Evaluation of Options for Primary Emergency Care Provision in the HSE Western Area

Pre-Hospital Emergency Care Council

July 2005

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1 Introduction

1.1 Background

The aim of this study is to identify spatial configuration options for Ambulance services that will assist in reducing the cumulative times for the delivery of emergency care to patients.

The study uses the term Spatial Cover[1] to identify broad geographic areas that represent service areas from each Ambulance station. Theoretical models of emergency care provision are developed that illustrate Response Times for Ambulance services and the relationships with locations of secondary emergency care centres. The models assume that all current Ambulance stations (see Table 1) provide 24/7 cover and that these can provide full service at all times. The sections on return-to-hospital times assume that within the region secondary emergency care is provided initially from hospitals in Galway city (UCGH), Castlebar General Hospital and Ballinasloe (Model 5). Later models envisage that only Galway and Castlebar are utilised.

In addition to standard Emergency Medical Technician (EMT) services, Advanced Paramedic (AP) services are modelled from a number of locations; these are evaluated in the study. Other similar studies assumed that Ambulance personnel undertook minimal medical procedures and the focus of the studies was on times taken to get patients to hospital. As AP services are specifically focused on undertaking procedures to stabilise patients with life threatening conditions the focus in this study is on 'Intervention' time i.e. the time elapsed between receipt of the emergency call and arrival at scene.

Table 1

Health Service Executive Ambulance Station and cover			
Region	**Station**	**COUNTY**	**Cover (Jul. 2005)**
West	Ballinasloe	Galway	"on-duty" to 08.00 to 2.00, "on-call" to 2.00 to 08.00
West	Carraroe	Galway	"on-duty" to 08.00 to 20.00, "on-call" to 20.00 to 01.00
West	Clifden	Galway	"on-duty" to 09.00 to 2.00, "on-call" to 2.00 to 09.00
West	Galway	Galway	24-Hour 'On-Duty'
West	Loughrea	Galway	24-Hour 'On-Duty'
West	Ballina	Mayo	24-Hour 'On-Duty'
West	Belmullet	Mayo	"on-duty" to 09.00 to 21.00, "on-call" to 21.00 to 09.00
West	Castlebar	Mayo	24-Hour 'On-Duty'
West	Boyle	Roscommon	"on-duty" to 08.00 to 2.00, "on-call" to 2.00 to 08.00
West	Roscommon	Roscommon	24-Hour 'On-Duty'

A number of models are presented below that encompass a variety of configurations of services; the targets times for these are 25-minutes for 'Response' time and 60-minutes for 'Return-to-hospital' and 'Intervention' time.

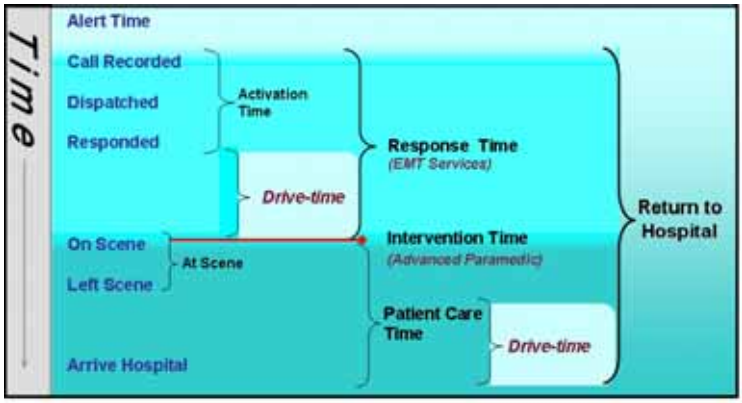
[1] The authors use the term 'Spatial Cover' to differentiate between it and the term 'Ambulance Cover' which relates to hours of availability and staffing arrangements at individual stations.

1.2 Critical Time Elements

The assessment of Response time, Return-to-hospital time and Intervention time are based on a number of separate activities in the delivery of care, these are;

Alert Time	*The time from the moment of the accident to the call to emergency services.*
Response Time	*The time from receipt of the call to arrival at the scene. Includes activation and drive time.*
Return to Hospital Time	*The sum of Response time and the time from arrival at 'Scene' to arrival at appropriate hospital. Includes Patient care and return drive-time.*
Intervention Time	*The time from receipt of call to arrival at the scene of an Advanced Paramedic team*

Figure 1.1 *Critical Time Elements*



'Alert' time, is the time between an emergency incident occurring and notification of the emergency services. It is difficult to estimate and varies according to context, however, it is assumed here that this time interval has reduced considerably in recent years due to the prevalence of mobile phones and is likely in many instances to be less than a minute.

Response time has been shown to have a wide range in Ireland (Breen et al, 2000)[2]. Key factors that influence response time include crew availability, distances and travel conditions. Crew availability primarily affects 'activation time' and with the widespread use of 24 hour cover in most Ambulance stations it is assumed that average 'activation times' have reduced. We assume an activation time of 5-minutes which reflects the median activation time for 'on-duty' crews found by Breen. From this figure a nominal target of 25 minutes 'response' time is used in the study, made up of 5 minutes activation time and minutes drive-time.

Patient care time will vary considerably according to the nature of the incident, and will thereby influence the 'Return-to-hospital' time. To simplify matters a five-minute stay is assumed at the incident and a slightly slower driver time to bring the patient to the required hospital. On this basis a nominal target of 60 minutes 'Return-to-hospital' time is chosen.

It is important to stress that the nominal targets do not represent definitive quality targets for Ambulance services but are instead intended to provide broad standardised objectives that can be used to compare the spatial cover between stations and regions only in the context of this study.

[2] Breen N, Wood J, Bury G, Murphy AW, Brazier H (2000).'A national census of ambulance response times to emergency calls in Ireland'. Journal of Accident and Emergency Medicine, 2000, 17: 392-5.

1.3 GIS Analysis

A GIS drive-time model is used to estimate the relevant spatial distances from each Ambulance station. The model uses road distance travelled and road quality. A delay factor has been applied for urban areas, where other road users are likely to delay progress of Ambulances. The average road speeds for Ambulances that have been used in the study are listed below. Although these vary according to the time of day and day of the week a standard delay factor has been applied which maintains the relative clarity of the model. The times used in the model are listed below in Table 2.

The first part of the model produces drive-time distances for each Ambulance station. These then are combined with return drive times for the study area back to specified hospital locations. The model assumes that each accident/incident will be served by the closest Ambulance station (by time) and that the Ambulance will return to the nearest appropriate secondary care centre. The model is flexible and different Ambulance station and hospital configurations can be used to test optimum service patterns.

Table 2

Average Road Speeds used in Model

	Average		Kilometres
Road Type	**MPH**	**KMH**	**Per Minute**
Motorway	68	109.4	1.82
National Primary	60	96.5	1.61
National Secondary	50	80.5	1.34
Regional Road	48	77.2	1.29
Third Class	32	51.5	0.86
Fourth Class	25	40.2	0.67
Northern Ireland (B) Road	50	80.5	1.34
Urban Normal Road	35	56.3	0.94
Urban Slow (Congested areas)	20	32.2	0.54

The drive-times used have been assessed by Ambulance personnel in the region and have been found to be broadly accurate with actual drive-times of Ambulances. However it must be stressed that these drive times represent an average approximation under controlled circumstances and assumptions in respect of different types of Ambulance times.

Estimation of population within the specified targets is carried out through 'overlaying' the GIS datasets of Electoral Divisions (ED)[3] with the results of the drive-time model. Invariably the results of the model and ED boundaries are not conterminous, in these cases an evaluation is made on where to assign the relevant population. The evaluation is made on the basis of the percentage of the ED within the particular drive-time distance and the local geography of the ED, which will influence the likely location of population within each ED.

For the Road Traffic Accidents a simple overlay procedure is used, and accidents for each drive-time distance are allocated solely on the basis of whether it lies within a particular drive-time band.

1.3.1 Data sources

A number of datasets were utilised in the study, these are listed in Table 3. The NRA Road Traffic Accidents database was used to provide information on all road traffic accidents in

[3] Electoral Divisions are the smallest aerial unit that is published by the CSO.

each region. The NRA compiles the database from records provided by An Garda Síochána[4]. The database lists all road traffic accidents where injury or damage to vehicles occurred from 1990 to the present. The database is very comprehensive and includes information on; numbers of people and vehicles involved; the age and sex of drivers, passengers and pedestrians; types of injuries sustained by drivers, passengers and pedestrians; time and location of each incident; the road type; the weather and driving conditions and possible cause of the accident.

The location attributes of the database are very important to this study as individual accidents can be located to +/- 100 metres and this allows close analysis of the spatial patterns of the RTA's.

In the Road Traffic Accidents database injuries are classified as 'Fatal', 'Serious Injury' or 'Minor Injury'. Fatal injuries occur when at least one person is killed as a result of the accident within 30 days of the accident. Serious injury is defined as an injury for which the person is detained in hospital as an 'in patient', or has sustained any of the following injuries whether or not they were detained in hospital: fractures; concussion; internal injuries; crushing; severe cuts and lacerations; and, severe general shock requiring medical treatment. Minor injuries are an injury of a minor nature such as a sprain or bruise (NRA, 2000).

Table 3

GIS Datasets used in the Study			
Data Set	***Type***	***Source***	***Description***
Roads 1:210,000	*GIS Vector*	*OSI*	*All roads classified by NRA Road Code*
Administrative *(County) Boundaries,* 1:210,000	*GIS Vector*	*OSI*	
DED Boundaries *(*SABE*)*	*GIS Vector*	*Eurogeographics*	*Small Area Statistics administrative boundaries*
Lakes Rivers *and* ***Background mapping*** 1:210,000	*GIS Vector*	*OSI*	
Main Towns *Polygons and points* (1:210,000)	*GIS Vector*	*OSI*	
Census of Population *1996*	*Numeric*	*CSO*	*Total Population*
Census of Population *2002*	*Numeric*	*CSO*	*Total Population*
Service points *– Ambulance Stations*	*Text /Numeric*	*HSE Western Area*	*Coordinates and details of emergency services, including operational data of the Ambulance Services.*

[4] These are carried out on CT68 forms for all reported accidents.

1.4 Analysis Options

We consider two aspects of the operation of emergency care provision; (1) examining options that improve 'Response times' after an Ambulance has been called and (2) examining options for improving 'Intervention time'.

(A) Response Time:

The options examined are;

i) **Model 1 (Baseline).** Quantifies the response times from the use of existing Ambulance stations as listed in Table 1.

ii) **Model 2** Quantifies potential contribution from use of Ambulance stations in neighbouring HSE areas. The Ambulance stations used in this analysis are Sligo, Carick-on-shannon, Longford, Athlone, Roscrea, Scarriff and Ennistimon.

iii) **Model 3** Evaluates the impact of development of a possible new Ambulance deployment location in Tuam Co. Galway.

iv) **Model 4** Evaluates the impact of development of possible new Ambulance deployment locations in Tuam Co. Galway, Gort Co. Galway and Ballyhaunis Co. Mayo.

(B) Return-to-Hospital – 'Intervention Time':

Again a number of scenarios are examined:

v) **Model 5** Evaluation of 'Return-to-hospital' times using existing Ambulance resources both within the region providing standard Emergency Medical Technician (EMT) services with three hospitals (UCGH, Castlebar and Ballinasloe) providing secondary emergency care. The response times are based on model 1.

vi) **Model 6 (Baseline Return-to-Hospital Time)** Evaluation of 'Return-to-hospital' times using existing Ambulance resources both within the region providing standard EMT services with the two hospitals (UCGH and Castlebar) providing secondary emergency care. The response times are based on model 1.

vii) **Model 7** Examination of the potential impact on 'Return-to-hospital' where both Ambulance services and secondary emergency services are provided from neighbouring HSE areas. The response times are based on model 2 and additional secondary emergency care centres examined are Sligo, Mullingar and Limerick.

viii) **Model 8** Examination of the potential impact on 'Return-to-hospital' where an additional possible Ambulance deployment point operates from Tuam Co. Galway and neighbouring emergency services are utilised as per model 7.

ix) **Model 9** Examination of the potential impact on 'Return-to-hospital' where a number of additional possible Ambulance deployment points operate from Tuam Co. Galway, Gort Co. Galway and Ballyhaunis Co. Mayo. Together with neighbouring emergency services utilised as per model 8.

x) **Model 10 (Intervention Time)** Examination of the potential impact on 'Intervention times' through the use of Advanced Paramedic (AP) services. A number of location options for AP services are examined. The locations presented in this model are based in Galway and Castlebar with additional services complementing these locations from Sligo (NW Area) and Athlone (Midlands Area).

1.5 Model Assumptions and Operational Contingencies

The fundamental assumption used in this study, that there are always Ambulance resources available at the nearest station to a particular incident is required to allow comparisons of the geographic relationship between Ambulance service provision and centres of secondary emergency care. Commonly in operational practice this assumption does not prevail and a particular station may not have resources available due to other emergency commitments or patient transport duties. In addition certain critical time elements can be considered to reflect optimum minimal times under 'best case' conditions; including for example short 'at scene' times, dry weather travel times etc.

These 'normalising' assumptions allow comparisons between different areas and enable comparisons of the geographic distribution of emergency services. To reflect real operational contingencies it is necessary to model real incidents and Ambulance response taken from operational records. This type of analysis has relevance for the distribution and availability of Ambulance resources within any region and the relationship to areas of highest demand for those resources. As such this builds on and complements the current study by including operational contingencies in addition to the geographic patterns of service potential presented here. The Pre-Hospital Emergency Care Council is engaged in preliminary studies on methods of using actual incident records to undertake this second phase of spatial analysis of emergency care provision.

2 Response Times

2.1 Model 1 Current Ambulance provision in HSE Western Area only

The response times are assessed for the ten ambulance stations in operation in January 2005. The response times portrayed in Map 1 and the respective population and Road Traffic Accident data are provided in Table 4 & 5 below.

Table 4

Response-time Populations *(Model 1)*				
Location	**Total Population**			
	2002	***%***	***1996***	***%***
Clare Border (1)	2,224	*0.6%*	2,229	*0.6%*
S. Connemara (2)	4,376	*1.2%*	4,277	*1.2%*
N. Connemara (3)	5,190	*1.4%*	5,236	*1.5%*
Mid Connaght (4)	37,088	*9.8%*	36,516	*10.4%*
N. Mayo Coast (5)	1,247	*0.3%*	1,429	*0.4%*
Achill & N. Mayo (6)	5,002	*1.3%*	5,121	*1.5%*
Islands (7)	1,657	*0.4%*	1,722	*0.5%*
Outside 25 Minutes	**56,784**	*14.9%*	**56,530**	*16.0%*
Within 25 Minutes	**323,513**	*85.1%*	**295,823**	*84.0%*
Total	*380,297*	*100%*	*352,353*	*100%*

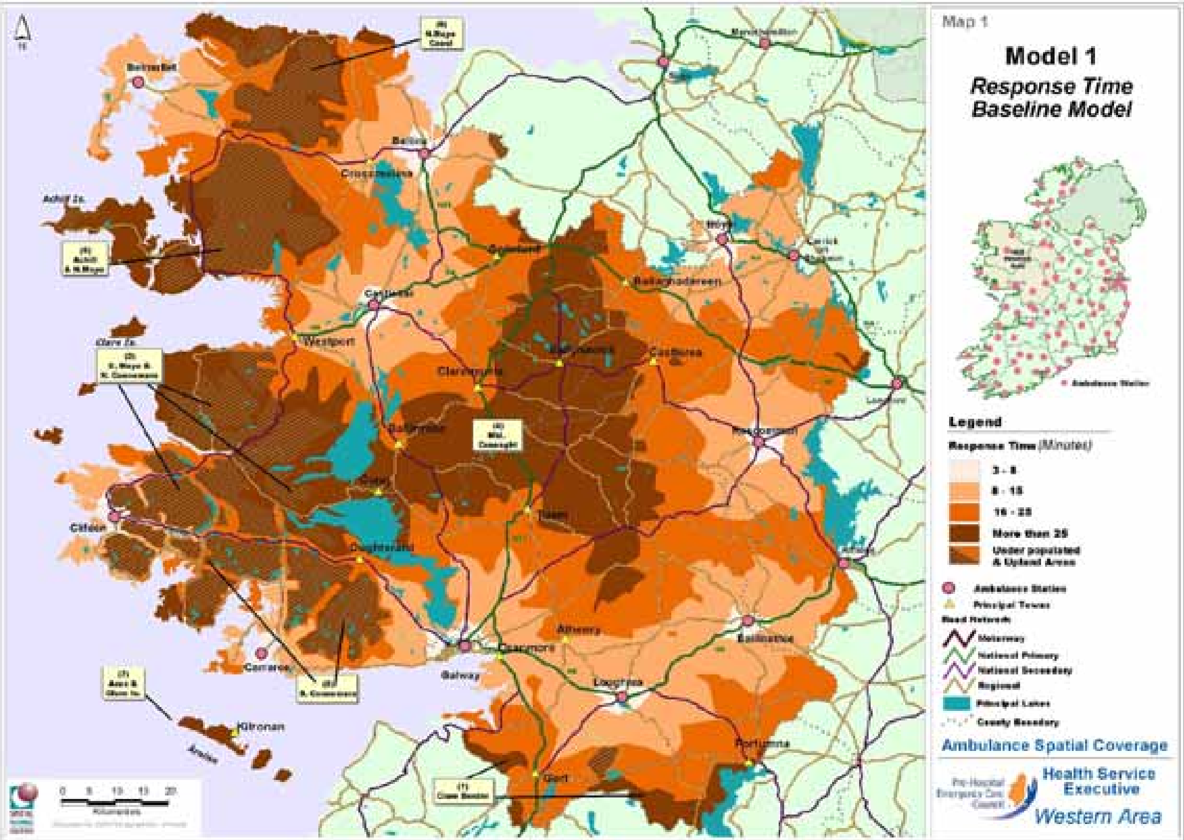
Source: CSO 2002, SPS Drive-time Model

Table 5

Response-time RTA's 1997 - 2001 *(Model 1)*								
Location	**RTA's**		**Fatal Injuries**		**Serious Inj.**		**Minor Inj.**	
	No.	*%*	*No.*	*%*	*No.*	*%*	*No.*	*%*
Clare Border (1)	8	*0.3%*	*1*	*0.5%*	3	*0.3%*	12	*0.3%*
S. Connemara (2)	11	*0.3%*	*2*	*0.9%*	3	*0.3%*	21	*0.5%*
N. Connemara (3)	25	*0.8%*	*4*	*1.9%*	10	*1.0%*	28	*0.7%*
Mid Connaght (4)	308	*9.7%*	*28*	*13.0%*	128	*13.4%*	365	*8.7%*
N. Mayo Coast (5)	4	*0.1%*	*0*	*0.0%*	2	*0.2%*	9	*0.2%*
Achill & N. Mayo (6)	40	*1.3%*	*1*	*0.5%*	16	*1.7%*	61	*1.5%*
Islands (7)	9	*0.3%*	*0*	*0.0%*	0	*0.0%*	13	*0.3%*
Outside 25 Min.	**405**	*12.8%*	**36**	*16.7%*	**162**	*16.9%*	**509**	*12.2%*
Within 25 Min.	**2,769**	*87.2%*	***180***	*83.3%*	**794**	*83.1%*	**3,672**	*87.8%*
Total	*3,174*	*100%*	*216*	*100%*	*956*	*100%*	*4,181*	*100%*

Source: NRA Road Traffic Accidents Database, SPS Drive-time Model

In total 56,784 people (14.9% of the regions population) were resident in areas outside the 25-minute target response times. The most significant area is identified as 'Mid Connaght' comprising of a broad swath of land extending from Cong through north county Galway to county Roscommon. In west Galway the areas of South and North Connemara contain 4,376 and 5,190 people respectively, this area is characterised by poor road connectivity and a dispersed population. The Achill and North Mayo area has similar characteristics and the model indicates that 5,000 people live in areas outside the target response.


Map 1
Model 1
Response Time
Baseline Model
Legend
Response Time (Minutes)
3 - 8
8 - 15
16 - 25
More than 25
Under populated
& Upland Areas
Ambulance Station
Principal Towns
Road Network
Motorway
National Primary
National Secondary
Regional
Principal Lakes
County Boundary
Ambulance Spatial Coverage
Health Service
Executive
Western Area
Westport
Ballina
Galway
Clifden
Athenry
Loughrea
Gort
Portumna
Kilronan
Kilometres

2.2 Model 2 Use of Neighbouring Stations

Ambulance stations from neighbouring HSE areas are included in this model and how they can potentially be of assistance to emergency services in the Western Area is demonstrated. In the original study that examined the distribution of Ambulance service in the Western area the methodology excluded the use of Ambulance resources from neighbouring HSE areas. This aspect of the methodology facilitated clarity of the response capability of Ambulance services within each separate HSE area. Furthermore since the use of neighbouring services is often on an 'ad-hoc' basis with decision on utilisation undertaken on a case-by-case basis it is difficult to fully quantify the extent of cross regional services. The additional stations included in the analysis are Sligo and Carrick-on-Shannon (HSE NW area), Longford and Athlone (HSE Midlands area), Roscrea, Scarriff and Ennistimon (HSE Mid Western area). As with all models cover is assumed to be 24/7 'on-duty' from all these stations.

Table 6

Response-time Populations *(Model 2)*

Location	Total Population			
	2002	***%***	***1996***	***%***
Clare Border (1)	760	*0.2%*	812	*0.2%*
S. Connemara (2)	4,376	*1.2%*	4,277	*1.2%*
N. Connemara (3)	5,190	*1.4%*	5,236	*1.5%*
Mid Connaght (4)	36,344	*9.6%*	35,844	*10.2%*
N. Mayo Coast (5)	1,247	*0.3%*	1,429	*0.4%*
Achill & N. Mayo (6)	5,002	*1.3%*	5,121	*1.5%*
Islands (7)	1,657	*0.4%*	1,722	*0.5%*
Outside 25 Minutes	**54,576**	*14.4%*	**54,441**	*15.5%*
Within 25 Minutes	**325,721**	*85.6%*	**297,912**	*84.5%*
Total	*380,297*	*100%*	*352,353*	*100%*

Source: CSO 2002, SPS Drive-time Model

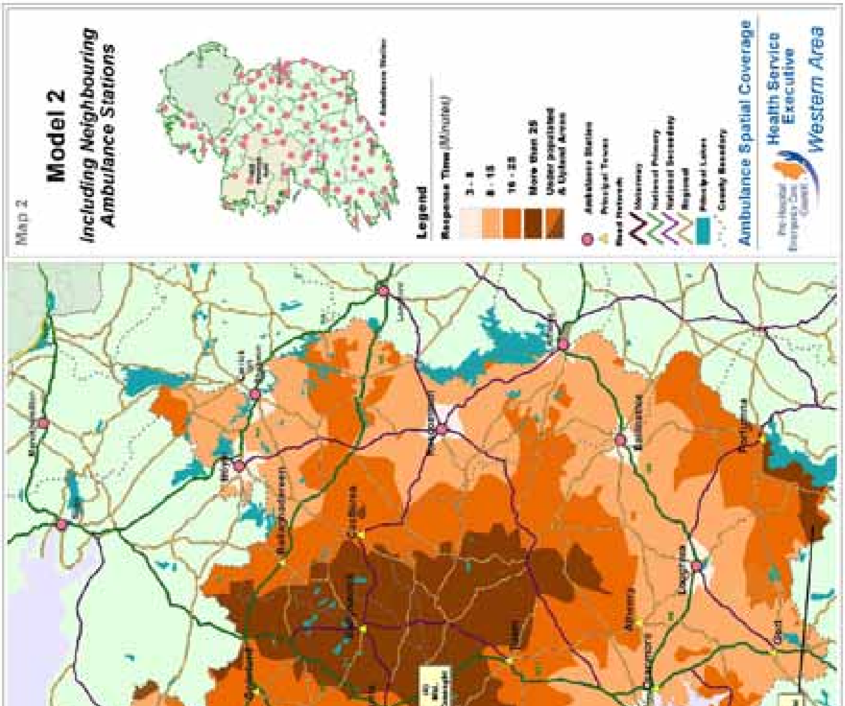
Table 7

Response-time RTA's 1997 - 2001 *(Model 2)*

Location	RTA's		Fatal Injuries		Serious Inj.		Minor Inj.	
	No.	*%*	*No.*	*%*	*No.*	*%*	*No.*	*%*
Clare Border (1)	1	*0.0%*	*1*	*0.5%*	1	*0.1%*	0	*0.0%*
S. Connemara (2)	11	*0.3%*	*2*	*0.9%*	3	*0.3%*	21	*0.5%*
N. Connemara (3)	25	*0.8%*	*4*	*1.9%*	10	*1.0%*	28	*0.7%*
Mid Connaght (4)	305	*9.6%*	*28*	*13.0%*	126	*13.2%*	361	*8.6%*
N. Mayo Coast (5)	4	*0.1%*	*0*	*0.0%*	2	*0.2%*	9	*0.2%*
Achill & N. Mayo (6)	40	*1.3%*	*1*	*0.5%*	16	*1.7%*	61	*1.5%*
Islands (7)	9	*0.3%*	*0*	*0.0%*	0	*0.0%*	13	*0.3%*
Outside 25 Min.	**395**	*12.4%*	**36**	*16.7%*	**158**	*16.5%*	**493**	*11.8%*
Within 25 Min.	**2,779**	*87.6%*	***180***	*83.3%*	**798**	*83.5%*	**3,688**	*88.2%*
Total	*3,174*	*100%*	*216*	*100%*	*956*	*100%*	*4,181*	*100%*

Source: NRA Road Traffic Accidents Database, SPS Drive-time Model

As is apparent from Maps 1 and 2 the location of the principal out-of-target areas in the centre and the western fringes of the region result in only minor reductions in the population and RTA's based in areas beyond the 25-minute target. In total an additional 2,208 people could be reached within 25-minutes between model 1 and model 2, representing a reduction of 3.9%. These reductions occurred along the Clare border with services from Scarriff and Ennistimon (1,464 people) and the northern parts of the mid Connaght block just west of Ballaghaderreen with services from Sligo (see Map2). Sligo is better placed to service this locality than services from Boyle due to better road connectivity along the N17. Other stations such as Athlone and Carrick-on-Shannon reduced response times in their catchments but had little impact on the response target times.


Map 2
Model 2
Including Neighbouring Ambulance Stations
Legend
Response Time (Minutes)
3 - 8
8 - 15
15 - 25
More than 25
Under populated & Upland Areas
Ambulance Station
Principal Towns
Road Network
Motorway
National Primary
National Secondary
Regional
Principal Lakes
County Boundary
Ambulance Spatial Coverage
Health Service Executive
Western Area
Westport
Castlebar
Ballina
Crossmolina
Belmullet
Achill Is.
Clifden
Oughterard
Galway
Carraroe
Kilronan
Gort
Loughrea
Portumna

2.3 Model 3 Additional Deployment Point (Tuam)

In order to address the extensive out-of-target area identified in Mid Connaght this model assesses the impact on Response Time of providing an additional Ambulance deployment point in Tuam Co. Galway. The model assumes that neighbouring stations as per model 2 are also utilised.

The results presented below in Tables 8 and 9 and Map 3 demonstrates a considerable reduction in both population and RTA's based outside the 25-minute target. In Mid Connaght the number of people indicated as being outside the target are 12,645, a reduction of 23,699 people or 65% from the population indicated in model 2. In terms of RTA's there was a similar scale of reduction with 196 (64.3%) from the initial 305 RTA's that occurred in the out-of-target area in Mid Connaght presented in model 2.

Table 8

Response-time Populations *(Model 3)*

Location	Total Population			
	2002	***%***	***1996***	***%***
Clare Border (1)	760	*0.2%*	812	*0.2%*
S. Connemara (2)	4,376	*1.2%*	4,277	*1.2%*
N. Connemara (3)	5,190	*1.4%*	5,236	*1.5%*
Mid Connaght (4)	12,645	*3.3%*	12,525	*3.6%*
N. Mayo Coast (5)	1,247	*0.3%*	1,429	*0.4%*
Achill & N. Mayo (6)	5,002	*1.3%*	5,121	*1.5%*
Islands (7)	1,657	*0.4%*	1,722	*0.5%*
Outside 25 Minutes	**30,877**	*8.1%*	**31,122**	*8.8%*
Within 25 Minutes	**349,420**	*91.9%*	**321,231**	*91.2%*
Total	*380,297*	*100%*	*352,353*	*100%*

Source: CSO 2002, SPS Drive-time Model

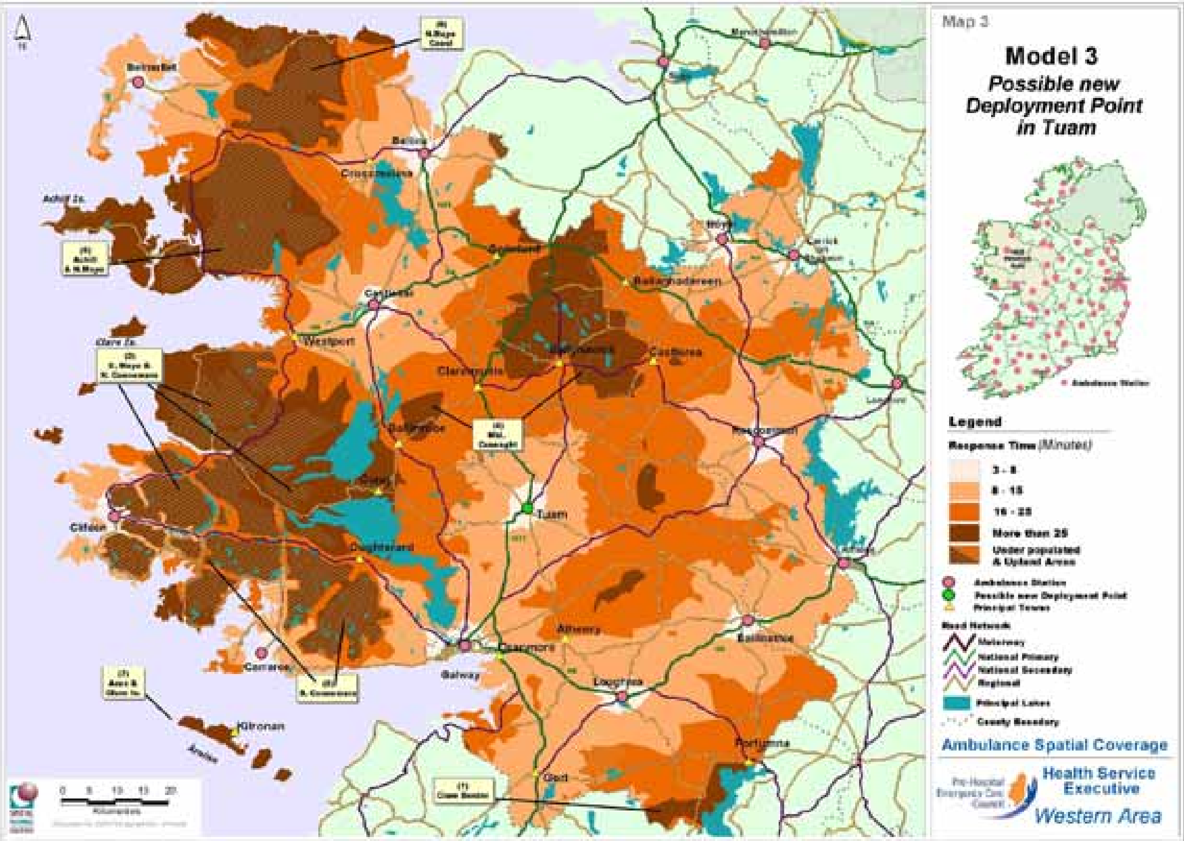
Table 9

Response-time RTA's 1997 - 2001 *(Model 3)*

Location	RTA's		Fatal Injuries		Serious Inj.		Minor Inj.	
	No.	*%*	*No.*	*%*	*No.*	*%*	*No.*	*%*
Clare Border (1)	1	*0.0%*	*1*	*0.5%*	1	*0.1%*	0	*0.0%*
S. Connemara (2)	11	*0.3%*	*2*	*0.9%*	3	*0.3%*	21	*0.5%*
N. Connemara (3)	25	*0.8%*	*4*	*1.9%*	10	*1.0%*	28	*0.7%*
Mid Connaght (4)	109	*3.4%*	*10*	*4.6%*	39	*4.1%*	141	*3.4%*
N. Mayo Coast (5)	4	*0.1%*	*0*	*0.0%*	2	*0.2%*	9	*0.2%*
Achill & N. Mayo (6)	40	*1.3%*	*1*	*0.5%*	16	*1.7%*	61	*1.5%*
Islands (7)	9	*0.3%*	*0*	*0.0%*	0	*0.0%*	13	*0.3%*
Outside 25 Min.	**199**	*6.3%*	**18**	*8.3%*	**71**	*7.4%*	**273**	*6.5%*
Within 25 Min.	**2,975**	*93.7%*	***198***	*91.7%*	**885**	*92.6%*	**3,908**	*93.5%*
Total	*3,174*	*100%*	*216*	*100%*	*956*	*100%*	*4,181*	*100%*

Source: NRA Road Traffic Accidents Database, SPS Drive-time Model

The use of an Ambulance deployment point in Tuam will only address out-of-target areas within the Mid Connaght block and numbers of people and RTA's in other out-of-target areas remain as per model 2.


Map 3
Model 3
Possible new Deployment Point in Tuam
Legend
Response Time (Minutes)
3 - 8
8 - 15
15 - 25
More than 25
Under populated & Upland Areas
Ambulance Station
Possible new Deployment Point
Principal Towns
Road Network
Motorway
National Primary
National Secondary
Regional
Principal Lakes
County Boundary
Ambulance Spatial Coverage
Health Service Executive
Western Area
Belmullet
Ballina
Crossmolina
Achill Is.
Castlebar
Westport
Clare Is.
Claremorris
Ballinrobe
Clifden
Oughterard
Carraroe
Kilronan
Aran Isles
Galway
Claregalway
Athenry
Loughrea
Ballinasloe
Portumna
Gort
Tuam
Ballyhaunis
Castlerea
Ballaghaderreen
Boyle
Roscommon
Swinford
Kilometres

2.4 Model 4 Additional Deployment Points (Ballyhaunis and Gort)

In addition to Tuam as a potential new deployment point this model examines the patterns of response times were two further new deployment points utilised, these are based in Ballyhaunis Co. Mayo and Gort, Co. Galway. The Ballyhaunis site was chosen to address the remaining out-of-target areas identified in Mid Connaght in Model 3. In respect to Gort the site was chosen to assess firstly how areas of the Clare border could be reached within the target response times and secondly to assist in later analysis for Return-to-hospital times. In model 2 we demonstrated how parts of the Clare Border area could be serviced from Ambulance stations based in the Mid-Western area. Notwithstanding this, it was shown in the Mid-Western Area report that parts of county Clare along the Galway border area had long return-to-hospital times with much of the area beyond the 60-minute target, inclusion of a station in Gort partially ameliorated this; this model therefore tests whether out-of-target areas for the Western Area may also benefit from Gort as a deployment point.

Table 10

Response-time Populations *(Model 4)*

Location	Total Population			
	2002	***%***	***1996***	***%***
Clare Border (1)	760	*0.2%*	812	*0.2%*
S. Connemara (2)	4,376	*1.2%*	4,277	*1.2%*
N. Connemara (3)	5,190	*1.4%*	5,236	*1.5%*
Mid Connaght (4)	3,354	*0.9%*	3,233	*0.9%*
N. Mayo Coast (5)	1,247	*0.3%*	1,429	*0.4%*
Achill & N. Mayo (6)	5,002	*1.3%*	5,121	*1.5%*
Islands (7)	1,657	*0.4%*	1,722	*0.5%*
Outside 25 Minutes	**21,586**	*5.7%*	**21,830**	*6.2%*
Within 25 Minutes	**358,711**	*94.3%*	**330,523**	*93.8%*
Total	*380,297*	*100%*	*352,353*	*100%*

Source: CSO 2002, SPS Drive-time Model

Table 11

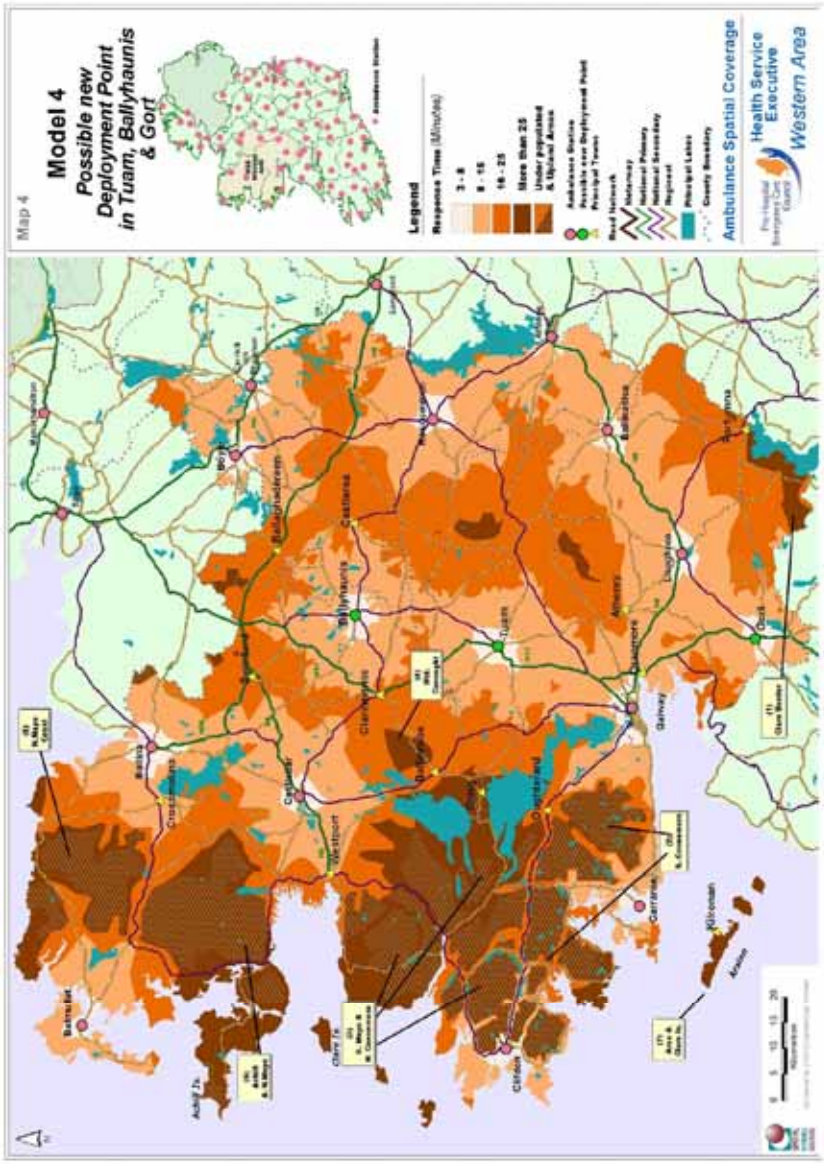
Response-time RTA's 1997 - 2001 *(Model 4)*

Location	RTA's		Fatal Injuries		Serious Inj.		Minor Inj.	
	No.	*%*	*No.*	*%*	*No.*	*%*	*No.*	*%*
Clare Border (1)	1	*0.0%*	*1*	*0.5%*	1	*0.1%*	0	*0.0%*
S. Connemara (2)	11	*0.3%*	*2*	*0.9%*	3	*0.3%*	21	*0.5%*
N. Connemara (3)	25	*0.8%*	*4*	*1.9%*	10	*1.0%*	28	*0.7%*
Mid Connaght (4)	33	*1.0%*	*5*	*2.3%*	7	*0.7%*	43	*1.0%*
N. Mayo Coast (5)	4	*0.1%*	*0*	*0.0%*	2	*0.2%*	9	*0.2%*
Achill & N. Mayo (6)	40	*1.3%*	*1*	*0.5%*	16	*1.7%*	61	*1.5%*
Islands (7)	9	*0.3%*	*0*	*0.0%*	0	*0.0%*	13	*0.3%*
Outside 25 Min.	**123**	*3.9%*	**13**	*6.0%*	**39**	*4.1%*	**175**	*4.2%*
Within 25 Min.	**3,051**	*96.1%*	***203***	*94.0%*	**917**	*95.9%*	**4,006**	*95.8%*
Total	*3,174*	*100%*	*216*	*100%*	*956*	*100%*	*4,181*	*100%*

Source: NRA Road Traffic Accidents Database, SPS Drive-time Model

The Ballyhaunis deployment point reduces the out-of-target population by 9,291 people resulting in 3,354 people remaining in out-of-target areas in Mid-Connaght. In total therefore use of two additional deployment points in Tuam and Ballyhaunis and neighbouring stations reduces the Mid-Connaght out-of-target population by33,734 people and 275 less RTA's.

The new deployment point at Gort is not so successful and does not reduce the out-of-target areas for ambulance response on the Galway/Clare border due principally to poor road conditions in the area.



2.5 Response Time Findings

The response times for current Ambulance stations providing emergency response services in the HSE Western area only were assessed in Model 1. Seven distinct areas were found to lie beyond the target response time of 25-minutes. Within these areas there was a population of 56,784 people and 405 RTA's occurred where 36 people died. In comparison with other HSE regions the Western Area had the highest population located in areas beyond the 25-minute target when only Ambulance services within the region are utilised.

Table 12 **National Results of Base-line Response Model**
(No cross regional services modelled)

Outside 25-minute Response-time, *(Population)*			
HSE Area	**Population** ***2002***	**Region** ***%***	**National** ***%***
Western	56,784	14.9%	*1.45%*
North Eastern	13,322	3.9%	*0.34%*
South Eastern	17,808	4.2%	*0.45%*
Eastern	8,121	0.6%	*0.21%*
North Western	22,401	10.1%	*0.57%*
Southern	4,923	0.8%	*0.13%*
Midlands	28,775	12.8%	*0.73%*
Mid-Western	15,041	4.5%	*0.38%*
Outside 25 Min. ***(000's)***	**167.2**	4.3%	***4.3%***
Within 25 Min. ***(000's)***	**3,746.4**	95.7%	***95.7%***
National Total (000's)	*3,913.6*	*100%*	*100%*

Source: CSO 2002, SPS Drive-time Model

When response times from neighbouring stations were utilised in model 2 some areas on the eastern and northern fringe of the Western area were now found to lie within the target response time, the reduction in out-of-target population was 2,208 people. The most significant area found to be out-of-target was found to lie in the mid-Connaght area extending from south Mayo, through Galway and Roscommon. Examination of a possible new Ambulance deployment point in Tuam was found to reduce the out-of-target population in this area by 23,699 people, resulting in the total out-of-target population for the entire study area of 30,877people (199 RTA's). This represents a 65% reduction in people residing in out-of-target areas from the situation prevailing when only neighbouring Ambulance stations were utilised.

The final model (model 4) assessed the impact of two further deployment points in Ballyhaunis Co. Mayo and Gort Co. Galway. The Ballyhaunis deployment point was found to have a significant impact on the remaining out-of-target area in Mid-Connaght with a residual population of 3,354 people residing in out-of-target areas when Tuam and Ballyhaunis were utilised (RTA's that occurred in out-of-target areas also reduced on a similar scale). The possible deployment point in Gort was found to have little impact on remaining out-of-target areas in this part of the region.

The overall residual out-of-target population when current Ambulance stations, neighbouring stations and the additional three deployment points was found to be 21,586 people representing a reduction of 62% from the baseline model. The principal remaining areas were found along the western coastline in North and South Connemara, Achill Island and North Mayo. In these areas poor road conditions and dispersed population result in considerable difficulties in the provision of Ambulance services within the 25 minute target. Development of Community Responder Schemes in these areas is an attractive option to assist in emergency care provision here.

3 Return-to-Hospital & Intervention Time

Three centres of emergency secondary care are assessed in this initial model; these are University Collage Hospital Galway, Castlebar Hospital and Portuncula Hospital in Ballinasloe. These are currently the principal emergency secondary care centres in the region. To assess the impact of on emergency care provision as a consequence of the withdrawal of A&E services from Ballinasloe subsequent models assume that only the two hospitals provide emergency secondary care. The use of these two hospitals within the model is not intended to indicate any policy recommendations in the context of this report but merely to provide information on the types of primary emergency care configurations that can service the Western Area.

3.1 Model 5 'Return-to-Hospital' – Three Centres

With three secondary emergency care centres assumed, model 5 indicates that 115,738 people and 969 RTA's are located in areas beyond the 60-minute target. This represents 30.4% of the entire regions population and 30.5% of all RTA's with the study period.

Table 13

Return-to-Hospital Populations *(Model 5)*

Location	Total Population			
	2002	***%***	***1996***	***%***
Clare Border (1)	7,597	*2.0%*	7,501	*2.1%*
NE Connaght (2)	70,487	*18.5%*	69,763	*19.8%*
Connemara & S. Mayo (3)	17,430	*4.6%*	17,226	*4.9%*
NW Mayo (4)	17,029	*4.5%*	17,854	*5.1%*
Sligo Border (5)	1,538	*0.4%*	1,573	*0.4%*
Islands (6)	1,657	*0.4%*	1,722	*0.5%*
Outside 60 Minutes	**115,738**	*30.4%*	**115,639**	*32.8%*
Within 60 Minutes	**264,559**	*69.6%*	**236,714**	*67.2%*
Total	*380,297*	*100%*	*352,353*	*100%*

Source: CSO 2002, SPS Drive-time Model

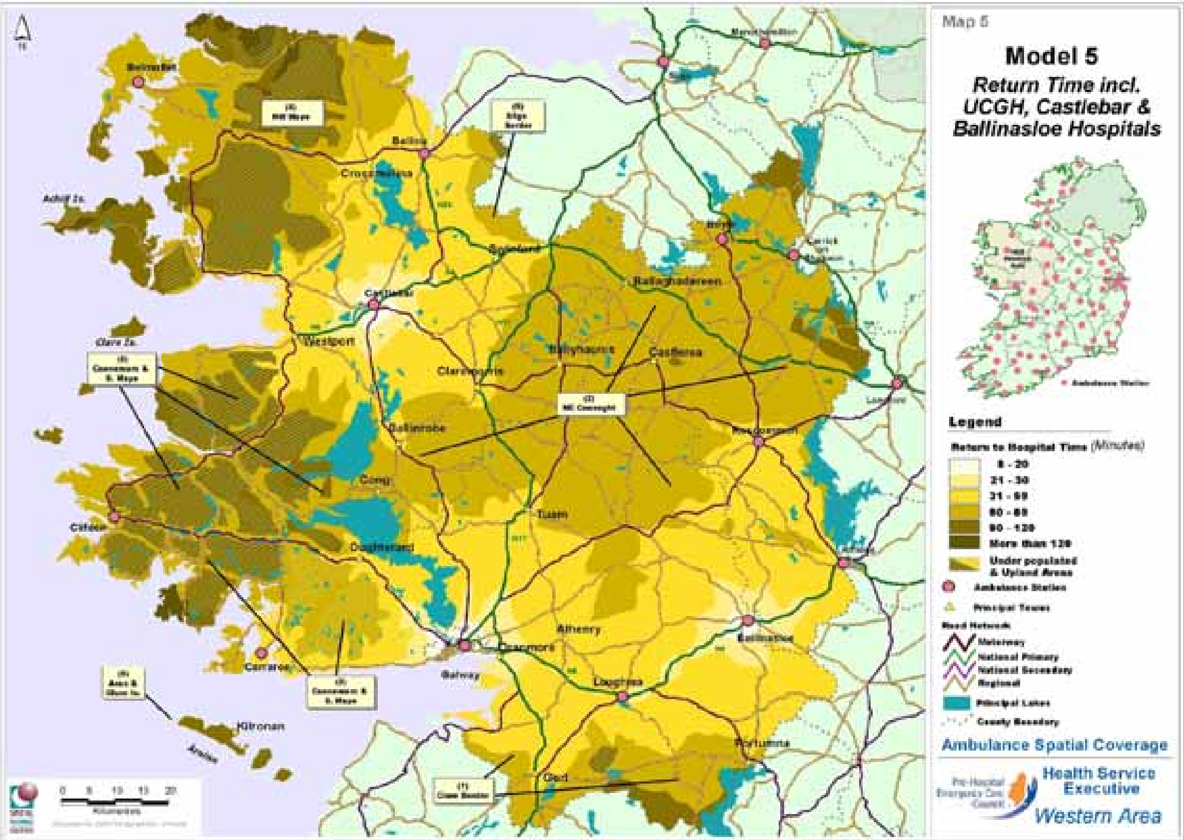
Table 14

Return-to-Hospital RTA's 1997 - 2001 *(Model 5)*

Location	RTA's		Fatal Injuries		Serious Inj.		Minor Inj.	
	No.	*%*	*No.*	*%*	*No.*	*%*	*No.*	*%*
Clare Border (1)	56	*1.8%*	*6*	*2.8%*	16	*1.7%*	81	*1.9%*
NE Connaght (2)	628	*19.8%*	*56*	*25.9%*	250	*26.2%*	759	*18.2%*
Connemara & S. Mayo (3)	132	*4.2%*	*15*	*6.9%*	45	*4.7%*	182	*4.4%*
NW Mayo (4)	140	*4.4%*	*4*	*1.9%*	47	*4.9%*	225	*5.4%*
Sligo Border (5)	4	*0.1%*	*0*	*0.0%*	5	*0.5%*	3	*0.1%*
Islands (6)	9	*0.3%*	*0*	*0.0%*	0	*0.0%*	13	*0.3%*
Outside 60 Min.	**969**	*30.5%*	**81**	*37.5%*	**363**	*38.0%*	**1,263**	*30.2%*
Within 60 Min.	**2,205**	*69.5%*	***135***	*62.5%*	**593**	*62.0%*	**2,918**	*69.8%*
Total	*3,174*	*100%*	*216*	*100%*	*956*	*100%*	*4,181*	*100%*

Source: NRA Road Traffic Accidents Database, SPS Drive-time Model

Map 5 below indicates the locations of the out-of-target areas, of these the NE Connaght block is the largest with 70,487 people followed by blocks in Connemara/South Mayo with 17,430 people and NW Mayo with 17,029 people.


Map 5
Model 5
Return Time incl.
UCGH, Castlebar &
Ballinasloe Hospitals
Legend
Return to Hospital Time (Minutes)
Ambulance Spatial Coverage
Health Service
Executive
Western Area
Westport
Claremorris
Ballyhaunis
Castlerea
Ballaghaderreen
Ballinrobe
Cong
Tuam
Oughterard
Athenry
Galway
Loughrea
Ballinasloe
Portumna
Gort
Clifden
Carraroe
Kilronan
Crossmolina
Ballina
Castlebar
Swinford
Boyle
Achill Is.
Clare Is.

3.2 Model 6 Return Time – Two Centres (Baseline)

This model assesses the patterns of emergency care provision with two emergency secondary care centres, Galway (UCGH) and Castlebar Hospital. It is apparent in Map 6 much of the area serviced by Ballinasloe is now found to lie beyond the 60-minute target and its population augments the out-of-target population assessed for the Mid-Connaught block.

Table 15

Return-to Hospital Populations *(Model 6)*

Location	Total Population			
	2002	***%***	***1996***	***%***
Clare Border (1)	16,736	*4.4%*	16,476	*4.7%*
NE Connaght (2)	90,722	*23.9%*	88,983	*25.3%*
Connemara & S. Mayo (3)	17,827	*4.7%*	17,544	*5.0%*
NW Mayo (4)	17,029	*4.5%*	17,854	*5.1%*
Sligo Border (5)	1,538	*0.4%*	1,573	*0.4%*
Islands (6)	1,657	*0.4%*	1,722	*0.5%*
Outside 60 Minutes	**145,509**	*38.3%*	**144,152**	*40.9%*
Within 60 Minutes	**234,788**	*61.7%*	**208,201**	*59.1%*
Total	*380,297*	*100%*	*352,353*	*100%*

Source: CSO 2002, SPS Drive-time Model

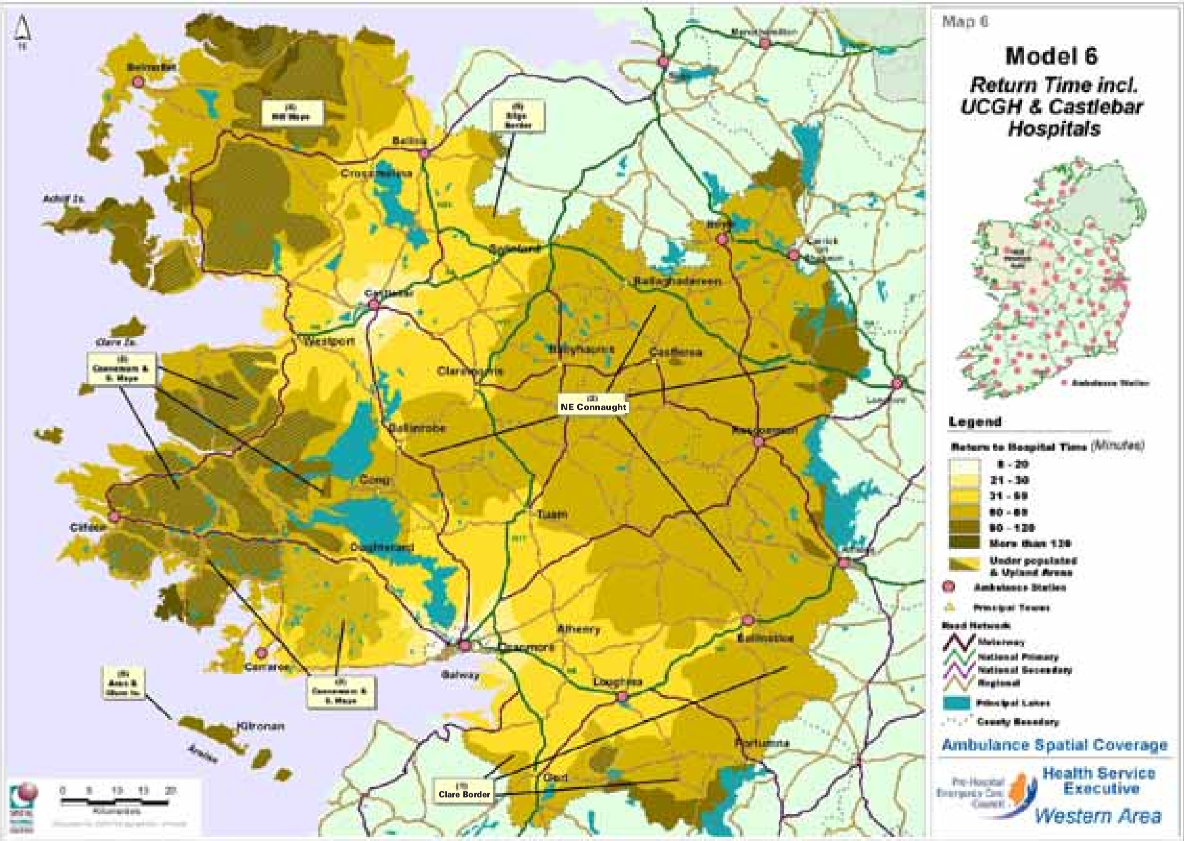
Table 16

Return-to-Hospital RTA's 1997 - 2001 *(Model 6)*

Location	RTA's		Fatal Injuries		Serious Inj.		Minor Inj.	
	No.	*%*	*No.*	*%*	*No.*	*%*	*No.*	*%*
Clare Border (1)	128	*4.0%*	*8*	*3.7%*	33	*3.5%*	194	*4.6%*
NE Connaght (2)	820	*25.8%*	*72*	*33.3%*	297	*31.1%*	994	*23.8%*
Connemara & S. Mayo (3)	132	*4.2%*	*15*	*6.9%*	45	*4.7%*	182	*4.4%*
NW Mayo (4)	140	*4.4%*	*4*	*1.9%*	47	*4.9%*	225	*5.4%*
Sligo Border (5)	4	*0.1%*	*0*	*0.0%*	5	*0.5%*	3	*0.1%*
Islands (6)	9	*0.3%*	*0*	*0.0%*	0	*0.0%*	13	*0.3%*
Outside 60 Min.	**1,233**	*38.8%*	**99**	*45.8%*	**427**	*44.7%*	**1,611**	*38.5%*
Within 60 Min.	**1,941**	*61.2%*	***117***	*54.2%*	**529**	*55.3%*	**2,570**	*61.5%*
Total	*3,174*	*100%*	*216*	*100%*	*956*	*100%*	*4,181*	*100%*

Source: NRA Road Traffic Accidents Database, SPS Drive-time Model

An additional 20,235 people reside in out-of-target areas of the North and East Connaght Block which represents an increase of 28.7% from the model 1. Overall 38.3% of the regions population were found to reside in out-of-target areas and 38.8% of RTA's occurred in these areas during the study period.


Map 6
Model 6
Return Time incl. UCGH & Castlebar Hospitals
Legend
Return to Hospital Time (Minutes)
Ambulance Spatial Coverage
Health Service Executive
Western Area
NE Connaught
Clare Border
Belmullet
Ballina
Crossmolina
Castlebar
Westport
Swinford
Ballaghaderreen
Ballyhaunis
Castlerea
Claremorris
Ballinrobe
Cong
Tuam
Roscommon
Clifden
Oughterard
Galway
Oranmore
Athenry
Ballinasloe
Loughrea
Portumna
Gort
Carraroe
Kilronan
Aran
Clare Is.
Achill Is.

3.3 Model 7 Neighbouring Stations & Hospital Services

In this model neighbouring Ambulance services and emergency secondary care services are introduced and their impact on the out-of-target areas assessed. The model utilises the Response times as identified in model 2. Two emergency secondary care centres were found to impact on the 60-minute target; Sligo and Mullingar. Other centres including Cavan, Tullamore and Limerick were assessed but found to have no impact on the target return-to-hospital time of 60-minutes.

Table 17

Return-to Hospital Populations *(Model 7)*

Location	Total Population			
	2002	***%***	***1996***	***%***
Clare Border (1)	12,680	*3.3%*	12,779	*3.6%*
NE Connaght (2)	82,229	*21.6%*	81,026	*23.0%*
Connemara & S. Mayo (3)	15,725	*4.1%*	15,413	*4.4%*
NW Mayo (4)	17,029	*4.5%*	17,854	*5.1%*
Sligo Border (5)	1,538	*0.4%*	1,573	*0.4%*
Islands (6)	1,657	*0.4%*	1,722	*0.5%*
Outside 60 Minutes	**130,858**	*34.4%*	**130,367**	*37.0%*
Within 60 Minutes	**249,439**	*65.6%*	**221,986**	*63.0%*
Total	*380,297*	*100%*	*352,353*	*100%*

Source: CSO 2002, SPS Drive-time Model

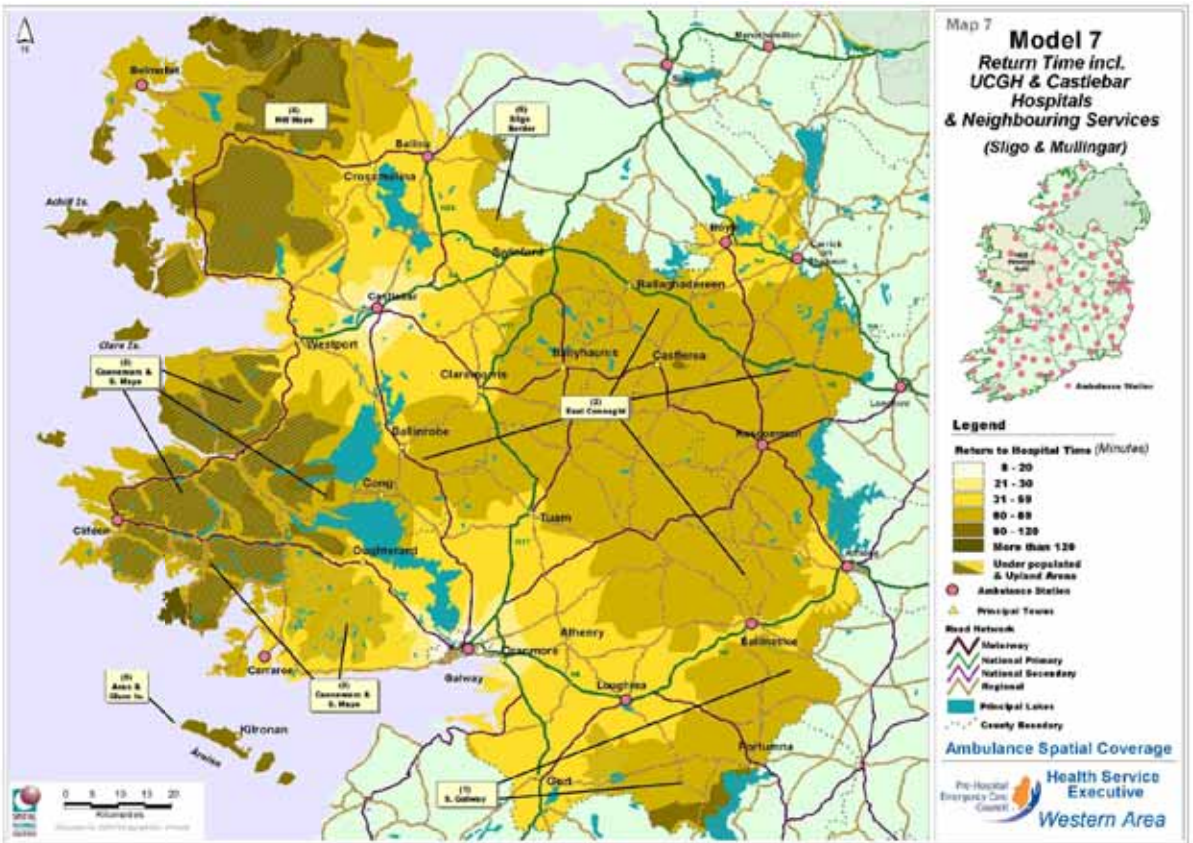
Table 18

Return-to-Hospital RTA's 1997 - 2001 *(Model 7)*

Location	RTA's		Fatal Injuries		Serious Inj.		Minor Inj.	
	No.	*%*	*No.*	*%*	*No.*	*%*	*No.*	*%*
Clare Border (1)	75	*2.4%*	*6*	*2.8%*	14	*1.5%*	120	*2.9%*
NE Connaght (2)	669	*21.1%*	*57*	*26.4%*	248	*25.9%*	815	*19.5%*
Connemara & S. Mayo (3)	176	*5.5%*	*22*	*10.2%*	66	*6.9%*	234	*5.6%*
NW Mayo (4)	140	*4.4%*	*4*	*1.9%*	47	*4.9%*	225	*5.4%*
Sligo Border (5)	4	*0.1%*	*0*	*0.0%*	5	*0.5%*	3	*0.1%*
Islands (6)	9	*0.3%*	*0*	*0.0%*	0	*0.0%*	13	*0.3%*
Outside 60 Min.	**1,073**	*33.8%*	**89**	*41.2%*	**380**	*39.7%*	**1,410**	*33.7%*
Within 60 Min.	**2,101**	*66.2%*	***127***	*58.8%*	**576**	*60.3%*	**2,771**	*66.3%*
Total	*3,174*	*100%*	*216*	*100%*	*956*	*100%*	*4,181*	*100%*

Source: NRA Road Traffic Accidents Database, SPS Drive-time Model

The principal reduction in out-of-target areas occurred on the northern and eastern fringes of the region as emergency secondary care centres together with improved response times from neighbouring regions lowered average drivetimes for these areas (see Map 7.). A reduction of 14,651 people in out-of-target population occurs with use of Sligo and Mullingar hospitals and neighbouring Ambulance services.


Map 7
Model 7
Return Time incl. UCGH & Castlebar Hospitals & Neighbouring Services
(Sligo & Mullingar)
Legend
Return to Hospital Time (Minutes)
8 - 20
21 - 30
31 - 59
60 - 89
90 - 120
More than 120
Under populated & Upland Areas
Ambulance Station
Principal Towns
Road Network
Motorway
National Primary
National Secondary
Regional
Principal Lakes
County Boundary
Ambulance Spatial Coverage
Health Service Executive
Western Area
Belmullet
Ballina
Crossmolina
Achill Is.
Sligo
Boyle
Ballaghaderreen
Castlebar
Westport
Clare Is.
Ballyhaunis
Claremorris
Castlerea
Ballinrobe
Cong
Clifden
Tuam
Oughterard
Athenry
Ballinasloe
Carraroe
Galway
Gort
Loughrea
Portumna
Kilronan
Aran Is.

3.4 Model 8 Return Times (New Deployment Point in Tuam)

Model 8 builds on the results from Model 7 but employs the use of the additional deployment point in Tuam.

Table 19

Return-to Hospital Populations *(Model 8)*

Location	Total Population			
	2002	*%*	*1996*	*%*
Clare Border (1)	12,680	*3.3%*	12,779	*3.6%*
NE Connaght (2)	73,677	*19.4%*	72,622	*20.6%*
Connemara & S. Mayo (3)	17,827	*4.7%*	17,544	*5.0%*
NW Mayo (4)	17,029	*4.5%*	17,854	*5.1%*
Sligo Border (5)	1,538	*0.4%*	1,573	*0.4%*
Islands (6)	1,657	*0.4%*	1,722	*0.5%*
Outside 60 Minutes	**124,408**	*32.7%*	**124,094**	*35.2%*
Within 60 Minutes	**255,889**	*67.3%*	**228,259**	*64.8%*
Total	*380,297*	*100%*	*352,353*	*100%*

Source: CSO 2002, SPS Drive-time Model

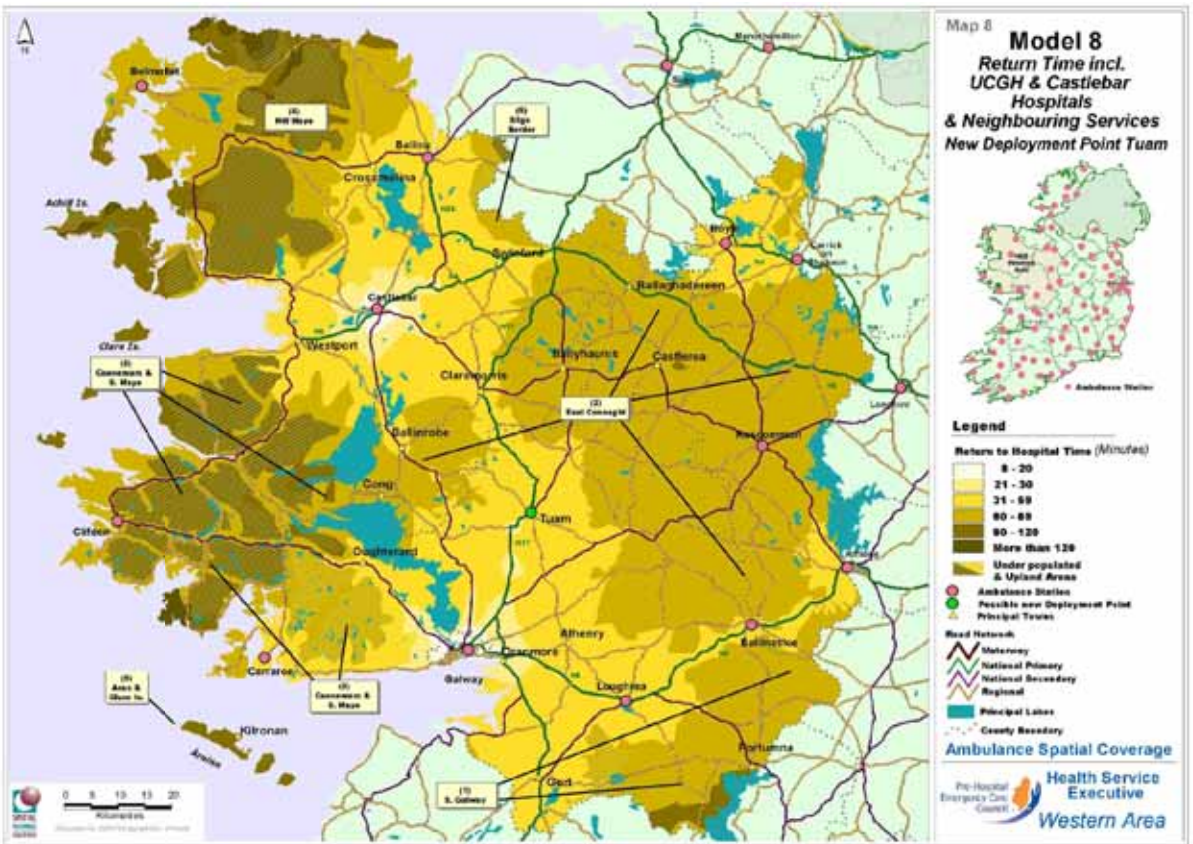
Table 20

Return-to-Hospital RTA's 1997 - 2001 *(Model 8)*

Location	RTA's		Fatal Injuries		Serious Inj.		Minor Inj.	
	No.	*%*	*No.*	*%*	*No.*	*%*	*No.*	*%*
Clare Border (1)	74	*2.3%*	*5*	*2.3%*	13	*1.4%*	120	*2.9%*
NE Connaght (2)	595	*18.7%*	*50*	*23.1%*	218	*22.8%*	731	*17.5%*
Connemara & S. Mayo (3)	163	*5.1%*	*19*	*8.8%*	64	*6.7%*	213	*5.1%*
NW Mayo (4)	108	*3.4%*	*3*	*1.4%*	35	*3.7%*	174	*4.2%*
Sligo Border (5)	4	*0.1%*	*0*	*0.0%*	5	*0.5%*	3	*0.1%*
Islands (6)	9	*0.3%*	*0*	*0.0%*	0	*0.0%*	13	*0.3%*
Outside 60 Min.	**953**	*30.0%*	**77**	*35.6%*	**335**	*35.0%*	**1,254**	*30.0%*
Within 60 Min.	**2,221**	*70.0%*	***139***	*64.4%*	**621**	*65.0%*	**2,927**	*70.0%*
Total	*3,174*	*100%*	*216*	*100%*	*956*	*100%*	*4,181*	*100%*

Source: NRA Road Traffic Accidents Database, SPS Drive-time Model

As occurred in the response times the impact of Tuam on return-to-hospital times was significant in the NE Connaght area with a reduction in the out-of-target population of 6,450people, representing an overall reduction of 8% for the North East Connaght area. Overall the reduction in out-of-target population was 5% for the entire region.


Map 8
Model 8
Return Time incl.
UCGH & Castlebar
Hospitals
& Neighbouring Services
New Deployment Point Tuam
Legend
Return to Hospital Time (Minutes)
8 - 20
21 - 30
31 - 59
60 - 89
90 - 120
More than 120
Under populated & Upland Areas
Ambulance Station
Possible new Deployment Point
Principal Towns
Road Network
Motorway
National Primary
National Secondary
Regional
Principal Lakes
County Boundary
Ambulance Spatial Coverage
Health Service Executive
Western Area
Belmullet
Ballina
Crossmolina
Achill Is.
Clare Is.
Westport
Castlebar
Claremorris
Ballyhaunis
Castlerea
Ballinrobe
Cong
Tuam
Clifden
Oughterard
Carraroe
Galway
Athenry
Ballinasloe
Loughrea
Kilronan
Aranes
Portumna
Gort
Sligo
Boyle
Ballaghaderreen
Roscommon
Athlone
Longford
0 5 10 15 20
Kilometres

3.5 Model 9 Return Times (Additional Deployment Points in Ballyhaunis and Gort)

In the response models we tested the impact of two additional deployment points in Gort and Ballyhaunis, these are included in this return-to-hospital model. As in model 8 the use of neighbouring emergency care services in the form of hospitals and Ambulance stations is included.

Table 21

Return-to-Hospital Populations *(Model 9)*

Location	Total Population			
	2002	*%*	*1996*	*%*
Clare Border (1)	12,680	*3.3%*	12,779	*3.6%*
NE Connaght (2)	64,835	*17.0%*	63,885	*18.1%*
Connemara & S. Mayo (3)	17,827	*4.7%*	17,544	*5.0%*
NW Mayo (4)	17,029	*4.5%*	17,854	*5.1%*
Sligo Border (5)	1,538	*0.4%*	1,573	*0.4%*
Islands (6)	1,657	*0.4%*	1,722	*0.5%*
Outside 60 Minutes	**115,566**	*30.4%*	**115,357**	*32.7%*
Within 60 Minutes	**264,731**	*69.6%*	**236,996**	*67.3%*
Total	*380,297*	*100%*	*352,353*	*100%*

Source: CSO 2002, SPS Drive-time Model

Table 22

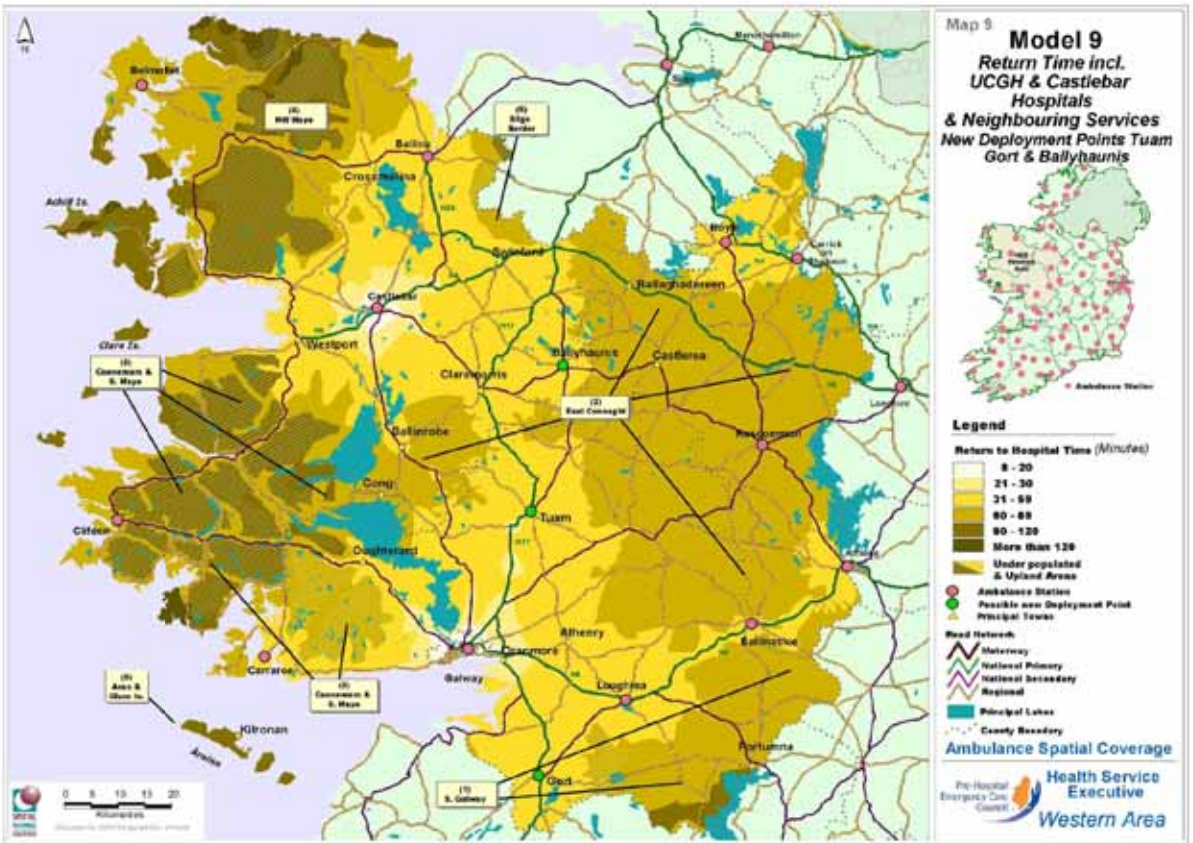
Return-to-Hospital RTA's 1997 - 2001 *(Model 9)*

Location	RTA's		Fatal Injuries		Serious Inj.		Minor Inj.	
	No.	*%*	*No.*	*%*	*No.*	*%*	*No.*	*%*
Clare Border (1)	74	*2.3%*	*6*	*2.8%*	13	*1.4%*	120	*2.9%*
NE Connaght (2)	489	*15.4%*	*42*	*19.4%*	173	*18.1%*	602	*14.4%*
Connemara & S. Mayo (3)	168	*5.3%*	*20*	*9.3%*	63	*6.6%*	222	*5.3%*
NW Mayo (4)	141	*4.4%*	*4*	*1.9%*	47	*4.9%*	227	*5.4%*
Sligo Border (5)	4	*0.1%*	*0*	*0.0%*	5	*0.5%*	3	*0.1%*
Islands (6)	9	*0.3%*	*0*	*0.0%*	0	*0.0%*	13	*0.3%*
Outside 60 Min.	**885**	*27.9%*	**72**	*33.3%*	**301**	*31.5%*	**1,187**	*28.4%*
Within 60 Min.	**2,289**	*72.1%*	***144***	*66.7%*	**655**	*68.5%*	**2,994**	*71.6%*
Total	*3,174*	*100%*	*216*	*100%*	*956*	*100%*	*4,181*	*100%*

Source: NRA Road Traffic Accidents Database, SPS Drive-time Model

The principal impact of the additional deployment points occurred within the NE Connaght block with a reduction of out-of-target population of 8,482 people. This represents a reduction of 7.1% with the use of Ballyhaunis as a new Ambulance deployment point. The use of a new deployment in Gort had no impact on the out-of-target population or RTA's in the region along the Clare Border.

A combination of distance from nearest hospital and population density combined to result in Ballyhaunis having a slightly greater impact on reducing out-of-target population than Tuam. Notwithstanding this, parts of NE Connaght remain beyond the 60-minute target.


Map 9
Model 9
Return Time incl.
UCGH & Castlebar
Hospitals
& Neighbouring Services
New Deployment Points Tuam
Gort & Ballyhaunis
Legend
Return to Hospital Time (Minutes)
8 - 20
21 - 30
31 - 59
60 - 89
90 - 120
More than 120
Under populated
& Upland Areas
Ambulance Station
Possible new Deployment Point
Principal Towns
Road Network
Motorway
National Primary
National Secondary
Regional
Principal Lakes
County Boundary
Ambulance Spatial Coverage
Health Service
Executive
Western Area
Belmullet
Ballina
Crossmolina
Achill Is.
Clare Is.
Westport
Castlebar
Ballyhaunis
Claremorris
Castlerea
Ballaghaderreen
Roscommon
Ballinrobe
Cong
Tuam
Clifden
Oughterard
Athenry
Ballinasloe
Carraroe
Galway
Claremorri
Loughrea
Kilronan
Aranles
Portumna
Gort
0 5 10 15 20
Kilometres

3.6 Model 10 Use of AP Services (Intervention Time)

This model examines the potential impact on the use of Advanced Paramedic (AP) services provided from a number of locations. The locations chosen within the Western area are Galway and Castlebar. Other locations that have an impact on target times for the region are Sligo, Ennis and Athlone. A test for the use of Roscommon as an AP deployment point was made; the results indicated that in terms of the 60-minute intervention target, there were only marginal differences over locating in Athlone. Athlone also has an important role in AP service delivery for the Midlands. Equally locating an AP location in Tuam was found to be less effective than locating within Galway city. Studies for the HSE North Western area and the HSE Mid-Western area indicated that both Sligo and Ennis were suitable locations for AP bases within those respective regions. In this model their additional value in servicing areas in the Western Area is demonstrated.

In this model the Ambulance and hospital services put forward in model 8 are utilised and the AP services are overlaid on to these.

Table 23

Intervention Time Populations *(Model 10)*

Location	Total Population			
	2002	***%***	***1996***	***%***
Connemara (3)	7,370	*1.9%*	7,756	*2.2%*
NW Mayo (4)	6,615	*1.7%*	6,151	*1.7%*
Islands (6)	1,657	*0.4%*	1,722	*0.5%*
Outside 60 Minutes	**15,642**	*4.1%*	**15,629**	*4.4%*
Within 60 Minutes	**364,655**	*95.9%*	**336,724**	*95.6%*
Total	*380,297*	*100%*	*352,353*	*100%*

Source: CSO 2002, SPS Drive-time Model

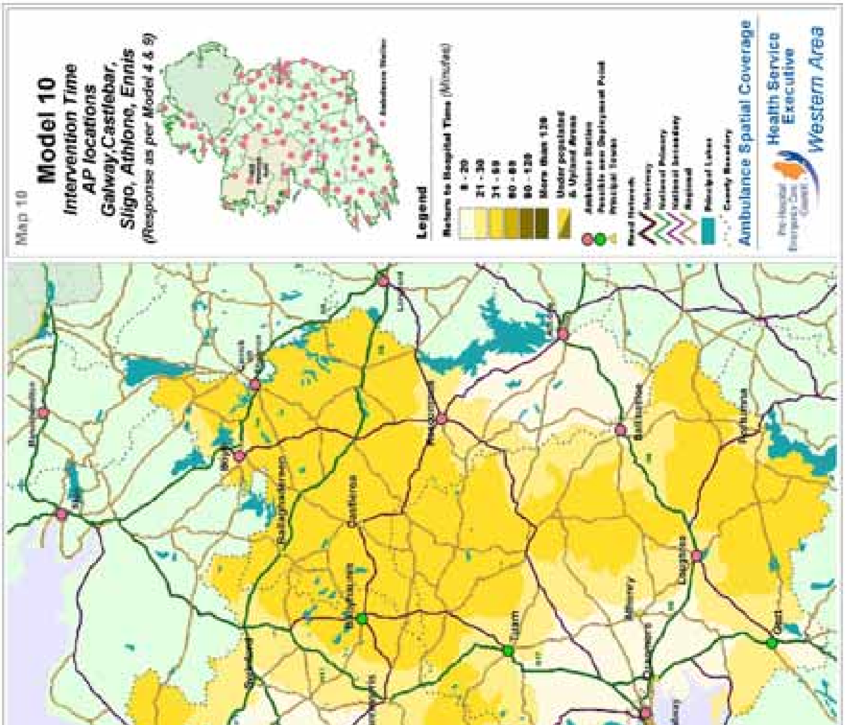
Table 24

Return-to-Hospital RTA's 1997 - 2001 *(Model 8)*

Location	RTA's		Fatal Injuries		Serious Inj.		Minor Inj.	
	No.	*%*	*No.*	*%*	*No.*	*%*	*No.*	*%*
Connemara (3)	35	*1.1%*	*4*	*1.9%*	7	*0.7%*	57	*1.4%*
NW Mayo (4)	56	*1.8%*	*2*	*0.9%*	15	*1.6%*	90	*2.2%*
Islands (6)	9	*0.3%*	*0*	*0.0%*	0	*0.0%*	13	*0.3%*
Outside 60 Min.	**100**	*3.2%*	**6**	*2.8%*	**22**	*2.3%*	**160**	*3.8%*
Within 60 Min.	**3,074**	*96.8%*	***210***	*97.2%*	**934**	*97.7%*	**4,021**	*96.2%*
Total	*3,174*	*100%*	*216*	*100%*	*956*	*100%*	*4,181*	*100%*

Source: NRA Road Traffic Accidents Database, SPS Drive-time Model

There is a very significant impact on the numbers of people based in out-of-target areas with the introduction of AP services, with 86.2% reduction in out-of-target population between model 9 and this model. The model indicates that 15,642 people reside beyond the 60-minute target, representing 4.1% of the total population of the region. The out-of-target areas comprised of the NW Mayo area with the largest population, 7,370 people, followed closely by the western peninsulas of Connemara. These areas are difficult to service due to the nature of the dispersed population. Realistic options for improving emergency care services in these areas are likely to concentrate on Community Responder Schemes in the areas, it is noteworthy in this regard that within each area there is an existing Ambulance station at Belmullet and Clifden.


Map 10
Model 10
Intervention Time
AP locations
Galway,Castlebar,
Sligo, Athlone, Ennis
(Response as per Model 4 & 5)
Legend
Ambulance Spatial Coverage
Health Service
Executive
Western Area

4. Conclusions and Recommendations

4.1 Conclusions

1) The baseline Response model (model 1) where emergency care services are provided by resources from the Western area alone indicated that 56,784 people and 405 (36 fatalities) were located in areas beyond the 25-minute response target.

2) The use of HSE neighbouring Ambulance services (model 2) had a marginal impact on the out-of-target areas as most were located at a distance from neighbouring HSE regions. The out of target population reduced to 54,576 people, representing a reduction of 3.9%, and RTA's reduced to 395 a reduction of 2.5% from the baseline response model. The most significant out-of-target area occurred in Mid-Connaght with 37,088 people resident there.

3) The impact of possible development of a series of new deployment points was assessed located in Tuam, Ballyhaunis and Gort.

    i) Model 3 demonstrated that a new deployment point at Tuam Co. Galway will have the highest positive impact with a reduction of 23,699 people resident in out-of-target areas (reduction of 196 of RTA's) in the Mid-Connaght district, which represents a reduction of 43.4% of total out-of-target population compared to model 2.

    ii) A new deployment point in Ballyhaunis Co. Mayo will further reduce out-of-target areas for response time. Model 4 indicated that an additional reduction of 9,291 people of the out-of-target population will occur (76 RTA's).

    iii) Model 4 also indicated that a new deployment point in Gort Co. Galway will have only marginal impact on the 25-minute response target when neighbouring Ambulance services are utilised. Poor road conditions and isolated population contributed to this marginal impact.

4) In total when neighbouring services and the possible new deployment points were included the total out-of-target population for the 25-minute response target was 21,586 people (123 RTA's). The remaining out-of-target areas were located in isolated areas with low population densities. Servicing these locations through conventional EMT Ambulance services would be difficult due to low population numbers extending across large tracts of uplands and inaccessible localities.

5) The baseline return-to-hospital model (model 5) where only current Ambulance services from the Western area and secondary emergency services from hospitals located in Galway (UCGH), Castlebar and Ballinasloe (Portuncula) indicated that 115,738 people (30.4% of total population) and 969 RTA's (30.5% of all RTA's) were located in areas beyond the 60-minute return target.

6) The model that assessed the withdrawal of secondary emergency services in Ballinasloe using Ambulance service located only in the Western area (model 6) indicated that the population located outside the 60-minute target rose to 145,509 people (38.3%) and 1,233 RTA's (38.8%).

7) Use of neighbouring Ambulance services and secondary emergency care centres (Sligo and Mullingar hospitals) (model 7) reduced the out-of-target population by 14,651 people resulting in a total of 130,858 people living in areas beyond the 60-minute target (34.4% of regional population).

8) The impact of possible new deployment points in addition to use of neighbouring services resulted in a total reduction of out-of-target population for return times of 15,292 (11.7% from model 7). Ballyhaunis had a slightly greater impact than Tuam. There was no impact in the model from a new deployment point at Gort.

9) Two AP locations were assessed, Galway and Castlebar. AP services from these locations considerably reduced the out-of-target areas. In addition to services from Galway and Castlebar AP services from Sligo, Ennis and Athlone were of considerable importance. A total of 15,642 people (4.1% of the region's population) and 100 RTA's (3.2% of regions RTA's) occurred in areas outside the 60-minute intervention time.

4.2 Recommendations

1) Assessment of an individual Health area's Ambulance resources and secondary care centres should take account of resources located in neighbouring areas. Analysis of actual incident records will assist such evaluations.

2) New deployment points in Tuam, firstly and secondly in Ballyhaunis will improve response times for the Mid Connaght region.

3) No significant benefits in respect to the targets used in this study will accrue to the Clare Border area with the development of a new deployment point in Gort, particularly if AP services are available from Ennis and Galway city.

4) There is a significant role for Community Responder Schemes in parts of North Mayo, Connemara and south Galway and they should be developed with a view to complementing AP services for the region.

5) AP services from Galway and Castlebar are optimum locations for AP services in the region and will have a significant impact on intervention times for the region.