, formal and informal) between crew (operations and medical) and hospital(s) for purposes of on-going education, debriefings, audits and other elements to facilitate continuous improvement
  - Continuous improvement across all areas of operations - from dispatching protocols and systems, to records keeping and database development, to staff training and equipment uniformity, to systems R & D
  - The need for thorough and rigorous audit of tasking and skills application<sup>153</sup>
  - Familiarisation of medical professionals at receiving hospitals as well as dispatching hospitals of the capabilities and limitations of aircraft
  - Optimal utilisation of national health services.

## 6.4 Related Issues

Any future deliberations with respect to dedicated HEMS on an all-Ireland basis should also include consideration of the following:

- Various options are available which range from ‘doing nothing’ to focusing on an inter-hospital transfer role only, through to the possible inclusion of a ‘primary response’ service at a future time (notwithstanding the concerns regarding the cost-effectiveness and appropriateness of ‘primary response’ HEMS).
- Funding for dedicated HEMS should be additional to existing plans and should not be at the exclusion of current pre-hospital emergency care and critical care strategies.

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<sup>152</sup> “While a dedicated HEMS service would be a fine addition to a range of health services currently in place the difficulties facing any Department of State which acts as a funder are that there is a whole range of very good things to do which would be beneficial to people’s health but the amount of money available to pay for these activities must be restricted.” Examination of the need for a dedicated air ambulance service by the Standing Committee on Air Ambulance Services, Ireland 1996. “Howsoever, in the context of when the country has in place a comprehensive ground-based integrated pre-hospital emergency medical service, the question of putting in place a HEMS as a complementary service should be seriously considered in tandem with the development of a total acute services response to patient need.” Helicopter Emergency Medical Services (HEMS) – A Discussion Paper for The National Ambulance Advisory Council, Ireland 1997.

<sup>153</sup> There is probably a role here for the National Ambulance Training Board jointly with the NIAS Regional Ambulance Training Centre.

- Clinical co-ordination, utilising and liaising with local and regional medical expertise, should be the prime 'driver' of any dedicated HEMS activity if implemented. This means that the appropriate level of response (escort and transport) is based on the medical requirements of the patient.
- For effective dedicated all-Ireland HEMS, guidelines for a clinical co-ordination system will need to be developed jointly by DoHC and DHSSPS to ensure standardised procedures across the island of Ireland. The role of clinical coordination should be strictly underpinned by a desire to provide appropriate levels of medical response in suitable and appropriate transport.
- Effective dedicated HEMS on an all-Ireland basis would necessitate asset co-ordination and communications to be undertaken, potentially, by a joint Northern Ireland / Republic of Ireland service agency / secretariat.
- A 'single number dial' initial contact system with the healthcare network (and / or emergency services) would need to be established to include the existing clinical co-ordination mechanisms, e.g. Mobile Intensive Care Ambulance Service, National Neonatal Transport Programme and Northern Ireland Critical Care Transfer Service. This approach could be expected to reduce the number of calls (within the system) being made, resulting in quicker response times. It would also enable the system to operate free of easy avenues for by-passing protocols.
- An internal (from within the DHSSPS and DoHC, for example) and external (using medical expertise from other jurisdictions, e.g. England or Scotland) operations and clinical audit system would be required to ensure that appropriate HEMS responses were being arranged through the clinical co-ordination process. This aids in ensuring that appropriate aero-medical and road movements are being asked for and helps reduce the level of incidence of inappropriate medical and / or transport mode responses. It will also enable the build-up of an "activity profile" for use as a guide for future reference.
- Uniform minimum training standards for HEMS and other aero-medical escort/support crew staff would need to be introduced and agreements between DoHC, DHSSPS, NIAS and the National Ambulance Training Board, PHECC and the medical coordinators at major hospitals would need to be devised regarding the level of escort skills required and appropriate staffing levels. The specialised nature of the HEMS environment and lack of professional orientation by those entering the aero-medical service for the first time, or understanding by those whose work interacts with the HEMS service, can create inefficiencies and occasions of patient care being compromised. The issue of professional indemnity and associated insurance issues would need to be resolved for inter-jurisdiction activities.



- Safety is paramount when working in an aviation environment and is a matter of concern in respect of both patient welfare and work force occupational health and safety. The quality of a HEMS service is dependent upon the quality of the staff providing the service and the degree to which they form an interrelated component of arrangements for health service delivery. Professional development, training and orientation, as well as awareness by healthcare providers who will interrelate with HEMS services, underpin the quality of service delivery and outcome for service clients.
- HEMS staffing policy and practices should require implementation of orientation procedures and ongoing refresher training. Orientation should include cross-cultural awareness training. Medical staff should be required to complete training in the early management of severe trauma (e.g. Advanced Trauma Life Support) and / or related courses. Ambulance officers and / or nursing staff should have completed appropriate training in advanced life support.
- The nature of HEMS work may require staff to work without support or with limited or intermittent supervision. Therefore, significant prior experience and proven competency in providing the professional level of care associated with that service, prior to working in the aviation environment, should be required. Experience and proven competency applies equally to standards for pilot employment. The nature of the work can be stressful and could require night-time and inclement weather operations. Standards should require the implementation of ongoing professional development strategies for staff from all disciplines. Issues such as the nature and role of mission / tasking debriefing sessions should be defined; the requirements for audit procedures determined and stress management practices determined.
- The initial use of a central fund for funding may be deemed appropriate in an environment where, whilst the quantum may be relatively predictable, the dispersion and range of severity is not. This would be the case with HEMS demand across the island of Ireland, and would likely be the case at least a few years into the operation of any dedicated HEMS system. Use of historical trends, as data recording is improved and standardised, may facilitate devolution of fund allocation to appropriate regional and sub-regional levels at some future stage.
- Centralised funding with allocation based on actual use (subject to strict auditing) would not expose rural or remote medical facilities (or particular regional authorities) to major dilemmas centred upon resource allocation. It would also aid in addressing the difficulty of allocation that is presented by the interplay of demographics, distance and randomly occurring events (such as major trauma incidents).

- The problem of responsibility for flight costs has been identified as a potential reason for reluctance in the arrangement of HEMS / aero-medical transfers. This could cause delays to responses as questions are raised about responsibility for payment for specific transport tasks. **The prime determinant of transport modality must be the clinical requirement, with cost considerations dealt with separately, utilising clear policy / procedural guidelines.** The need for medical practitioners to undertake ‘on the spot’ clinical decisions should not be pressured by financial considerations associated with modality.
- Adoption of ‘user pays’ concepts and mechanisms should be considered in the context that they do not interfere with the delivery of appropriate and timely clinical decisions (both medical and transportation).
- A well-specified service requirement is essential for the effective operation of a dedicated all-island HEMS. It is important that the services required to deliver a HEMS are clearly defined in the form of an ‘output specification’. Such a specification would set out the specific services to be delivered and would be the starting point for determining an appropriate procurement strategy and process, ongoing management arrangements and for assessment of value for money regarding the services procured. The advantage of an output specification is that it focuses on a defined level of service and not on a range of inputs. The risks associated with management of assets and recurrent costs can therefore be taken into account when considering the overall service to be procured.

## GLOSSARY

**A&E:**

Accident and Emergency. A term usually applied to either vehicles / ambulances or hospital units.

**CPI:**

Consumer Price Index – the usual indicator /measure of price inflation.

**DHSSPS:**

Department of Health, Social Services and Public Safety, Belfast.

**DoHC:**

Department of Health & Children, Dublin.

**EMS:**

Emergency Medical Services

**EMT:**

Emergency Medical Technician. A non-doctor provider of pre-hospital emergency care, at basic life support level. EMTs are, in the main, employed in the Ambulance Service, both in the public (Health Boards and Dublin Fire Brigade) and private sector in the Republic of Ireland. To become an EMT it is necessary to complete the Emergency Medical Technician programme in a recognised training institution and be successful in the National Qualification in Emergency Medical Technology (NQEMT) examination conducted by the Pre-Hospital Emergency Care Council (PHECC).

**HEAS:**

Helicopter Emergency Ambulance Service. A term used in England and Wales to describe operations consistent with the 'HEMS' function as defined under European aviation regulations vis-à-vis the 'Primary Mission' categorisation where medical crews provide immediate assistance at the accident scene:

(2) *Helicopter Emergency Medical Service (HEMS)* – “A flight by a helicopter operating under a HEMS approval, the purpose of which is to facilitate emergency medical assistance, where immediate and rapid transportation is essential, by carrying:

- Medical personnel; or
- Medical supplies (equipment, blood, organs, drugs); or
- Ill or injured persons and other persons directly involved”.

**HEMS:**

Helicopter Emergency Medical Service. The ‘HEMS’ function as defined under European aviation regulations is consistent with the more widely recognised ‘primary response’ operations of which the second is consistent with the ‘Primary Mission’ categorisation where medical crews provide immediate assistance at the accident scene:

(2) *Helicopter Emergency Medical Service (HEMS)* – “A flight by a helicopter operating under a HEMS approval, the purpose of which is to facilitate emergency medical assistance, where immediate and rapid transportation is essential, by carrying:

- Medical personnel; or
- Medical supplies (equipment, blood, organs, drugs); or
- Ill or injured persons and other persons directly involved”.

**HMCG:**

Her Majesty’s Coastguard. (This entity is now understood to be subsumed within the Marine and Coastguard Agency).

**Inter-hospital transfer / air ambulance:**

The retrieval service (inter-hospital transfer) is consistent with the European aviation regulations definition of ‘tertiary mission’:

- (3) *Helicopter Air Ambulance Flight* – “A flight usually planned in advance, the purpose of which is to facilitate medical assistance, where immediate and rapid transportation is not essential, by carrying:
  - Medical personnel; or
  - Medical supplies (equipment, blood, organs, drugs); or
  - Ill or injured persons and other persons directly involved”.
- This corresponds to the “Tertiary Mission”, or the ordered *inter-hospital transfer*.

**IRCG:**

Irish Coast Guard

**Irish Air Corps:**

The aviation branch of the Defence Forces of the Republic of Ireland.

**JAR-OPS:**

Joint Airworthiness Regulations of the Joint Airworthiness Authority – an agency that regulates European aviation matters of which both Ireland and the UK are participants.

**OJEC:**

Official Journal of the European Community.

**MICAS:**

Mobile Intensive Care Ambulance Service. Operated in the Republic of Ireland. A dedicated road vehicle transfer service for adult patients for transfer from local hospitals to central Intensive Care Units.

**MCA:**

Marine and Coastguard Agency. An executive agency of the UK's Department for Transport which provides a response and co-ordination service for maritime Search & Rescue, counter pollution and salvage.

**MoD:**

The Ministry of Defence of the United Kingdom of Great Britain and Northern Ireland.

**MoU:**

Memorandum of Understanding

**MRT:**

Maritime Rescue Team

**NNTP:**

National Neonatal Transport Programme. Operated in the Republic of Ireland. A 7-day per week transport service for infants up to 6 weeks based on three Dublin hospitals.

**NI:**

Northern Ireland

**NICCaTS:**

Northern Ireland Critical Care Transfer Service. A road vehicle transfer service for patients over the age of 12 years from hospital to hospital where the receiving hospital / facility is either an Intensive Care Unit (ICU) or operating theatre / scanning suite.

**Paramedic:**

In the UK, Ambulance Paramedics (as designated by the National Health Service – NHS) are specially selected and highly trained Ambulance Technicians who undertake at least two months additional clinical training in lifesaving procedures. The course includes additional training in anatomy and physiology, advanced trauma management and treatment of serious medical emergencies. Paramedics learn a range of invasive skills and how to administer a wide range of drugs.

**PHECC:**

Pre-Hospital Emergency Care Council - a statutory agency of the Republic of Ireland.

**PPP:**

Public Private Partnership.

**PSNI:**

Police Service of Northern Ireland

**RNLI:**

Royal National Lifeboat Institution.

**RoI:**

Republic of Ireland.

**RTA:**

Road Traffic Accident

**SAR:**

Search and Rescue. The European regulatory authority definition of SAR operations from an aviation perspective is as follows:

*Search & Rescue (SAR)* – “A flight the purpose of which is to give immediate assistance to persons threatened by grave and imminent danger or hostile environment”.

**Secondary Mission / Secondary Response HEMS:**

Under European regulations, the understanding of the “Secondary Mission” is one where a helicopter combines with a ground ambulance under a number of different scenarios to optimise patient outcome as well as optimising overall resource use.

**“24/7”:**

Twenty-four hours per day, seven days per week.