

# Public Access Defibrillator HTA for consultation

HIQA Report

Review: Gearoid Oman



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## 2.2 Activity

### 2.2.1 Calls per 1,000 population

Ireland (including DFB)	69
Northern Ireland	81
England	171
Scotland	160
New Zealand	85

### 2.2.2

NAS growth 6.5 over 3 years 2011-2013 in line with UK, DFB only 1%

### 2.2.3 Emergency activity urban via rural

	Urban %	Rural %
NAS (ex DFB)	60	40
SECAM	85	15
East England	72	28
Scotland	80	20

## 2.3 Local Activity

### 2.3.1 Activity

700 calls per day

- 500 emergency 85% Emergency/urgent 15% routine
- 100 urgent 70% Rural/urban minor – 30% Urban
- 100 routine

75% of GP calls are made in Rural/urban minor areas, 25% in urban

### 2.3.2

Huge increase in calls in December

### 2.3.3 Activity by geography.

Calls in 24hours based on 5KM radius

- Major Urban = 6+ calls
- Minor Urban = 1-5 calls
- Rural = less than 1 call

## 2.4 Performance

### 2.4.1 NAS Performance time

Best possible results are <8minute response times:

- 85% Urban major
- 75% Urban minor
- 40 rural

### 2.4.5

Echo/Delta – 8 min

Charlie/Bravo – 19 min

Alpha/Omega – 60min

**2.4.10** first responder??? 80 % of patients reached within 23 min

### 2.4.11 current performance

27% in 8 min

67% in 67 min

99% responded to Echo/Delta in <60min. Commendable and good by international standards.???

## 2.5 Call Cycle

Average of 93 min per call

- Emergency 91 min
- Urgent 108 min
- Routine 120min
- Urban Major 74 min
- Urban minor 93
- Rural 110 min

The cycle

- Clock starts – after call determinant (up to 2 minutes)
- Allocation time is 100 sec but recommended to be 45sec. Even quicker for echo calls by asking fewer questions.
- Mobilisation is 80 sec should be 45 sec improved through technology and behaviour via staff engagement and support and management focus
- Travel to scene average 15 min. normal international
  - Echo/delta calls
    - Urban 10, international 4-5min
    - minor urban 12min, international 6min
    - Rural 23 min
- Time at scene 20 min ave and compares with international times
- Time to clear not transporting 30 min ave and compares with international times.
- Time to hospital 26min average
- Time to clear at hospital 30 min ave and compares with international times. 15 min handover 15 min clean up

## 3 Demand

Additional staff based on normal growth demand of 6.5% year on year

Year 1 @6.5% growth 22 additional P/AP

Year 2-4 @6.5 growth 121 additional P/AP

## 4 Capacity modelling

It also has a much larger proportion of activity that occurs in a large number of smaller urban centres, where typically there is only one ambulance available to provide a response and the time taken to transport a patient to the nearest hospital can often be in excess of an hour. This creates a challenge for NAS to achieve a consistent level of performance in these areas, as once the local ambulance is committed to an incident it is not available to respond to a second incident should this occur before it has returned from transporting the patient on a proceeding incident.

In the smaller towns and larger villages where there is no ambulance located, it is significantly more difficult for ambulance services to provide an assurance of a suitable level of initial response without the involvement of volunteer responders. As Figure 4-2 illustrates, in the area covered by NAS there are many communities of this type, that are more than a 6 minute drive from the nearest town and where, typically, there will be at most one or two Echo and Delta incidents per week. The only

practical way of providing an initial response in these areas within the 8 minute window is through a voluntary Community First Responder (CFR) scheme. Where such schemes exist, they can provide a high level of initial response to their local community, but the development of schemes of this type is time consuming and requires a high level of commitment from both the local community and ambulance services. It should be recognised that although the CFRs are volunteers, the infrastructure necessary to support, manage and deploy them has its own cost that has to be borne by ambulance services.

#### 4.4 RRV

RRV can be located with a high level of accuracy in those locations where there is the greatest likelihood of incidents occurring and are able to attend those incidents within 8 minutes in over 90% of occasions. In addition, RRV vehicles can also play an important role in the smaller urban centres by ensuring that there is a sufficient level of clinical resource available in the area to respond to high acuity incidents when the local ambulance is responding to another incident.

However, unlike the position in the more densely populated urban areas, the level of activity in the smaller urban centres is insufficient to keep a solo response resource fully occupied in responding to emergency calls alone. Consequently the introduction of a solo response resource in these areas would need to be structured as part of a broader primary care resource for the local community in the form of a community paramedic scheme or as part of a district nursing structure or local community hospital.

#### 4.5 Double Crewed Ambulance (DCA)

Consequently, our modelling is based on the assumption that 60% of high acuity incidents in urban areas will be responded to initially by an RRV, and that the remaining incidents (where an RRV is not available to respond) will be resourced by DCAs.

Nevertheless, although the use of RRVs allows DCA utilisation rates to be maintained at a higher rate than would be required if all responses at 8 minutes were provided by DCAs, the rate still has to be maintained at a sufficiently low rate to enable the service to continue to meet the 19 minute transport standard.

The considerations that we have applied in determining the optimal resourcing for NAS are as follows:

- DCA resource should be supplemented with RRVs in the major urban centres at a level that will enable 60% of Echo and Delta calls to be attended by an RRV
- RRV resource should be made available to supplement a DCA resource in minor urban centres where the average level of daily activity for emergency and urgent activity exceeds 4 incidents per day and the average daily hours of work for DCA resource, exceeds 12 hours per day
- The average utilisation for DCA resource in major urban centres is assumed to be 55%. In minor urban centres where RRV resource is provided, DCA utilisation is assumed to be 45%. In other locations DCA resource is assumed to range between 40% and 30% depending on the average volume of activity in the area in question

## Responders

### 4.8 Potential improvements in rural 8 minute performance from the use of CFR schemes

As Table 4-4 also shows, the provision of the additional resource will only have a very small impact on the performance level that NAS would be able to achieve in the rural area as this consists of locations that are more than 5 km from the nearest NAS deployment point. Since the ability of NAS to meet the 8 minute performance standard depends upon a NAS resource being available within close proximity to an incident at the time that it occurs, it follows that the additional NAS resource will only have a marginal effect on 8 minute performance in rural areas.

In this context, it is important to emphasise the significant difference that NAS has in relation to the proportion of activity that occurs in rural areas by comparison with other ambulance services. As Table 4-5 shows, over 40% of the emergency activity in the area that NAS covers occurs in the rural area which is significantly higher than is the case in other services where it is unusual for the proportion of rural activity to exceed 30%. Moreover as Table 4-5 shows, in the West and North West deployment areas the proportion of activity that occurs in rural areas is 53.8% and 60.9% respectively.

It should be noted, however, that a number of other ambulance services which also have a relatively high proportion of their activity in less highly populated areas do manage to achieve a significantly higher level of 8 minute performance in rural areas. This is achieved through the use of Community First Responder (CFR) schemes under which local communities acquire a defibrillator and establish and maintain response schemes that are able to attend high acuity calls within their local area. We understand that NAS does have a number of CFR resources who are informed about incidents in their local area, but does not currently have a formal process for establishing whether a CFR has attended, or for recording the time at which they arrived at the scene. Consequently, it is likely that the level of 8 minute response that is currently achieved in rural areas is somewhat higher than the levels that are included in Table 4-1 to Table 4-4.

Nevertheless, in order to achieve a significant improvement in rural performance NAS would need to identify those locations where there is a sufficient volume of emergency activity to justify the establishment of a structured CFR scheme and to ensure that these schemes were well resourced and supported. In general these will be small towns and larger villages where there are likely to be one or more Echo and Delta calls per week. It should be noted that the number of locations that meet this requirement and thus the potential for CFR schemes to improve the rural performance will differ from area to area depending on the population density and topographical makeup of the area in question.

This is illustrated in the following heat maps of the distribution of one month's Echo and Delta incidents that occurred in the rural areas in the North East and North West Dispatch areas respectively.

As these heat maps show, the activity in the North West is significantly more dispersed than in the North East and there are a smaller number of locations with a sufficient concentration of activity to enable an active CFR scheme to have a predictable impact on 8 minute performance. Thus whilst in the North East it would be possible to plan to establish CFR schemes that would cover as much as 35 - 40% of the rural activity in the dispatch area, in the North West it would be difficult to cover more than 25% of the rural activity with such schemes.

We have undertaken an analysis of the number of locations where there is likely to be an average of one Echo and Delta call per week within each of the deployment areas listed as Appendix D to this report. Based on the assumption that CFR schemes in these locations would be able to respond to 70% of the incidents that fall within these areas within 8 minutes, Table 4-6 shows that the level of 8 minute performance in rural areas would improve from 10.1% to 32.9% and the overall level of 8 minute performance within the area covered by NAS would improve from 51.2% to 60.6%.

#### Recommendation

NAS should work with their volunteers to consider developing the scope of their network of community First Responder schemes to include some differentiated Delta calls (recognising this will require a major retraining programme), as well as increasing the number of schemes to cover many more areas, thereby improving patient care, clinical outcomes and response times in rural areas.

## 5 Resources and rostering

### Roster patterns

The highest level of resource required is during the day on weekdays when NAS is responding to both routine and emergency calls, with the lowest resource being required between midnight and 8.00 am on weekdays when the volume of emergency incidents is at its lowest.

By contrast at the weekends the level of activity remains relatively high until between 2.00 and 3.00 am. Consequently NAS rosters need to ensure that resource is planned in a way that meets this variable pattern of demand throughout the week.

### Abstractions and relief

This shows that the minimal level of absences that NAS needs to plan for as a result of unavoidable staff absence is 21.5%, which requires a relief factor of 27.4%. However this makes no provision for professional training which is particularly important for a service such as NAS that not only needs to maintain adequate levels of continuing professional training for its qualified staff, but also needs a development programme to upgrade staff to Advanced Paramedic status. In addition there will be an ongoing training requirement for staff in the control room in order to comply with the requirements

for operating the AMPDS triage system.

The addition of a level of training of 10 days per year increases the abstraction rate from 21.5% to 25.4% and results in a relief factor of 34%. This is consistent with the level of relief that was recommended in the UK Office of Strategic Health Authorities paper 2007<sup>13</sup>. Based on these figures, we have, therefore, undertaken our analysis of the front line staff requirement for NAS based on the assumption of a relief factor of 34%.

The precise level of relief that will be required remains to be determined based on the detailed requirements that NAS has for training and workforce development and the most appropriate way in which this can be delivered.

#### Recommendation

NAS should introduce a relief ratio of 34% as outlined in the framework in this report.

### 5.3 Deployment of Advanced Paramedics

It may not be possible for NAS to establish a separate response plan that would enable a vehicle with an Advanced Paramedic to respond to high acuity calls, and a different vehicle with lower skilled staff to respond to other calls. Consequently we believe that it will be difficult for NAS to achieve full compliance with its objective of providing a full AP response to all incident codes identified by the Pre Hospital Emergency Care Council (PHECC).

Consideration should therefore be given to potentially developing a clinical model which provides as many RRVs staffed with Advanced Paramedics as possible and further work is undertaken to determine the best configuration of additional APs on strategically located ambulances. This would enable NAS to determine the optimal number of APs required and their deployment to ensure optimal compliance with the PHECC codes whilst minimising skill decay for the AP group.

Optimising the utilisation of the Advanced Paramedics already in post by ensuring that they are sent to appropriate calls wherever possible and are situated well geographically.

#### Recommendation

NAS should give consideration to a programme of work which includes further sensitivity modelling as to the options for providing an Advanced Paramedic to those patients who require it within appropriate timeframes.

#### Current roster hours

Hr per week	EA	RRV	ICV	Total
Current roster hours	37918	958	4876	43752
Vehicle per day	225 1/7	5.5 1/7	40 1/5	Per day 270

	AP/P	EMT	Total
Current staff In post	1233	149	1382
Staff required for current rosters with 34% relief ratio	1664	189	1853
Staff changes to deliver best achievable performance with 34% relief ratio	431	40	471



## 7.2 Resources

Dispatch desk resources and activity						
Deployment area	Max number of ambulances (current)	Max number of RRVs (current)	Max number of ambulances (future)	Max number of RRVs (future)	Total incidents per day	Incidents per ambulance (future)
Dublin/Wicklow	13	1	16	6	100.4	6.3
East Kildare	5	1	5	3	31.1	6.2
Midlands	13		13	5	46.4	3.6
Mid West	12	2	10	2	38.9	3.9
North East	14		14	6	71.9	5.1
North West	12	2	14	4	36.2	2.6
West	18		21	6	68.2	3.2
South	21	2	25	5	90.2	3.6
South East	17		18	6	81.0	4.5
<b>NAS TOTAL</b>	<b>125</b>	<b>8</b>	<b>136</b>	<b>43</b>	<b>564.3</b>	<b>4.3</b>

11 additional ambulances and 35 additional RRV's  
 North East and east Kildare control desks to be combined  
 Midlands and mid west control desks to be combined

### 8.1 Hear and Treat

#### Recommendation

NAS should consider setting up a clinical support desk in the control room to offer a Hear and Treat service to appropriate patients.

### 8.2 See and Treat

#### Recommendation

NAS, in partnership with the wider health system, should review its policy of taking all patients to A&E and consider developing a See and Treat approach.

## 10 Summary of all recommendations

(Listed chronologically as they appear in the report, not in priority order)

- A. NAS should undertake further investigation into why emergency calls per head are so low in Ireland compared to England, so that future patterns of growth in Ireland can be better understood and accommodated.
- B. NAS should work with partners in the Irish health system to establish an agreed basis for handling routine activity (inter-hospital transfers of patients) with improved utilisation of ICVs.
- C. NAS should build on the HIQA National Standards for Safer Better Healthcare and develop a suite of appropriate clinical outcome and patient experience measures.
- D. NAS should consult with HIQA on a review of response time targets, in the light of the conclusions of this report about their achievability.
- E. NAS should invest in technology to support a more systematic approach to performance management and continuous improvement to enable full staff engagement.
- F. NAS should review its vehicle allocation processes with the aim of reducing the time from call determinant (identification of patient complaint) to vehicle allocation from 100 seconds to 45 seconds (although full achievement of this target will be dependent on the completion of the investment in new technology and the control rooms).
- G. NAS should introduce a process for earlier identification of, and dispatch of a vehicle to, Echo (immediately life threatening) calls.
- H. NAS should review its vehicle mobilisation processes with the aim of reducing the time from allocation to vehicle mobile from 80 seconds to 45 seconds (although full achievement of this target will be dependent on the completion of the investment in new technology and the control rooms).
- I. NAS should undertake a review of all vehicle deployment points in both major and minor urban areas to reduce drive times, aiming for an average drive time of 4 minutes in major urban areas. (See Appendix E for proposed major urban deployment points).
- J. NAS should work in partnership with identified hospitals to reduce the time spent by ambulances at hospital and ensure safe handover of patients.
- K. NAS should consider extending the use of Rapid Response Vehicles (RRVs) in both the major urban and minor urban areas.
- L. NAS should consider developing the scope of their network of Community First Responder response to include Delta calls (recognising this will require a major retraining programme), as well as increasing the number of schemes to cover many more areas, thereby improving patient care, clinical outcomes and response times in rural areas.
- M. NAS should introduce a relief ratio of 34% as outlined in the framework in this report.
- N. NAS should give consideration to a programme of work which includes further sensitivity modelling as to the options for providing an Advanced Paramedic to those patients who require it within appropriate timeframes.
- O. NAS should review the number and structure of the dispatch desks, operating processes and the control room staffing arrangements.
- P. NAS should consider setting up a clinical support desk in the control room to offer a Hear and Treat service to appropriate patients.
- Q. NAS, in partnership with the wider health system, should review its policy of taking all patients to A&E and consider developing a See and Treat approach.

## Appendix D - Location of potential Community First Responder schemes

### **Dublin Wicklow**

Greystones  
Charlesland  
Rathdrum  
Tinahely  
Rush  
Balbriggan

### **North West**

Bundoran  
Kinlough  
Tobercurry  
Enniscrone  
Newtown Cunningham  
Buncrana  
Milford

### **Midlands**

Clara  
Portarlinton  
Mountmellick  
Moate  
Edgeworthstown  
Abbeyleix

### **East Kildare East**

Monasterevin  
Kildare  
Prosperous  
Celbridge  
Kilcock  
Leixlip

### **West**

Westport  
Swinford  
Ballaghadereen  
Ballyhaunis  
Castlereagh  
Tuam  
Ballinrobe  
Athlone  
Gort  
Portumna  
Athenry

### **South East**

Cahir  
Fethard  
Carrick on Suir

### **Tramore**

Kilmuckridge  
Courtown  
Bunclody  
Bagenalstown  
Ballyragget  
Tullow  
Callan

### **North East**

Trim  
Enfield  
Kinnegad  
Athboy  
Bettystown  
Ashbourne  
Kells  
Duleek  
Slane  
Dunleer  
Castlebellingham  
Carrickmacross

### **Mid West**

Kilkee  
Miltown-Malbay  
Newmarket on Fergus  
Rathkeale  
Abbyfeale  
Adare  
Killaloe  
Borrisoleagh  
Borrisokane  
Templemore

### **South**

Ballybunion  
Ballyheigue  
Charleville  
Castleisland  
Milltown  
Dunmanway  
Bandon  
Kinsale  
Ballincollig  
Cobh  
Ringport  
Castlemartyr  
Rathcormac

Towns with fire stations in red

## Deployment point modelling

The model works by creating a number of geographical zones based upon the volume of call incidents across the country. As in the initial report, geographical zones are categorised as major urban, minor urban or rural, depending on the number of incidents that occur within a 24-hour period. (For a definition of major urban, minor urban and rural areas, see section 2.3.3 in the main report.) Note that the name used for a zone purely reflects the number of incidents that occur, and is not based on the geographical features of the zone.

### Major urban areas

- These are generally larger towns that have concentrated demand
- In major urban areas, RRVs should provide the key initial response to high acuity emergency incidents

### Minor urban areas

- These are generally smaller towns (and the outskirts of major towns and cities) that have moderate demand
- In minor urban areas, DCAs provide the key initial response to high acuity emergency incidents
- Supplementary RRV cover is recommended in these areas when the activity level is high (typically during daytime hours). High activity indicates that DCA cover will be insufficient to provide the necessary cover to meet the 8 minute performance standard

### Rural areas

- In these areas, CFRs would be recommended as a key initial response to suitable high acuity emergency incidents
- To provide support to the initial response, a DCA or other transport resource should be available within a maximum of 30 minutes

The initial report used drive zones of 5km radius, which give a good approximation of 6 minute drive times. The distance modelling in this more detailed breakdown uses isochrones to align resources. An isochrone represents the distance that a vehicle can drive in a given time, and depends on factors such as road type.

The following key considerations were employed in undertaking this modelling exercise:

- The modelling is based on the nine current dispatch areas (former health districts) as shown in Figure 17-1 with some minor modification
- The inputs to the model are incident volume by geography (demand), by incident type and by time of day (activity)
- The model assumes that NAS will organise its dispatch and deployment process to correspond with the structure recommended in Section 7 of the report. This reflects the way in which activity cycles in and out of different hospitals
- Each dispatch area is modelled independently



**Drive zones to meet the 8 minute standard for the new NAS dispatch areas**

Table 17-1 below gives the split of the deployment zones by the new dispatch areas. There are a total of 114 drive zones for the 8 minute response.

Table 17-1: Number of 8 minute drive zones in major urban and minor urban areas by new dispatch area

	Major Urban	Minor Urban	Total
East	23	11	34
Midlands	0	11	11
Mid West	3	10	13
North East	4	8	12
North West	1	8	9
West	2	6	8
South West	5	10	15
South East	2	10	12
<b>Total</b>	<b>40</b>	<b>74</b>	<b>114</b>

Table 17-2: Number of 19 minute drive zones in major urban, minor urban and rural areas by the new dispatch area

	Major Urban	Minor Urban	Rural	Total
East	5	0	0	5
Midlands	0	11	2	13
Mid West	1	6	5	12
North East	2	7	0	9
North West	1	5	6	12
West	1	7	2	10
South West	1	14	5	20
South East	1	8	0	9
<b>Total</b>	<b>12</b>	<b>58</b>	<b>20</b>	<b>90</b>

Table 18-1: Additional average weekly roster hours for NAS to deliver best achievable performance– Including DFB activity

Including DFB Activity	Ambulance	RRV	ICV	Total
<b>Current</b> available NAS & <b>DFB</b> hours – September 2014	39932	958	4880	45770
NAS & DFB roster hours required to deliver best achievable performance ( <b>initial modelling</b> see table 5-6 & Table 6-1)	46676	4536	4880	56092
NAS & DFB roster hours ( <b>enhanced modelling</b> ) required to deliver best achievable performance <b>including 6.5% activity</b> growth (see table 18-4 below)	49190	5292	5280	59762
<b>Total additional average weekly rostered hours required (enhanced modelling)</b>	<b>9258</b>	<b>4334</b>	<b>400</b>	<b>13992</b>

Table 18-2: Additional average weekly roster hours for NAS to deliver best achievable performance– Excluding DFB activity

Excluding DFB activity	Ambulance	RRV	ICV	Total
<b>Current</b> available NAS Hours – September 2014	37916	958	4880	43754
NAS roster hours required to deliver best achievable performance ( <b>initial modelling</b> see table 5-6)	42646	3948	5280	51874
NAS roster hours ( <b>enhanced modelling</b> ) required to deliver best achievable performance <b>including 6.5% activity</b> growth (see table 18-4 below)	43130	3948	5280	52358
<b>Total NAS additional average weekly rostered hours required (enhanced modelling)</b>	<b>5214</b>	<b>2990</b>	<b>400</b>	<b>8604</b>

Table 18-3: Number of additional staff required to cover best achievable rosters for Ireland (including DFB activity)

Including DFB activity	AP / Paramedic	EMT	Total
NAS Current Staff in post (2014 data)	1233	149	1382
NAS staff required to deliver best achievable performance with 34% relief ratio including DFB activity (enhanced modelling)	1927	189	2116
<b>No of staff required with 6.5% activity growth</b>	<b>1946</b>	<b>189</b>	<b>2134</b>
No of staff requiring funding with new dispatch areas, (minus current overtime spend see section 5-7)	1822	165	1986
Additional staff requiring funding	589	16	605
<b>Total additional staff in a dual provision model</b>	<b>445</b>	<b>16</b>	<b>461</b>

Table 18-4: Number of additional staff required to cover best achievable rosters for Ireland – (Excluding DFB activity)

Excluding DFB activity	AP / Paramedic	EMT	Total
Current NAS Staff in post (2014 data)	1233	149	1382
<b>No of staff required to deliver best achievable performance with new dispatch areas, 34% relief ratio and 6.5% activity growth</b>	<b>1741</b>	<b>189</b>	<b>1930</b>
No of staff requiring funding with new dispatch areas, (minus current overtime spend see section 5-7)	1617	165	1782
<b>Total additional staff requiring funding</b>	<b>384</b>	<b>16</b>	<b>400</b>