Northern England Clinical Senate

Durham Dales Paramedic Skill-mix Review

Final Report

1. Introduction

In December 2014, the Northern Clinical Senate received a formal referral from the Durham Dales, Easington and Sedgefield Clinical Commissioning Group to provide an independent clinical assessment of the following issue:

> *For people in the Durham Dales area, is there any difference in terms of patient care and outcome between an ambulance service staffed by a paramedic with an Emergency Care Assistant (ECA), and one staffed by two paramedics?*

In order to provide an appropriate response to this referral, the Northern Clinical Senate drew together clinical experts from across the country on all aspects of the clinical journey that patients would experience in this instance. Their expertise included both the clinical aspects of care based on the latest research and guidance available and the knowledge and experience of how care is delivered in rural settings. Table 1 shows the Review Team members and their relevant expertise/experience to undertake the review.

Member	Background / role
Dr Lesley Kay (Chair)	• Vice-Chair - Northern Clinical Senate • Consultant Rheumatologist and Clinical Director - Patient Safety, Newcastle upon Tyne Hospitals NHS Foundation Trust
Mark Millins	• Lead Paramedic Yorkshire Ambulance Service • UK Ambulance Services Clinical Guidelines Lead • Member of Consultant Paramedic Advisory Group (College of Paramedics) • Vice Chair National Ambulance Lead Paramedic Group • Member of the Yorkshire and Humber Clinical Senate.
Richard Lee	• Assistant Director of Operations (Clinical Modernisation) – Welsh Ambulance Service NHS Trust • Previously Head of Clinical Services and Regional Director – South East, Central and West Wales (both Welsh Ambulance Service) • Paramedic • NICE Major Trauma Guidelines Project Executive Team Paramedic member

Dr David Bramley	• Consultant in Emergency Medicine & Pre-Hospital Emergency Medicine - City Hospitals Sunderland • Medical Director - Great North Air Ambulance Service • Network Director – Northern Trauma Network
Dr Peter Weaving	• GP Clinical Director at North Cumbria University Hospitals NHS Trust • Previously CCG Co-Clinical Chair – Cumbria CCG and GP at a practice serving a rural community • Northern Clinical Senate Council Member
David Davis	• Paramedic • NHS 111 Workforce Development Programme National Clinical Lead - NHS England • NHS Pathways Clinical Lead / Deputy Lead Governor South East Coast Ambulance Service • AHP Clinical Lead South East Coast Clinical Senate Council • Formerly AHP National Clinical Lead for Informatics - Department of Health/HSCIC • Fellow of the College of Paramedics and formerly Director of Communications

Table 1: Northern Clinical Senate Review Team

The Review Team worked through the methodology outlined within the report to determine a response to the question set. The conclusions drawn from this process underpin the recommendations made to the sponsoring organisation in this Final Report. The sponsoring organisation is not statutorily obliged to implement these recommendations and will need to consider them through their own decision-making process.

The Final Report has passed through the Northern Clinical Senate governance process and has been approved by the Northern Clinical Senate Council.

2. Background

The two-paramedic crew service model for the Durham Dales was put in place by the North East Ambulance Service (NEAS) following a review they had undertaken on rural ambulance provision and at the request of the then commissioner of the service, County Durham Primary Care Trust (PCT) in 2008.

As part of the PCT decision, additional investment was made in the provision of a single crewed paramedic Rapid Response Vehicle (RRV) for 12 hours a day to support the dual-paramedic crewed ambulance. Since the introduction of this model, commissioning responsibilities have changed since the enactment of the Health and Social Care Act (2012) with the abolition of PCTs and have moved to the newly formed clinical commissioning groups (CCG) - in this instance, the Durham Dales, Easington and Sedgefield CCG.

These crews and RRV operate out of the Barnard Castle and Weardale stations and cover both Weardale and Teesdale.

3. Methodology

The review process used the following methodology.

Stage 1 - Pre-review information

- Literature review on paramedic skill-mix / ambulance provision in rural areas
- Details of deployment and backup procedures for the Durham Dales
- Details of air ambulance provision in the area (including night flight etc)
- Details of pre-alert systems in operation with receiving hospitals
- Details of clinical oversight / supervision for crews to be based in the dales
- Job descriptions of Paramedic / Emergency Care Assistant / Paramedic Technician from NEAS and the other 9 English Ambulance Services

Prior to commencing the review, DDES CCG and NEAS had devised a paper audit form to give to crews responding to calls in the Durham Dales (the Review Team members had sight of the form prior to circulation and were comfortable with the questions being used). The data collection ran from the 1st to the 28th February 2015. During this time only 28 forms were completed by ambulance crews (NEAS responds to roughly 250 calls a month in the Durham Dales area).

It transpired that only 28 NEAS Rural Ambulance Skill Mix audit forms were completed during February 2015. NEAS felt that neither re-auditing nor extending the audit period further would result in a higher completion. Instead the Review Team agreed to take a sample of Electronic Patient Report Forms (EPRFs – the clinical assessment reports that are completed by crews for each incident NEAS respond to) to provide a representative sample size of information to review.

The Review Team received 471 EPRF extracted from NEAS' clinical database which included 335 relating to incidents responded to by crews working out of the Barnard Castle and Weardale stations, and 136 forms relating to incidents in the Durham Dales responded to by crews working from other stations. Both the local audit and the extracted EPRFs were considered by the Review Team.

Stage 2 – On-location Review Day structured around the following sessions:

- Session 1 in Newcastle - NEAS representatives: Medical Director, Consultant Paramedic, Chief Operating Officer and Operations Manager – South Division
- Session 2 in Westgate, Weardale - Rural Ambulance Monitoring Group

- Session 3 in Bishop Auckland – paramedics and ambulance staff based in the Durham Dales

Session 3 was arranged to allow the Review Team to hear the views of paramedics and ambulance crews working in the Durham Dales. Unfortunately, due to either operational crews being unavailable as they were responding to calls or off duty staff being unable to attend as they were on annual leave, no paramedics were available for this session. To ensure that paramedics could put forward their views, the offer was made to all those crews covering the Durham Dales to submit individual paramedics' views electronically or speak to Review Team members after the review day. Four paramedics subsequently put forward their views which were taken into consideration by the Review Team in writing this report.

Stage 3 – Collation of supplementary information either requested by Review Team members or identified as relevant by session attendees on the Review Day.

The information provided in all three sessions was collated, analysed and assessed by the Review Team with the conclusions and recommendations outlined in this report.

4. Views expressed on the Review Day

4.1 NEAS

The main views expressed on the Review Day by NEAS were that:

- The current service model in the Durham Dales is unique in the North East (including other significantly rural areas such as Northumberland) and probably across the rest of the country in areas such as Yorkshire and Wales.
- There are ongoing issues of recruitment, retention and long term sickness in the crews working out of the two main Durham Dales ambulance stations. NEAS believe that this would be alleviated by moving to the proposed models with paramedic vacancies that have proved difficult to recruit to, being filled with more available non-regulated ambulance care assistants, Emergency Care Assistants (ECAs) also known as Emergency Care Support Workers (ECSWs) in some ambulance trusts
- Resources released by moving to the proposed skill mix model would mean an increased level of service to the Durham Dales (through the introduction of an additional RRV) with no additional clinical risk identified or anticipated
- The risks in the proposed service model already exist in the current service model (e.g. connectivity of communications) and are not affected by the skill-mix change

- Significant changes have been made to the remote clinical support available to all crews in recent years e.g. introduction of a 24/7 clinical hub staffed by senior paramedics and the creation of the new Emergency Care Clinical Manager (ECCM) role.

4.2 Rural Ambulance Monitoring Group

The main views expressed by the RAMG during the session were that:

- The Durham Dales is a unique place (rurality, population changes in summer with significant number of holiday makers, no street lighting, etc) which requires a service model that differs from the norm.
- The current service model was introduced in response to concerns around patient safety in 2008 so why would there be a change now?
- There has been an ongoing erosion of service since 2010, feeling strongly that ambulances were being taken out of the dales area due to incident volumes in other areas, handover delays at Durham hospitals and returning crews being diverted to other incidents on the way back to the dales (with suspicion that this may not just be for Red 1 category calls but all the way to Green 2 calls). The RAMG perceive that this leads to significant periods of time when there is no coverage for the dales (but can't quantify this as the information provided by NEAS has ceased to be provided on grounds of patient confidentiality and the fact it was a "non-commissioned" report).
- Whilst recognising that two paramedics per crew may be viewed to be a "luxury", they did not want to see further erosion of service level.
- (organisational) politics and the new commissioning arrangements were stopping proper joined up discussions on developing services appropriate for rural communities – examples given that RAMG members are directed to staff members in NECS as opposed to being able to meet with CCG staff
- There was concern about the pressure on single paramedic from a staff welfare point of view and potential impact on retention of current staff should current model change.
- There was concern that if a paramedic is absent or ill then the dales would be left with basic life support crews.
- The group had been told by a consultant from James Cook Hospital (in Middlesbrough) that "Complex, multiple-condition patients require two paramedics"
- There were no community first responders or known location of public access defibrillators in Weardale.

4.3 Paramedics based in the Durham Dales

The Review Team received four individual responses from paramedics working in the Durham Dales between the Review Day and the production of this report.

- There are current workforce pressures in the Durham Dales due to long term illness and retirements. Paramedics report that this leaves them working extra overtime in order to keep a vehicle on the road. Due to demands of the service at present this leads to numerous missed meal breaks and enforced late returns and early starts turning 12 hour shifts into 13, 14 sometimes even 15 hour shifts.
- Crews in the Durham Dales face extended travel times. Journey times from the upper Dales are circa 50 minutes to Darlington with additional journeys if for stroke (University Hospital North Durham) or acute myocardial infarction requiring percutaneous intervention (James Cook Hospital, Middlesbrough)
- One paramedic felt that crews in the Durham Dales often spend time on inappropriate jobs which could be reduced by a more efficient triage system as opposed to another who felt that patients in the Durham Dales actually use ambulances more appropriately (i.e. when they really need them) than in other areas.
- Crews in the Dales feel that they *"are constantly getting pulled into the big towns and quite often the Dales go completely uncovered".*
- Some paramedics felt that co-morbidities, the larger population of older people and unique elements of case-mix (the example given was of high motor-cycle usage in the area) needed to be taken into consideration
- Some paramedics felt that ECA/ECSWs only had limited training and a lack of on-the-road experience of difficult jobs in rural locations with no backup make responding effectively more difficult.
- One paramedic felt that while it may be difficult to justify having a double paramedic crew on for every job, there are some jobs where having the skill of two paramedics definitely improves the patient's experience and possibly the outcome. They feel that this is very hard to prove or disprove however as it is impossible to perform a randomised controlled trial as each job is so individual
- One paramedic offered the suggestion of introducing the Qualified Technician Role in the Dales and then Paramedic burn out would be less likely to occur as an improved skill mix to the introduction of ECA/ECSW role in the Dales
- Examples were given of multiple-casualty incidents where paramedics has had felt that the dual paramedic model had helped them manage the situation more effectively, especially due to the distance that back-up ambulances would have to travel to arrive on scene

5. Discussion

The Review Team considered the evidence submitted and views expressed on the day and identified the following key issues:

- Paramedic skill-mix in relation to the scene of an incident
- Clinical support available for crews in rural areas
- Clinical risk management
- Ambulance coverage and journey travel times

5.1 Paramedics skill-mix in relation to the scene of an incident

The Review Team considered the difference in impact that the two different skill-mix models could have at the scene of the incident with arguments heard that more paramedics on scene lead to quicker assessment and treatment and therefore improved patient outcomes.

Neither the experience of the clinical experts on the Review Team or the limited published research in this area supported this argument as dual-paramedic crews tend to spend longer on scene than mixed-model crews when more rapid conveyance to an acute setting may have been more beneficial to the patient. In fact part of the treatment of a seriously ill patient is the packaging and removal to the ambulance which is not a paramedic skill.

The clinical experts on the Review Team feel that there are only a very small number of instances in which there is absolute urgency for treatment on scene (cardiac arrest, choking, exsanguinating haemorrhage or obstetric calls where a baby that has been born requires resuscitation whilst the mother suffers a post-partum bleed). In these most urgent cases, unless an ambulance is in very close vicinity at the time the incident occurs, then the chances that a paramedic crew can intervene successfully are very limited (regardless of skill mix).

For cardiac arrest cases, the paramedic/ ECA model provides a team capable of commencing advanced life support and there will be cases where a lone paramedic on Rapid Response Vehicle (with ambulance back-up) will be the first on scene. The immediate priorities at a cardiac arrest are good quality cardiopulmonary resuscitation (CPR) and immediate defibrillation of a shockable rhythm. Both of these skills can be safely undertaken by ECA staff.

In other very urgent cases, often the most important factor affecting the clinical outcomes of the patient is the speed by which the patient can reach a definitive care setting, the treatment by the ambulance crew whilst essential, must be undertaken en route.

The argument for multiple casualty incident, whilst an emotive one, should not be used to justify double-paramedic crews due to the infrequency of these types of incident. It often does not stand that two paramedics will be able to treat a patient on scene more quickly than a single paramedic and an ECA in such instances as there is only one piece of the necessary clinical equipment (e.g. defibrillator) available on each ambulance. As asserted by NEAS, the paramedic resource released from the skill-mix change would also enable the increase in number of RRV which should lead to more rapid back-up in such incidents. However, operational and staffing realities may not lead to this occurring in practice at times.

The area also benefits from good access to air ambulance support and this service should be in attendance as often as possible at critical incidents.

Ultimately in all instances, many of the advantages of a two paramedic crew are lost once the conveyance of the patient begins as one member of the crew is always driving the ambulance. The access to peer support and review is mitigated through remote clinical supervision available from the clinical support function as outlined earlier within the document.

Instances identified in the completed audit forms

Of these 28 forms, three contained indications that paramedics felt that the two-paramedic model had had a beneficial impact on the clinical outcomes of the patients in these instances.

The Review Team looked at these three cases. Two of them were patients being treated for Sepsis. Sepsis is a common and potentially life-threatening condition triggered by an infection that causes a series of reactions including widespread inflammation, swelling and blood clotting. This can lead to a significant decrease in blood pressure, which can mean the blood supply to vital organs such as the brain, heart and kidneys is reduced and if left untreated mean organ failure and ultimately death. Sepsis is often treated in the first hour with the application of six measures (the Sepsis Six[1]) which are:

1. Administration of high flow oxygen.
2. Taking blood cultures
3. Giving broad spectrum antibiotics
4. Giving intravenous fluid challenges
5. Measuring serum lactate and haemoglobin
6. Measuring accurate hourly urine output

[1] http://www.nhs.uk/Conditions/Blood-poisoning/Pages/Treatment.aspx

Of these six measures, only two(measures 1 and 4) are able to be given by ambulance crews in the North East, as in many other parts of the country, with the others to be delivered in an acute hospital. The clinical experts on the Review Team noted that ECAs should already have the training to deliver oxygen and assist the paramedic with the administration of IV fluids. These treatments would be best administered within the ambulance during the journey to hospital with the other crew member driving to enable the patient to reach an acute care setting as quickly as possible to receive the other four measures.

It was felt that such cases do not justify a dual-paramedic crew. It is also noted that Sepsis care provision is advancing in the pre-hospital arena, with the introduction of point of care testing and other interventions, but that this would not add power to the argument to retain a double-paramedic crew.

In the third case, the patient was suffering from acute shortage of breath and exacerbation of chronic obstructive pulmonary disorder (COPD) with abdominal pain. The form describes that:

"Having a double paramedic crew enabled treatment of both drugs and IV fluids where effective monitoring and re-assurance of patient and family. An ECSW (ECA) would have delayed certain aspects of critical care with disastrous consequences".

The full EPRF for this incident was requested and based on this and the information included in the written account, the Review Team felt that:

- There may have been some immediate temporal benefit to the case described, however, this type of clinical presentation is one that other ambulance services would expect their mixed paramedic / ECA crews to manage efficiently and effectively as a matter of course
- The detailed information does not support the suggestion that this incident would require a double paramedic crew

In this instance, there were three paramedics present as a Rapid Response Vehicle was also in attendance. If the mixed crew model were in place in this instance there would have still been two paramedics on scene.

5.2 Clinical support for paramedics in rural areas

One of the factors the Review Team felt was an important consideration in the proposals to change the skill-mix for the crews working in the Dales was to ensure that there was sufficient clinical support available. NEAS outlined a range of support mechanism including the 24/7 telephone / radio (Airwave) support access to the Clinical Hub and the introduction of the Emergency Care Clinical Manager role.

The Review Team recognise that ambulance crews working in rural and very-rural areas are at risk of being unable to retain and maintain their knowledge, skills and competencies across a wide range of clinical areas, simply due to the lower volume of incidents attended. This requires greater focus on training of skills on things seldom done by both the individuals in the crews and NEAS as their employer. NEAS outlined the new training needs self-assessment programme that will help target training necessary across stations/areas or to individual needs that demonstrated a robust approach to ensuring crews can maintain both their skills and confidence, particularly if this were to be tailored to those skills areas most likely to lapse due to the case volume and mix experienced due to the rural setting.

Clinical supervision needs to be carefully considered and developed in partnership with the workforce, to support this group of clinicians.

5.3 Clinical risk management

The Review Team took into consideration the management of clinical risks associated with the proposed skill-mix.

NEAS discussed past issues of crews' ability to recognise ST elevation in electrocardiograms, particularly when there was a lack of 3G connectivity (which can impact telemetry transfer to the PPCI centre). In these instances, the clinical risk is managed through the ability of a paramedic to interpret an ECG learned during Advanced Life Support (ALS) training (mandatory on an annual basis) for all NEAS paramedics.

The Review Team noted that NEAS is one of a minority of ambulance trusts in the country currently using telemetry for ECG so during the times that telemetry is unavailable, this does not negate the ability of the paramedic to autonomously care for the patient to a level below that available anywhere else in the country.

There was also discussion around the risk associated with the Airwave radio system black-spots, especially for new crew members coming to work in the area.

The paramedics on the Review Team felt that the overall risk associated with Airwave blacks-pots was no greater for a mixed-crew than for a double paramedic crew and that Airwave black-spot locations would be well known by local crews. The national Airwave system is being reviewed and NEAS should ensure that known black-spots are addressed in future developments.

5.4 Ambulance coverage and journey travel times

One of the key reflections of the Review Team from hearing the views of NEAS, the RAMG and paramedics working within the Durham Dales is that their needs to be a clear separation of concerns over the impact of changes to the skill-mix of the crews and the general ambulance coverage in the Durham Dales.

Whilst outside of the scope of clinical review, the concerns around the crews being sent out of area are valid ones. It is important to note however that maintaining the current skill-mix model may be contributing to these issues, particularly given the current workforce pressures being experienced by the Barnard Castle and Weardale Stations and NEAS more widely.

If NEAS is able to re-deploy a number of paramedics through the implementation of the skill mix change, then the operational response provided may enable a more effective deployment within the Durham Dales.

6. Conclusions

Based on the information submitted (including the small number of completed audit forms), the meetings with members of the North East Ambulance Service and the Rural Ambulance Monitoring Group and the views submitted by paramedics working in the Durham Dales, the Northern Clinical Senate Review Team has made the following conclusions:

Conclusion 1: There was no evidence of any difference in patient outcomes between an ambulance staffed by a paramedic with an Emergency Care Assistant (ECA), and one staffed by two paramedics.

The case mix and geographical factors of the Durham Dales area are not significantly different to other rural and very-rural areas in the UK that already operate the mixed-crew model. Whilst it was noted that rurality is linked to extended travel times, this factor should not determine the clinical model as during the journey in a two paramedic crew, one paramedic is driving the vehicle (with the driver training provided to ECA staff and paramedics is identical).

Conclusion 2: The Review Team feel that personnel resources would likely be better utilised by moving to the mixed crew model.

Due to the current model of dual-paramedic crew and the use of Rapid Response Vehicles, there are occasions when three paramedics are attending the same incident. To a back drop of pressured workforce and the need to deliver challenging performance targets, the Review Team felt that the mixed-crew model offered a more effective use of resources.

In this regard, whilst it is appreciated that it could be perceived that a change in skill mix from the dual-paramedic to the mixed-model would be a loss/reduction in service, it would in fact release capacity that would be available to provide a wider range of services and potentially increase the quality of care across the system. On the balance of probability, more vehicles capable of responding to incidents over a rural geography would be of more benefit than fewer vehicles with dual-paramedics.

Conclusion 3: There are practical processes in place and training in the process of being introduced that will support the mitigation of clinical risk in rural and very-rural areas.

The evidence presented by NEAS regarding the availability of the clinical support hub, the introduction of ECCM staff and the systematic self-assessment training needs analysis convinced the Review Team that adequate clinical support is available to paramedics in the Durham Dales. The Review Team felt that as well as this, NEAS should offer to do extra training in interpretation of ECGs for crews based in the Durham Dales.

Conclusion 4: Staff would need to be supported through any introduction of service change

The Review Team recognises the challenges of providing healthcare in rural and extremely rural areas with small teams of dispersed staff. Further the team recognises the issues this produces in terms of recruitment and retention of staff and development and maintenance of expertise. NEAS will need to take care and support staff and identify any unforeseen consequences of service change through any introduction of change.

That paramedics and ECAs in the new arrangement will require ongoing clinical and training support to help mitigate the small clinical risks associated with lower incident volume. NEAS will also need to identify clear contingency plans for when there is sickness/absence within the crews covering the dales. Airwave black-spots should be mapped and made available for new crew members or crew members from out-of-area covering absence.

Staff confidence and wellbeing needs to be considered as it will be important to retain competent and capable staff within the context of such long transfer times. This should include:

- The introduction of specialist (primary and critical care) and advanced roles should be considered and implemented at the earliest opportunity – to provide escalation and supervision opportunities
- With the future potential of a supervision ratio of roughly 1:1.5 paramedics for students in the coming years, it would make sense to invest in the Dales workforce to ensure that they are all capable for supervision , practice educators in stations and student paramedics
- All paramedics should have regular supervision shifts as part of their rotations to ensure quality, competence, confidence and patient safety
- There should be specific focus on the confidence of crews in the interpretation of ECGs as part of the self-assessment of crews training needs
- If the inevitable overruns experienced by Dales ambulance crews are leading to shifts in excess of 12 hours then consideration should be given to rostering shorter shifts (e.g. 8 or 10 hours) to ensure that even with an over run the longest working shift is 12 hours.

Conclusion 5: There are opportunities for NEAS, the commissioner and local communities to work together to develop a set of services and relationships that would improve the resilience of rural populations.

For some of the most urgent cases in rural and very-rural areas, ambulances may not be able to get to the scene of an incident quickly enough regardless of the number of ambulances available or how they are crewed.

In these instances it is members of the local communities themselves who may be the only people close enough to give basic life-saving treatment until an ambulance arrives. There are opportunities for NEAS, local commissioners and local communities to come together to help develop more resilient local communities in a planned way.

Ideas from the Review Team include:

- To arrange CPR and defibrillator training in local communities on Saturday mornings and raise awareness/interest in Community First Responder training
- Taking advantage of the schemes such as the British Heart Foundation nation of lifesavers scheme which offers part funding of defibrillators to be used by local communities https://www.bhf.org.uk/heart-health/nation-of-lifesavers/using-defibrillators/applying-for-a-public-access-defibrillator

- Placing public access defibrillators in cabinets in the more populous parts of the Durham Dales so they are accessible to all. Facilities such as phone boxes are used elsewhere in the UK.
- To undertake an online audit in conjunction with community groups and private businesses (e.g. caravan / holiday parks) to map where defibrillators are current situated.
- NEAS looking to use the Advanced Paramedic role currently in development with Health Education North East
- Engage in programmes such as Restart-a-Heart (https://www.erc.edu/index.php/events/en/10/2015/12/eid=110/ - a Europe-wide day aimed at teaching secondary schoolchildren how to perform life-saving CPR skills) when opportunities arise

7. Recommendations

The Review Team recommends that the CCG as sponsor organisation should:

- Accept the conclusions drawn from this independent expert review in answering the question posed
- Support NEAS in their move to introduce the new skill-mix model
- Ensure that NEAS support the crews in the Durham Dales as these changes are introduced and beyond, and clearly outline contingency plans should there be sickness/absence post implementation
- Routinely assess the levels of ambulance cover in the Durham Dales area
- Actively engage with NEAS and local groups to develop plans that will create more resilient local communities
- Work with County Durham and Darlington NHS Foundation Trust to reduce ambulance handover delays, which contribute to ambulance crews being away from the Durham Dales