PACEC

Public and Corporate Economic Consultants

With Janette Turner, Medical Care Research Unit, University of Sheffield

NHS Wales Ambulance Service Emergency Ambulance Services Committee

Clinical Model Pilot Evaluation

Final Report

January 2017

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EXECUTIVE SUMMARY

Introduction

PACEC and the Medical Care Research Unit at the University of Sheffield were appointed by the Emergency Ambulance Services Committee to undertake a review of the Clinical Model Pilot of the Welsh Ambulance Service Trust. This is the final evaluation report. The evaluation objectives are to assess the following:

- **Clinical indicators / outcomes** – to demonstrate the effect of the removal of time-based response standards on clinical performance
- **Value for money** – to establish the cost effectiveness of ambulance services
- **Patient experience** – to assess the impact of the new model of care on patients both in terms of satisfaction and welfare
- **Staff perceptions** – to determine how WAST and LHB staff (ranging from frontline to managerial) perceive the clinical model pilot, especially its design, implementation and performance.

To accomplish this, PACEC and the Medical Care Research Unit at the University of Sheffield have undertaken a comprehensive research programme to document the design and implementation of the Clinical Model Pilot, and assess the impact it has had on ambulance service performance during its first year of operation.

The research programme included the following:

- Review of literature on ambulance service procedures
- Development of a theoretical framework describing the Clinical Model Pilot's potential impacts
- Quantitative analysis of performance data
- Qualitative Consultations with stakeholders.
- Staff survey

Findings

The new operational model introduced in October 2015 has substantially changed the way in which WAST provide a response to 999 calls requesting urgent health care. The intention was to provide a service which is more clinically focused by prioritising the small cohort of patients who can most benefit from a very rapid response, and allowing more discrimination for other calls so that not just the speed but type of response is proportionate to patient need.

There is a clear and universal acknowledgement, both from WAST and external stakeholders, that moving to the new clinical model was appropriate and the right thing to do. The increased time allowed for call categorisation has not introduced any new risk to patient safety, and it is likely that, without the new model there would have been significant risk for patients, particularly over winter, due to continuing increase in patient demand. The evidence presented shows that there have, overall, been no serious safety concerns, with two key indicators – Serious Adverse Incidents reported, and re-contact rates – remaining stable or declining.

Quantitative assessment of the clinical model pilot using the new Ambulance Quality Indicators (AQIs) shows that the pilot has had a positive impact on ambulance service performance:

- Response time reliability for the most urgent category (now "Red") has increased substantially
- Fewer resources are being used per incident, regardless of categorisation
- Direct costs have decreased slightly and are being redistributed to earlier Steps in the Ambulance Patient Care Pathway

The effects on patient outcomes are difficult to ascertain: little outcome data is collected, and process measures, such as delivery of care bundles, are still being developed. Delivery of stroke and STEMI care bundles show consistent and, in the case of STEMI, improving compliance with delivery, although this is not the case for the hip fracture bundle. The clinical model itself does not directly affect this, but by incorporating the reporting of clinical outcome indicators the model provides a conduit for monitoring and quality improvement initiatives.

Overall, there is agreement that the service is much more clinically focused, rather than simply being operationally driven. The same findings are emerging from similar changes being tested across England, and there is a growing consensus that the principles used to develop the WAST clinical model and comparable models in England and Scotland are sound, and are providing a mechanism for enabling ambulance services to manage demand and better use the resources they have for the benefit of patients.

It takes time for new ways of working to become established and for a new operating model to mature. WAST have acknowledged that, ideally, some of the work that is currently in progress such as the replacement of the CAD and associated information systems and the demand and capacity review would have allowed them to make further progress. Nevertheless much of the work, particularly in changing call assessment and dispatching processes which underpin the model, has been successfully implemented.

Scope for further improvements is principally centred around the following:

- A need to review the call categories outside Red, in particular the Amber category. There is concern that this group is too large and not sufficiently discriminatory in terms of prioritising patients with high acuity illness, and that for some calls this is resulting in unacceptably long waits.
- Investment in information systems will provide opportunities to both enhance and make more seamless the call management and dispatch process and provide more robust information to support further development both internally and externally. The approved and planned replacement of the CAD system will be a key factor in supporting further development and improvement of the clinical model.
- Providing alternative response options is a multifactorial problem. Some factors lie within the ambulance service, requiring identification of calls which might best be served by these options but also having the infrastructure, workforce profile and training to provide them at necessary scale. Others are outside the ambulance service and are concerned with the wider system provision of suitable alternative services, at the time they are needed and with clear agreed access and referral pathways that will allow ambulance service clinicians to safely transfer care.
- There is variation between health boards, indicating that wider system processes for managing calls that do not need transporting to an acute hospital are better in some areas than others. There is scope to increase hear and treat and see and treat if the right pathways are in place that allow and support confident and safe clinical decision making by clinicians in the clinical hub or at scene with a patient.

The continued development and future success of WAST as a key provider in the emergency and urgent care system in Wales will require both the continued and evident internal commitment and joint working and commitment to a common purpose by multiple partners. A success and advantage that has grown out of the development and implementation of the new clinical model is that WAST is now much more visible to the wider health system: a central player in the development of emergency and urgent care services, rather than a passive recipient. This will be key to achieving more benefits from the clinical model, as WAST and others now have better understanding and working relationships that will support the development of both internal operations and the more broad, system wide alternative care pathways that will support the aspirations of providing high quality, clinically focused care to the population it serves.

1 INTRODUCTION

PACEC and the Medical Care Research Unit at the University of Sheffield were appointed by the Emergency Ambulance Services Committee to undertake a review of the Clinical Model Pilot of the Welsh Ambulance Service Trust. This introduction provides an overview of the terms of reference for the review and the methodological approach used in this evaluation.

1.1 Terms of Reference

The aim, objectives and outcomes of this evaluation are outlined in the project specification, and are listed below.

1.1.1 Aim

The Emergency Ambulance Services Committee (EASC) commissioned an evaluation of the effectiveness and impact of the model over the 12 months of the pilot phase, to inform future decision making and developments. This document is the final evaluation report.

1.1.2 Objectives

The original brief and project specification outlined an assessment of the following:

- **Clinical indicators / outcomes** – demonstrate the effect of the removal of time-based response standards on clinical performance
- **Value for money** – establish the cost effectiveness of ambulance services
- **Patient experience** – assess the impact of the new model of care on patients both in terms of satisfaction and welfare
- **Staff perceptions** – determine how WAST and LHB staff (ranging from frontline to managerial) perceive the clinical model pilot, especially its design, implementation and performance.

1.1.3 Specification

The activities set out for the evaluation group were as follows:

- Review the existing evidence on ambulance service delivery
- Analyse quantitative data against the key objectives of clinical model pilot
- Analyse the pilot's cost effectiveness and value for money
- Conduct a qualitative analysis of stakeholder views and interviews with frontline staff

1.1.4 Outcomes

- Capture and share learning about the development of the pilot
- Report on emerging best practice from the pilot
- Assess the model's impact on the wider pre-hospital component of the unscheduled care system
- Inform the development of the Collaborative Commissioning Framework.

1.2 Methodology

PACEC employed the following research programme, which was split into two phases:

Phase 1 (January – June 2016)

- **Background & policy context** – desk review summarising the pilot's context, with a particular focus on the underlying rationale and engagement of stakeholders in its design and implementation.
- **Logic model & evaluation framework** – developing a formal logic model portraying the new operational method of ambulance service delivery and relating this to the evaluatory approach applied here.
- **Stakeholder consultations** – discussions with key players in Welsh ambulance services.
- **Data specification** – development of a data specification setting out the measures and information required to conduct this evaluation.
- **Baseline review** – mapping the ex-ante situation of ambulance service performance in Wales, with particular attention being paid to flagged issues such as average vehicle allocation, lost hours to handover and serious adverse incidents.

Phase 2 (July – December 2016)

- **Indicator analysis** – quantitative analysis of ambulance service performance for the duration of the pilot timeframe on the basis of context-specific Ambulance Quality Indicators.
- **Further consultations** – stakeholder and staff consultations informed by exploratory data analysis, supported by surveys conducted online and internally through WAST.
- **Conclusions** – synthesis of the research conducted for this evaluation, summarising the key findings as classified according to the thematic objectives.
- **Recommendations** – delivery plan of top-line messages regarding ambulance service delivery and performance measurement.

A baseline report setting out the initial findings on the baseline and the development of the new clinical response model was completed in June 2016. This document sets out the findings of the Phase 2 research. The remaining chapters of this document are structured as follows:

2. Policy context
3. Theoretical framework
4. Trend analysis
5. Qualitative findings
6. Staff survey
7. Conclusions

2 POLICY CONTEXT

2.1 Introduction

This section details the background and context in which the Clinical Model Pilot was developed and outlines the rationale for the new dispatch model. It is based on information provided by Emergency Ambulance Service Committee (EASC)[1] and the Welsh Ambulance Services Trust (WAST)[2], a review of publicly available literature and policy statements, and interviews with key staff at EASC and WAST.

Traditionally, response time has been the main dimension of measurement when measuring ambulance performance. In recent years there has been a move towards holistic evaluation based on systematic reviews of the relationship between response time and patient outcome. These reviews showed that this dimension is only of crucial importance for patients experiencing a stroke, cardiac arrest, or similarly life-threatening incidents. Regardless of their urgency, such emergencies account for less than one per cent of all calls to the emergency helpline in England & Wales.

Pre-hospital care thus manifests itself in far more forms than the speed with which ambulance reach their patients, i.e. clinical need and effective care. There has been a shift in perception regarding ambulances themselves in this regard. Whereas they were previously seen as a mere mode of transport facilitating eventual care it is now understood that ambulances represent an integral component of pre-hospital care, facilitating treatment without conveyance to hospital.

In addition to this the Welsh NHS is experiencing further pressure on its services because of an ageing population, increase in chronic sufferers and continuing austerity. Facing these realities, the Welsh Government decided to reform its measurement of ambulance services as outlined in a written statement during July 2015.

2.2 Background

Historically the quality of ambulance services has been measured using the length of time it takes an ambulance to respond to a call. **Response Time Reliability** (RTR) was set as a standard in the UK and Wales in 1974. The use of response time standards as a benchmark for performance has been the predominant performance measure for Emergency Medical Services (EMS) throughout the world in recent decades. A review of response times conducted in 2009 found some variation in the response time specification across different settings, but the underlying concept is the same - see Table 2:1 below.

[1] Emergency ambulance services in Wales are commissioned via the Emergency Ambulance Service Committee (EASC)
[2] Ambulance Services in Wales are provided by a single organisation – The Welsh Ambulance Services NHS Trust (WAST). WAST deploys a fleet of 275 ambulances and 150 rapid response cars from three Clinical Contact Centres (CCC). The Trust employs around 2000 staff through its Emergency Medical Service (EMS).

Table 2:1: Identified Response time standards by Country

Country	Category A life-threatening & serious	Category B not life-threatening but serious	Category C neither serious nor life-threatening	Compliance %
UK	8:00	19:00	60:00*	75/95/95
US	8:59-15:00*		Varies[3]	90
US (NFPA)[4]	8:00			90
Australia	15:00	25:00	60:00	90/90/90
Canada	8:59			90

Source: Office of the Strategic Health Authorities. Emergency Services Review – A comparative review of Ambulance Service international best practice. Department of Health October 2009.

The variation in both time standards and expected compliance across different countries indicates there is no agreed consensus on optimum response time performance but reflects historical and operational differences between services and settings.

The usage of response time performance as a quality measure is based on research regarding the relationship between time and patient outcomes for very specific clinical conditions, such as out of hospital cardiac arrest. Such incidents have a clearly documented inverse relationship between delay in resuscitation (in particular when it comes to defibrillation in ventricular fibrillation arrests) and survival[5]. Ambulance response time is a related factor and shorter response time is significantly associated with increased probability of receiving early defibrillation and subsequent survival[6]. However, out of hospital cardiac arrests account for a very small proportion of the 999 population – in England they represent a mere 0.6% of all incidents[7].

There is no direct relationship between ambulance response times and patient outcome in terms of mortality when it comes to other conditions, life-threatening or not[8, 9, 10]. This does not mean that time is not important. The relationship between time and definitive care is well established for a number of acute conditions and form the basis of time standards derived from well-established evidence for patients with acute myocardial infarction (time to PCA or thrombolysis) and stroke

[3] Specified by local county/state regulations
[4] National Fire Protection Association 1710 standard - (BLS/first responder within 4 minutes & ALS unit within 8 minutes)
[5] Cummins R, Ornato J, Thies W, Pepe P. Improving survival from sudden cardiac arrest: The "Chain of Survival" Concept. A statement for health professionals from the advanced life support committee and the emergency cardiac care committee, American Heart Association. Circulation 1991; 83: 1832-47.
[6] Pell J, Sirel J, Marsden A, Ford I, Cobbe S. Effect of reducing ambulance service response times on deaths from out of hospital cardiac arrest: a cohort study. BMJ 2001; 322: 1385-1388.
[7] Ambulance Quality Indicators for Wales have subsequently been developed (see Section 2.8 below) which show a similar proportion for patients with attempted resuscitation following cardiac arrest (644 incidents out of 111,120 999 calls taken through the MPDS in April-June 2016, or 0.58%), while information for England is available from: https://www.england.nhs.uk/statistics/statistical-work-areas/ambulance-quality-indicators/
[8] Pons PT, Hankoo S, Bludworth W, et al. Paramedic response time: does it affect patient survival? Academic Emerg. Med 2005; 12(7): 594-600.
[9] Blackwell T, Kline J, Willis J, Monroe Hicks G. Lack of association between pre-hospital response times and patient outcomes. Prehosp Emeg Care 2009; 13(4): 444-450.
[10] Turner J, Nicholl J, O'Keeffe C, Dixon S. The costs and benefits of implementing the new ambulance service response time standards. Final report to the Department of Health. Medical Care Research Unit, University of Sheffield; January 2006

(time to acute stroke unit admission) [11, 12]. Ambulance services have a significant role to play in the achievement of these standards, but it is providing actual treatment or delivering patients to an appropriate facility where definitive treatment can be provided that demonstrably has an impact on outcome.

A patient may receive a short response time within standard (a success for the ambulance service) but delayed / unsuitable transport or delivery to an inappropriate facility may result in failure to meet the time standard for definitive care and hence negatively impact on patient outcome. It is the timeliness of the whole pre-hospital component of care, not just response time, which could be considered the indicator of good care.

Response time measures also do not reflect the clinical need or effectiveness of care delivered in terms of patient outcome. Although there are ongoing debates and programmes of work associated with the development of alternative indicators for measuring ambulance service performance and quality, there is an international consensus that quality measurement and improvement needs to be much more focussed on the delivery of clinically effective care and patient outcomes and should encompass the broad EMS population, not just a few discrete life-threatening emergencies[13].

There was a shift from a "first come first served" approach to the introduction of call prioritisation following a 1996 Department of Health review of ambulance service response time standards in England[14]. The system based on urgency and clinical need was rolled out by 2001. This method contained three categories: A (immediately life-threatening), B (serious but not immediately life-threatening) and C (neither serious nor life-threatening). These were reformed in December 2011 into colour classifications ranging from Red 1 to Green 3, with different time based targets set for individual categories (see section 3.3).[15]

In addition to the shift in the clinical approach to ambulance service delivery described above, there are a number of Wales-specific factors increasing demand for ambulances regionally. These are set out below:

- **Ageing population:** The population of Wales is predicted to grow by 5% between 2012 and 2025. However, the age profile will become much older, with the number of people aged 65 and over growing by 26% over this period; compared with a growth of 1% for people aged under 65[16];
- **Increasing prevalence of chronic conditions:** Wales currently has the highest rates of long-term limiting illness in the UK, which is the most expensive aspect of NHS care. Between 2001-02 and 2010-11 the number of people with a chronic or long-term condition in Wales increased from 105,000 to 142,000[17]; and
- **Fiscal strain:** NHS organisations plan on the basis of a flat-cash settlement and need to find sufficient savings to both offset cost pressures while also delivering service improvements.[18] A report by the Nuffield Trust[19] estimated that there will be a funding gap of £2.5 billion for the

[11] Department of Health Vascular Programme Team. Treatment of Heart Attack National Guidance. Final Report of the National Infarct Angioplasty Project (NIAP). Department of Health 2008. Gateway ref 10590.
[12] Department of Health Vascular Programme Team. National Stroke Strategy. Department of Health 2007. Gateway ref 9025.
[13] Office of the Strategic Health Authorities. Emergency Services Review – A comparative review of Ambulance Service international best practice. Department of Health October 2009.
[14] Chapman R. (1996) Review of ambulance performance standards. Final report of steering group
[15] Chapman R. (1996) Review of ambulance performance standards, Final report of steering group
[16] Nuffield Trust (2014) A Decade of Austerity in Wales?
[17] Nuffield Trust (2014) A Decade of Austerity in Wales?
[18] McClelland, Siobhan (2013) A Strategic Review of the Welsh Ambulance Service
[19] Nuffield Trust (2014) A Decade of Austerity in Wales?

NHS in Wales by 2025/26, in 2013/14 prices, assuming that the current rate of efficiency savings is maintained until 2015/16, and that funding is held flat in real terms between 2015/16 and 2025/26. This would require further efficiency savings worth 3.7% a year in real terms after 2015/16.

Concurrently, the role of the ambulance service has changed from providing a mode of transport to delivering clinical assistance, in other words being '*at the frontline of pre-hospital emergency care*'.[20] Treatment begins when the emergency vehicle arrives, and not when patients are conveyed to hospital.

The emerging scientific consensus on clinical outcomes being far more important than response times, the pressures increasing demand for ambulance services, and the realignment of EMS vehicles within the healthcare delivery system fostered a discussion of reforming ambulance services in Wales.

Improving public confidence in the effectiveness and quality of the ambulance service in Wales is a key political objective and Clinical Modernisation is one of WAST's four strategic programmes[21]:

- Clinical Modernisation
- Clinical Contact Centres
- Non-Emergency Patient Transport Service
- 111.

Together these are central to the WAST Integrated Medium Term Plan (IMTP) and the revised clinical model is a key part of the Clinical Modernisation programme.

2.3 Welsh Ambulance Dispatch Model (2011 to October 2015)

The distinct features of the clinical response model in operation between December 2011 and September 2015 are detailed below in Table 2.2.

[20] National Assembly for Wales: Welsh Ambulance Services NHS Trust: Submission to National Assembly for Wales Health and Social Care Committee: Follow-Up Inquiry into Ambulance Services, December 3, 2015
[21] Welsh Ambulance Services NHS Trust (2015) Refreshed Integrated Medium Term Plan: A Focus On Delivering 2015/16 Priorities

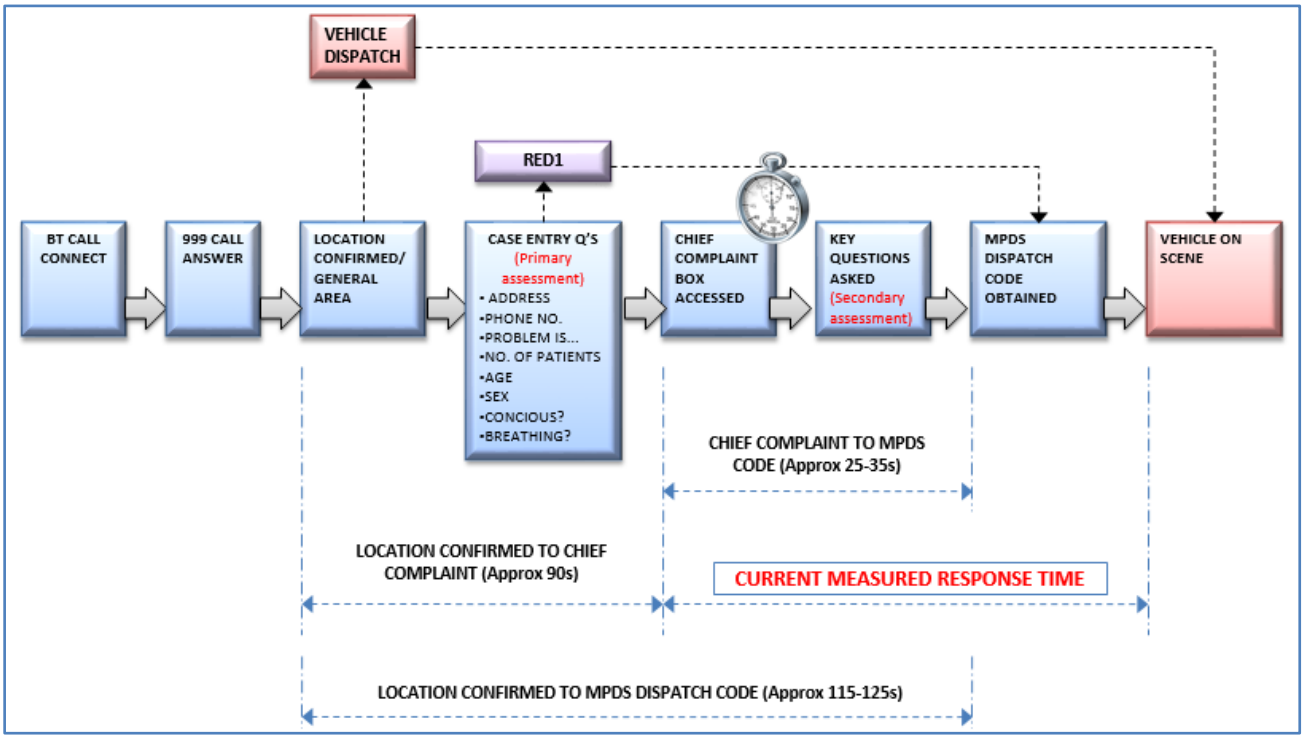
Table 2:2: Features of the Pre-Pilot Model

Previous Model	
Response target	An **eight minute response target** for patients categorised as 'life-threatened' / cardiac arrest patients (Red 1 or Red 2 calls, not the entire population); however there is little clinical evidence to support the effectiveness of this target on patient outcomes[22] and it resulted in a number of operational workarounds such as 'double dispatching' (i.e. sending a rapid response vehicle to the scene to 'stop the clock' but with an emergency ambulance back up which could take a further twenty minutes or longer).[23] Other standards / targets included: • For calls categorised as Green 1 and 2 an ambulance was supposed to arrive on scene within 30 minutes in 95% of incidents. • Calls classified as Green 3 did not merit dispatching. These calls were transferred to NHSDW for clinical telephone assessment, with a target that patients should receive an assessment within 10 minutes in 90% of cases. • Urgent calls from GPs were the most common Green-classified call received by WAST. In such calls, the ambulance service used a protocol known as Card 35 which aimed to ensure all calls from GPs were treated with the same urgency in a consistent & equitable way. The ambulance call taker ran through a set of questions with the GP and together they decided upon an appropriate response time. The target was for WAST to meet this agreed response time in 95% of cases. These targets were consistently not met prior to 2015.
Resources per incident	Indicates **number of vehicles dispatched per incident**. Higher than 1 if multiple vehicles were dispatched to the scene initially or if the first vehicle to arrive needed to call in additional resources.
Process	Vehicles were dispatched once the caller's location was confirmed, with a further 90-120 seconds to ascertain a full chief complaint and Medical Priority Dispatch System (MPDS) code. Dispatching a resource at the address stage led to inefficiency as a high number of resources were cancelled en route and the number of appropriate resources available to higher priority emergency calls was greatly reduced.[24]

An overview of the previous dispatch model is illustrated in Figure 2.1.

[22] McClelland, Siobhan (2013) A Strategic Review of the Welsh Ambulance Service
[23] Clinical Modernisation (Phase 2) Programme Definition Document (2015)
[24] Clinical Modernisation (Phase 2) Programme Definition Document (2015)

Figure 2:1: Previous Dispatch Model



Source: Clinical model professional advisor presentation (July 2015)

The key issues associated with the previous model included[25]:

- Dispatching resources to a 999 call, on blue lights and sirens, before chief complaint was established and an assessment was made whether ambulance is actually required;
- Dispatching multiple emergency vehicles to the same incident, on blue lights and sirens, only to cancel vehicles least likely to arrive first;
- Repeatedly diverting ambulance vehicles from one call to another; forcing ambulance clinicians to prioritise response time rates above providing healthcare;
- Using a "fast response unit" such as a car (introduced in a previous strategy) to attend Green calls, thus "stopping the clock" even though this unit may provide little clinical value to the patient (e.g., stroke patients), who then has to wait a long time for a conveying ambulance to arrive; and
- Very long waits for lower priority ("green") calls that nevertheless need assessment and possible conveyance to hospital, some of which have time dependent problems.

This approach was also prohibitive to the Clinical Contact Centre (CCC) telephone triage system. Clinicians were available to provide a more in-depth assessment of patients awaiting an emergency vehicle by asking clinically focussed questions which could result in self-care, alternative transport or a lower priority, more appropriate ambulance response. The immediate dispatching of vehicles at the earliest possible stage in the call meant that these vehicles would occasionally arrive before this assessment was complete.

[25] WAST Clinical Model Briefing (July 2015)

2.4 Reforming ambulance services in Wales

2.4.1 Understanding & creating the rationale for change

Following the longstanding concerns about the key issues in the delivery of ambulance services in Wales set out above, the former Minister for Health and Social Services commissioned a review to establish where improvements could be made to deliver high quality ambulance services, within the context of NHS Wales' strategic direction. The McClelland review was published in in April 2013 and recommended a set of options for changing the strategic model for Welsh Emergency Medical Services[26]. The Minister for Health & Social Services responded to this review in July 2013 by sharing his intention to develop a new delivery model to be based on a commissioner/provider relationship between the Welsh Local Health Boards (LHBs) and the ambulance service.

From April 2014 the LHBs were statutorily required to work together to form a joint committee – the **Emergency Ambulance Services Committee** (EASC) – for the purpose of undertaking the functions of planning and securing the provision of emergency ambulance services on a joint basis.[27]

Alongside the establishment of EASC the Chief Ambulance Services Commissioner's role was created (CASC), with responsibility for commissioning ambulance services and ensuring LHBs provide sufficient resources to allow WAST to deliver against a "**National Collaborative Commissioning: Quality & Delivery Framework Agreement**" (NCCQDF). This framework agreement between the LHBs and WAST details:

- What is required *(commissioning)*
- How assurance is given for what is required *(quality)*
- How what is required will be delivered *(delivery).*

The approach to developing the new framework was set out at the EASC's inaugural meeting in April 2014, which introduced the CAREMORE® commissioning method (see section 2.6.3 below).

The framework became operational in April 2015 but is highly flexible because its component Schedules can be simply amended and added to (with changes recorded in a document control section).

2.4.2 Response-time rates vs. clinical outcomes

The McClelland review also recommended that ambulance services in Wales should be measured on clinical outcomes instead of response-time rates. This led to a clinical review by Dr Brendan Lloyd, medical director of the Welsh Ambulance Services NHS Trust.[28] This review highlighted there was no evidence that an 8-minute response time has a positive impact on patient outcomes. Instead it outlined proposals to move from time-based performance measures to an evidence-based approach focused on the quality of clinical care and patient experience.[29] The review notes that a new model would give clinical contact centre call handlers (Emergency Medical Dispatchers, or EMDs) extra time to triage calls which are not instantly identified as being an immediate threat to life before dispatching an ambulance resource. This is similar to the English "dispatch on disposition" pilot.

[26] McClelland, Siobhan (2013) A Strategic Review of the Welsh Ambulance Service
[27] Via Welsh Statutory Instrument 2014 No. 566 (W. 67): The Emergency Ambulance Services Committee (Wales) Regulations 2014
[28] Vaughan Gething AM, Deputy Minister for Health (2015) *Clinical review of ambulance response time targets*
[29] Ibid.

A new clinical model could thus allow EMDs up to 120 seconds . to ask important questions about a patient's symptoms. This allows EMDs to accurately identify the nature of their condition and allocate the correct vehicle. This response ranges from an advanced paramedic who can provide treatment on scene, or an emergency ambulance manned by a paramedic crew to assess and treat at scene and transport the patient to the most appropriate treatment centre as quickly as possible. If the EMD identifies a condition suitable for "hear and treat", it will be passed to a clinician (a nurse or paramedic) for further enhanced assessment and advice/referral.

The "dispatch on disposition" element of the new clinical model is similar to the approach piloted in two areas of England (South West Ambulance Service NHS Trust and the London Ambulance Service NHS Trust – one running the NHS Pathways triage system and one running the Medical Priority Dispatch System). The England pilot followed a letter from Professor Keith Willett, National Director for Acute Care at NHS England, which highlighted that "*giving call handlers extra assessment time to make the right decision for the patient could improve clinical outcomes and improve their chances of survival*". His letter to the Secretary of State for Health recommended an additional 120 seconds for assessment, before the clock starts, for all 999 calls as well as new categories and allocation of calls[30]. The WAST model has taken a similar approach but has accelerated the process.

A proposal to report on a wider number of these clinical outcomes was supported by the Welsh Ambulance Services NHS Trust (WAST) through:

- Increased investment in a new clinical triage system, with medical staff running the Clinical Desk;
- Investment in expansion of the Clinical Audit Team;
- Investment in Digipen technology, meaning that WAST will record patient information digitally from September 2015; and
- Support for a new CAD through a business case currently being submitted to Welsh Government.

The Deputy Minister for Health and Social Care Vaughan Gething approved a pilot of a new clinical model for ambulance services in Wales which commenced on 1 October 2015.

2.5 Consultation process

2.5.1 Workshops with Health Board representatives and senior advisors

A set of workshops for a clinical review of the ambulance service targets were facilitated by Welsh Government and involved a number of colleagues from NHS Wales. A key advisor with a dual role was Dr Grant Robinson, the national lead for unscheduled care and also a consultant haematologist at the Aneurin Bevan Health Board.

Around 8 clinical review workshops were held with Welsh health board personnel and a range of specialist advisors. To ensure that a broad range of views and expertise was represented, particularly from a clinical standpoint, representatives from the Royal College of Medicine, Royal College of Physicians, and the British Medical Association's General Practitioners Committee were consulted. Information from WAST was gathered via Chief Ambulance Commissioner Stephen Harrhy. Subsequently, WAST Medical Director, Dr Brendan Lloyd, wrote a further letter to the Deputy Health Minister setting out the interim findings. A literature review was also conducted using search terms such as "8 minute target", "clinical evidence" and conditions such as "cardiac arrest".

[30] Letter from Professor Keith Willett to Jeremy Hunt (January 2015) "Clinical review of ambulance responses in England: Advice to Secretary of State"

2.5.2 Staff and Patient Consultation

Discussions were held with various groups of patient representatives during the development of the model. Care bundles are produced by networks specialising in specific conditions (e.g. Cardiac Network for Wales, Stroke Association for Wales). Particular care was taken to engage with these networks to ensure that the activities under the new model match these care packages, and that patient care is not compromised by removing the eight minute response target from the newly-classified Amber 1 calls. A key tenet of this approach is that treatment begins when the vehicle arrives, not at hospital.

Strokes were a particular focus of this approach; the point was made that sending the most appropriate response (i.e. an ambulance) as soon as possible is more effective than a rapid response vehicle, even if the RRV is closer – the appropriate response is conveyance to a hospital where stroke care including thrombolysis is available.

While preparations were being made for the launch of the pilot, a set of presentations to health board colleagues were delivered. Staff surgeries were also held in order to introduce staff members to the new commissioning framework & working method and gain some feedback on these.

The Head of Clinical Operations and Medical Director also visited over 20 ambulance stations to hold staff surgeries both before and after pilot implementation. WAST also conducted a survey of staff. The new model was well-received across clinical contact centres and operational staff. Issues that were flagged include the mismatch between capacity and resources on the one hand and demand on the other; vague specification of the role first responders and RRV paramedics play in the new clinical model, changing practices in clinical contact centres and the role and capacity of the clinical desk.

A communication strategy is being developed for feeding back information to staff (results of consultations, early performance findings under the new model, etc.).

2.6 Designing the clinical model pilot

Following the consultation procedure, a presentation was given to the Chief Medical Officer of the Welsh Assembly Government drawing together the evidence on the strategic case, the background, the English pilot, and the clinical case for change. The Chief Medical Officer requested a further briefing in July 2015. After some further consideration, Vaughan Gething, the Deputy Health Minister, announced the pilot's introduction in a written statement on the 29th July 2015.

The pilot was implemented in all regions of Wales simultaneously because of logistical practicalities. There is a single CAD system across the three clinical contact centres and seven local health boards in Wales, which means it would practically impossible to operate different systems in overlapping locations. Another reason no control group was chosen is the low level of emergency incidents per health board in a given day. The amounts are sufficiently low that not enough calls would be handled and the results would lack a high level of statistical confidence: the evidence of success or failure might be inconclusive.

2.6.1 Developments in the use of MPDS

The assessment system used in Wales (and some services in England) for the classification of 999 calls is called MPDS (Medical Priority Dispatch System). This system was designed in America for use by Emergency Medical Services (EMS), but it can be licensed by organisations in other countries. MPDS is an algorithm-based software programme designed to prioritise emergency ambulance calls in terms of the speed of response required (lights and sirens or not) and whether

advanced or basic life support is needed. Calls are assigned a code comprising a numeric indicator reflecting the nature of the call (e.g. chest pain, fall, and unconsciousness) and one of 6 levels of urgency ranging from Echo (time critical life threatening emergency) through to Omega (not life-threatening or time critical). This system allows services to identify which calls have the highest priority so that resources can be allocated in order of clinical need.

The operating environment and resources available differ from country to country. Hence MPDS does not specify either time intervals for response or the exact type of response needed for each code. These are set locally instead by taking into account any requirements for response-time performance categories (such as the 8 minute response time target for "Red" calls in the UK) and the resource configuration (types of vehicles and staff). In Wales (and England) vehicles were dispatched on confirmation of address regardless of the urgency of the call in order to maximise the chances of achieving an 8 minute response regardless of whether the clinical situation necessitates such a response. This has meant that the potential advantages of call prioritisation in efficient allocation of resources have not been fully utilised.

The principles underlying MPDS are set out in extensive documentation which accompanies the MPDS system, and in the academic literature produced by the International Academy of Emergency Medical Dispatch. The system has been customised for use in England and Wales as the Advanced Medical Priority Dispatch System (AMPDS).

The prioritisation of 999 calls is governed by the Clinical Prioritisation and Software Group (CPAS) in Wales, which covers MPDS and other software for triage and resource prioritisation. The new model required the CPAS, chaired by Dr Jonathan Whelan, to ratify a new Dispatch Cross Reference (DCR) table. This DCR allocates MPDS codes to one of the new Red, Amber 1, Amber 2, Green 2 and Green 3 classifications. The existing table is based on the UK Department of Health guidelines, with some minor reclassifications.

Another required output for the new model design was a Patient Centred Response Matrix (PCRM), which gives the clinical contact centre advice on the ideal ambulance asset to send including crew composition and vehicle type. These two outputs – the DCR table and PCRM – define the appropriate response to each call.

The process of generating the new PCRM was based on evidence about existing call volumes for each AMPDS code and associated conveyance rates (i.e. the percentage of patients conveyed to hospital or some other health facility in a vehicle). The group reviewed each individual AMPDS code including the branching script that the EMD (who is not clinically trained) uses to assess the call, to determine what likely conditions were being assigned to each code and what the best type of operational response would be.

The following two examples, which are drawn from stakeholder interviews and contain approximate statistics, illustrate the process:

- Example 1: Chest pain, code 10. The majority of cases are likely to be cardiac in nature and patients are very likely to require conveyance to hospital. There are 30-40,000 calls per year, with a conveyance rate of 80-85%. Patients require an ECG, clinical assessment by a medical professional, occasionally medication, and conveyance to hospital. An emergency ambulance staffed with at least one paramedic to assess, treat and convey the patient to hospital is thus the most appropriate response. This is a change from the old model, where the nearest vehicle would have made first contact with the patient. If this were a rapid response vehicle, this would then have to call for an appropriately equipped and crewed ambulance, introducing a delay in treatment and reduced clinical outcomes even if the 8-minute response time target had been hit.
- Example 2: Allergy, code 2. A serious allergic reaction such as anaphylactic shock has a conveyance rate of over 90%: hospital attendance is extremely important. Immediate

treatment requires the administration of oxygen and adrenaline, which can be done by non-medically trained staff. An emergency ambulance is the correct response but does not necessarily need a paramedic onboard.

The conveyance rate was the key piece of evidence for each code. Stakeholder consultations confirmed that there is a conveyance threshold around 60%, above which the most appropriate vehicle is an ambulance rather than a car. Codes with a lower conveyance rate can be dealt with using cars containing paramedics, thus allowing ambulances to be retained for other calls. There are some exceptions to this rule: the conveyance rate for a woman in labour is nearly 100%, but this does not mean a woman about to give birth requires an ambulance - an RRV can be used instead. Regardless thereof an ambulance would have been dispatched under the old clinical model if it was the only vehicle scheduled to arrive in under eight minutes.

The coding process was straightforward, but time-consuming. It revealed that there is an evident single most appropriate vehicle allocation and crew composition response for most incident categories. WAST has a complex range of resources at its disposal: emergency ambulances and rapid response vehicles make up the great majority of the vehicles, but there are also a range of specialist resources (helicopters, extrication units, major incident response teams) available which are rarely required. For the most part the choice is between a small number of types of vehicle and staff. Over time, the effectiveness of each response will be measured by the Ambulance Quality Indicators (AQIs) and minor changes can be made if required.

2.6.2 Creating a 5-step Ambulance Patient Care Pathway

The McClelland review also recommended the development of a wider suite of targets and standards to incentivise change and provide a greater focus on patient experience and outcomes.[31] To support this, the Emergency Ambulance Services Committee developed a quality and delivery framework and an innovative five-step ambulance patient care pathway as detailed in Table 2.3. This five-step model is incorporated into the Framework Agreement as “Models of Care” Schedule M1 (High Level Description for Model of Care). The new clinical model is part of the second and third pathway “Answer My Call” and “Come to See Me”.

[31] McClelland, Siobhan (2013) A Strategic Review of the Welsh Ambulance Service

Table 2:3: Overview of the five-step Ambulance Patient Care Pathway

Step	Overview
One - Help Me Choose	This step focuses on public education regarding the services provided by WAST and how/when to access them appropriately. This step will include the development of appropriate linkages between WAST and the future 111 service, building on the success of NHSDW and its website. Considerable work has been undertaken to identify and reduce demand from frequent callers.
Two - Answer My Call	This step focuses on the response to 999 and Health Care Professional (HCP) calls by WAST‟s Clinical Contact Centres (CCCs). This step incorporates the provision of adequate time to assess a call and the use of the Medical Priority Dispatch System (MPDS) to identify the priority of the call before offering / sending the most appropriate response.
Three - Come to See Me	This step focuses on how WAST makes decisions about what resources to dispatch to assessed/prioritised calls. Broadly, three response options will be available: • Emergency Medical Services (EMS – Emergency Ambulances [EAs] and Rapid Response Vehicles [RRVs]) will be allocated to RED calls, and Amber calls ('See & Treat') • Clinical Telephone Assessment (CTA – "hear & treat") will be offered to all other low acuity GREEN calls • A dedicated patient transport service will be provided by Urgent Care Service (UCS) for low acuity GREEN patients who are assessed by HCPs as requiring admission to hospital.
Four - Give Me Treatment	This step focuses on the development and delivery of a range of clinical care services able to offer a variety of treatment options. The selection of the most appropriate treatment will be supported by decision support tools e.g. Paramedic Pathfinder for "see & treat"; the Manchester Triage System and the Clinical Assessment System for "hear & treat"). Treatment options will include the use of Alternative Care Pathways or ACPs (set out in a Directory of Services) allowing patients to be referred to primary and community care. WAST will develop a Clinical Hub to coordinate the delivery of care to patients ("sign-posting" for clinical advice, managing referrals to alternative care pathways, and arranging non-emergency transportation i.e. managing any element of WAST's services that is not time critical or an emergency transport to ED).
Five - Take Me to Hospital	Patients who require ongoing care and treatment will be transported to hospital or to alternative care settings (e.g. Minor Injury Unit or a primary/community care facility). The clinical acuity of the patient will dictate the level of transport. For critical care patients or patients requiring ongoing treatment, EAs will be utilised. All other patients will be transported by a combination of Urgent Care Services (UCS) and non-emergency patient transport services (NEPTS).

Source: Welsh Ambulance Services NHS Trust (2015) Refreshed Integrated Medium Term Plan: A Focus on Delivering 2015/16 Priorities

Performance across the 5 Step Ambulance Patient Care Pathway (APCP) is assessed by Ambulance Quality Indicators (see section 2.8) which are set out in the Review of Performance Schedules of the Framework Agreement.

The 5-step APCP is an integral part of NCCQDF. This ambulance service delivery process is designed in a way that capacity release occurs at the later resource- and cost-intensive steps (4&5) as more and more patients utilise resources at earlier steps (1&2). The pathway is also

meant to increase the amount of incidents resolved by hear & treat in step 2 which should render more vehicles available to be allocated to actual emergencies. This pathway is designed to be far more cost effective and requires the NHS to dispense with fewer resources while still enabling the ambulance service to provide unhampered clinical care.

2.6.3 CAREMORE® & 5-step Ambulance Patient Care Pathway

The foundation of this reform lies with the 2013 McClelland Review of the Welsh Ambulance Service, commissioned by the Welsh minister for Health and Social Services. This review recommended a new modus operandi for Welsh ambulances, the delivery of which should be the responsibility of a joint committee in which both the commissioners (Local Health Boards) and provider (WAST) are represented.

The implementation of this recommendation led to the creation of the Emergency Ambulances Services Committee, which commissions Emergency Ambulance Services on behalf of NHS Wales. The EASC at its inaugural meeting in April 2014 sponsored the use of CAREMORE® for the creation of the Framework Agreement. CAREMORE® is a 'made in Wales' commissioning method, focusing on:

Care standards

Activity

Resource **E**nvelope

Model(s) of care

Operational arrangements

Review of performance

Evaluation

(Its registered trademark belongs to Cwm Taf University Health Board on behalf of NHS Wales).

A Collaborative Commissioning Project Group was then established to lead the production of the Framework Agreement, with representation, at executive director level from all Health Boards and WAST, together with Welsh Government and Public Health Wales. Key stakeholders have collaboratively supported its development through specific workstreams and events.

The Framework Agreement covers WAST's provision of emergency ambulance services, which includes:

- responses to emergencies following '999' telephone calls;
- urgent hospital admission requests from General Practitioners (and other Health Care Professionals);
- high dependency and inter-hospital transfers;
- patient triage by telephone;
- NHS Direct Wales Services; and
- major incident responses.

In addition, an innovative citizen centred perspective has been adopted in the creation of the Framework Agreement which is called the Ambulance Patient Care Pathway. This pathway describes a 5-step process for the supporting the delivery of emergency ambulance services within NHS Wales. The 5-steps are:

- Step 1: Help me choose
- Step 2: Answer my call

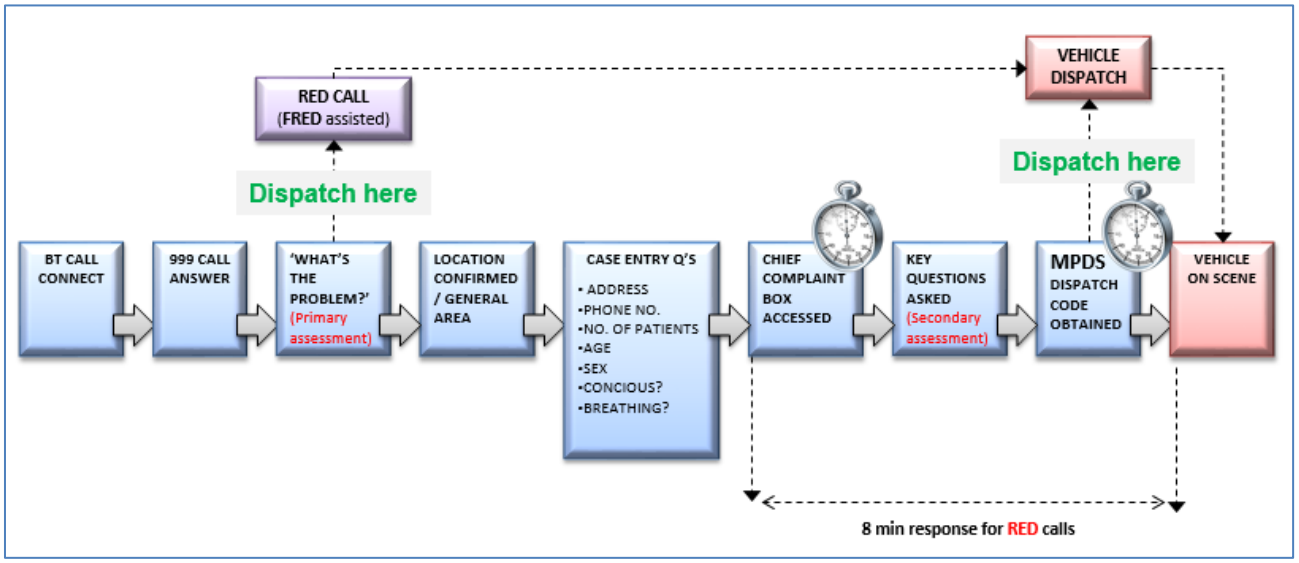
- Step 3: Come to see me
- Step 4: Give me treatment
- Step 5: Take me to hospital

Splitting ambulance service delivery into these distinct steps also allows for financial analysis of the various components. Prior to the introduction of the new clinical model, 80% of all EMS resources were being spent on the latter two steps: attendance & conveyance. In addition to improving clinical outcomes and increasing the quality of healthcare provided, the pilot is also supposed to redirect resources to earlier steps in the pathway. This is meant to increase the cost-effectiveness of healthcare provision in Wales as directing, signposting and diverting patients is far cheaper than referring them or handing them over to a local hospital.

2.7 Overview of the New Dispatch Model

The new model has been operational from 1 October 2015 and is illustrated in Figure 2.2 below.

Figure 2:2: New Dispatch Model (from October 2015)



Source: Clinical model professional advisor presentation (July 2015)

The new model introduced three new categories of calls (red, amber and green), each separated into two classes (1 & 2). The categories are outlined below in Table 2.4.

Table 2:4: Management of emergency calls under the new model (from October 2015)

Category	Overview
RED	Immediately life threatening calls such as cardiac arrest or choking. These calls will be subject to both clinical indicators such as Return of Spontaneous Circulation (ROSC) rates and a time based standard requiring a minimum attendance at 65% of these calls within 8 minutes.
AMBER	Serious but not life threatening. These calls will include most medical and trauma cases such as chest pain and fractures. Amber calls will receive an emergency response. A response matrix has been created to ensure that the most suitable clinical resource is dispatched to each amber call. This will include management via "hear & treat" services over the telephone. Patient experience and clinical indicator data will be used to evaluate the effectiveness of the ambulance response to amber calls.
GREEN	999 calls received and categorised as green are neither serious or life threatening. Conditions such as ear ache or minor injuries are coded as green calls. Green calls are ideally suited to management via secondary telephone triage. Health Care Professionals (HCP) such as doctors, midwives or community hospitals often require an urgent transfer of a patient from low acuity care to a higher acuity facility. These transfers are coded as green calls and undertaken within a timeframe agreed with the requesting HCP.

It is recognised that statistics on category A and Red 1 / Red 2 calls prior to the new model are not directly comparable with Red calls under the pilot as[32]:

- Call categories have been redefined and replaced by colour coding;
- Emergency Medical Dispatchers are allowed up to an additional two minutes to accurately identify both the severity and nature of a patient's condition (for those calls that are not immediately life threatening), and the clinical resource they require before dispatching an ambulance – resulting in a reduction in the number of calls received with a time target;
- A small proportion of calls that were classed as red 2 calls have been moved to the red category in addition to the calls that were previously categorised as red 1. This means that comparisons cannot be made between performance against the old red 1/2 categories and the current red category; and
- An 8 minute response time target is only applied to red calls and therefore comparisons of the 8 minute target performance cannot be made for before and after 1 October 2015.

In the new model EMDs have up to 120 seconds . to ask important questions about a patient's symptoms; to accurately identify the nature of their condition and dispatch the correct type of response needed. For those conditions where time is a significant factor, for example cardiac or respiratory arrest, the new model allows for a rapid response by an appropriately skilled clinician. In these circumstances speed of response and clinical indicators are both used to measure performance.

Where the condition of the patient is such that their life is not in immediate danger, the new model allows for an appropriate clinical response which may or may not result in conveyance to hospital, dependent on the condition of the patient. Performance in these cases is measured not by the

[32] StatsWales (https://statswales.wales.gov.uk/Catalogue/Health-and-Social-Care/NHS-Performance/Ambulance-Services/Pre-October-2015/ambulancecallsandemergencyresponses-by-area-categoryofcall

speed of response, but in the appropriateness of the care provided linked to relevant clinical indicators.

2.8 Ambulance Quality Indicators

In order to measure performance against these clinical indicators and ensure the shift towards operating procedures that focus on clinical outcomes instead of response-time rates can be comprehensively evaluated EASC also developed a set of Ambulance Quality Indicators (AQIs). These were specifically created in conjunction with the 5-step APCP, thus enabling WAST to monitor and improve its clinical and operational delivery in every one of the five steps against a number of key metrics. The AQIs are described in greater detail as part of the methodological discussion in section 3.4.

The AQIs are a detailed set of longitudinal indicators which cover each step of the pathway in some detail. From January 2016 the data is disaggregated by LHB. This is a powerful monitoring tool. However, it is recently introduced, and so does not give a long baseline series of performance metrics from before the APCP. It is important that the definitions and measurement techniques are kept constant, in order to monitor ongoing progress.

2.9 Summary

The new clinical model is part of a wider WAST Clinical Modernisation plan and the new commissioning arrangements for ambulance services in Wales, governed by EASC and set out in a collaborative commissioning framework. The McClelland review made a series of recommendations about the delivery of ambulance services in Wales, one of which was the introduction of clinical targets instead of response time targets in order to provide more appropriate and accurate indicators of quality of service. The review was backed by interviews with clinicians, executives, and chairs of the 7 Welsh University Health Boards and the clinical model pilot was introduced on 1 October 2015 for a period of 12 months. This pilot did not simply reallocate calls to different codes or redesign incident categories, but rather represents a significant shift in how the WAST delivers services.

The broad conclusion of the stakeholder interviews is that the various processes used to develop the model have worked well. Initial engagement with staff has succeeded in explaining the potential benefits of the new model and helping them understand the changes to their roles. Continuous staff engagement is crucial to further development of the pilot as WAST seeks to explore the benefits of the new model to date and identify any problems in its implementation.

3 Theoretical FRAMEWORK

3.1 Introduction

This section details the logic model for the pilot setting out the inputs, expected outputs and outcomes. It also outlines the evaluation framework for this report, detailing the way in which the clinical model pilot impacts clinical outcomes, value for money, patient experience and staff perception. This theoretical framework also outlines the pragmatic approach taken here as informed by the availability and comparability of quantitative data and describes the qualitative research programme undertaken to build upon that indicator analysis.

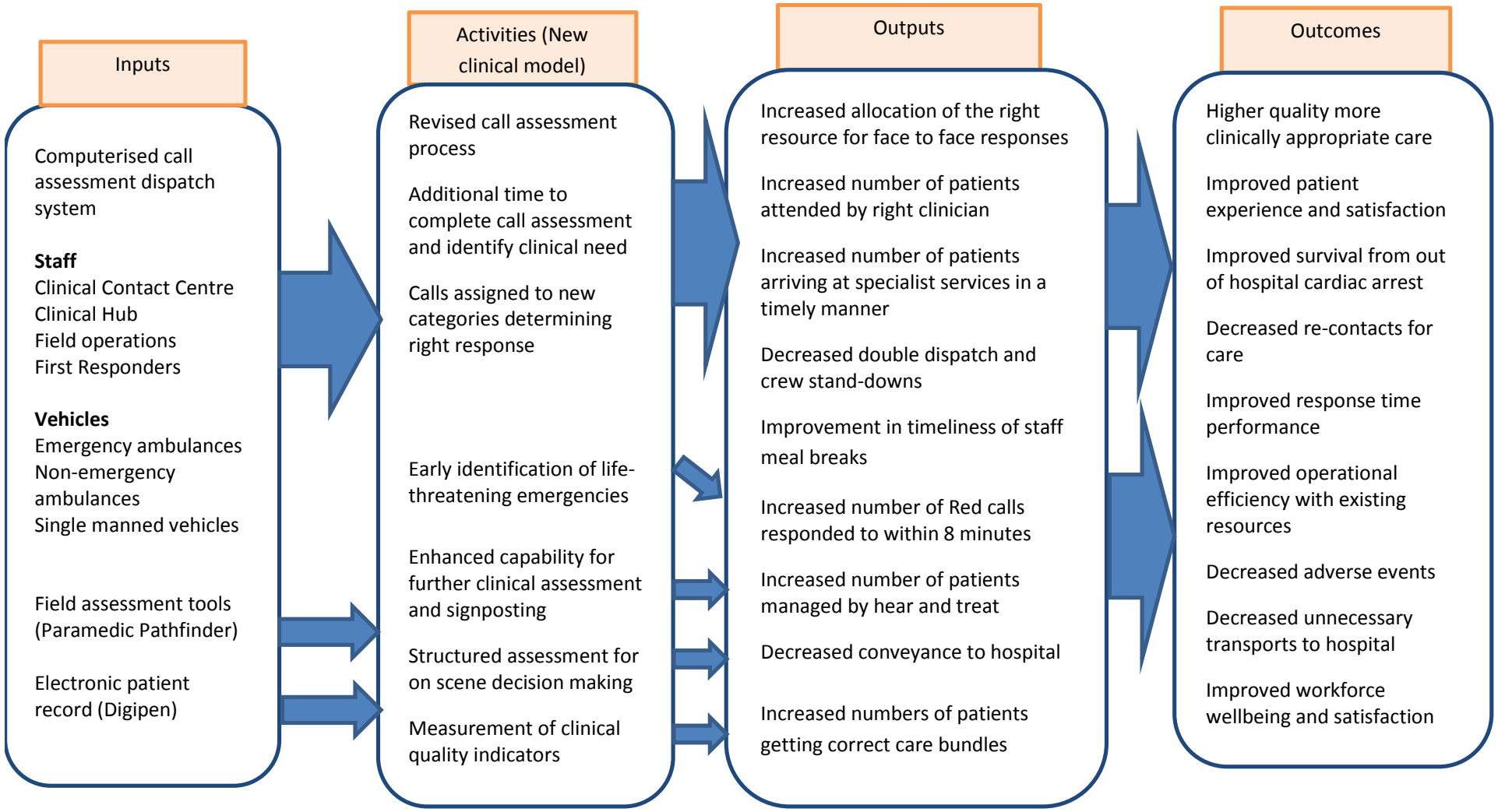
3.2 Logic Model

A logic model details the inputs, activities and output measures that should be used to deliver the required outcomes or results. It reflects the design of the new clinical model as set out in the preceding chapter, and the benefits which it is expected to achieve.

The following logic model has been developed using ongoing discussions with Health Informatics staff at WAST and key stakeholder interviews. The outputs are designed to be specific and measurable using the management information collected by WAST in the course of the operation of the model. The outcomes are longer-term effects, some of which are detectable using management information, others of which will be assessed using our programme of primary research – please see the evaluation plan later in this chapter for details (section 4.3).

The logic model in Figure 4.1 overleaf sets out how the inputs, activities and outputs are expected to translate into benefits for patients as a result of the new clinical model.

Figure 3:1: Logic Model



3.3 Evaluation Framework

The logic model sets out the main service changes included in the clinical model, the mechanisms by which the impacts will take place, and the expected outputs in terms of service improvements. The purpose of this evaluation is to assess how the new clinical model was implemented and whether this has achieved or is beginning to achieve the intended objectives and improvements. This report does that on the basis of mixed-methods research, which builds on our previous exploration of the policy context resulted in the October 2015 clinical model reform. The methods included in the research design of this evaluation range from exploratory data analysis to economic evaluation and qualitative methods such as interviews and surveys. This enables us to present a comprehensive assessment of the clinical model pilot's design, implementation and performance in its first 12 months.

3.3.1 Quantitative analysis of operational performance

Ideally the impact of the new clinical model would be assessed by comparing a range of operational and clinical measures for the new model against the previous model. Such analysis would then clearly show how the pilot's performance compares to the clinical model in operation between December 2011 and September 2015. There are however a number of factors which preclude this approach, meaning that the quantitative methodology for the evaluation of this pilot requires extensive consideration and comparison across any dimension can only be done with great caution.

The longitudinal evaluation of the new clinical model's impact on ambulance service performance can only be done on the basis of exhaustive and comparable data. The change in measuring techniques that accompanied the service delivery reforms does not facilitate such evaluation, as is explained in Appendix I. This methodological note describes the available data on ambulance statistics before and after the introduction of the clinical model pilot in October 2015 and determines the impact the nature of this data, specifically the move towards more clinically focused ways of describing performance, has on evaluating outcomes of the clinical model pilot.

Overall limitations on data availability and comparability create difficulty in creating a quasi-experimental design for this evaluation. As such we have opted for a non-experimental trend observational study, whose aims, objectives and framework are outlined below:

Research objectives

The purpose of this analysis is threefold:

1. To provide a methodological framework for exploring ambulance service performance in line with limitations of data availability and comparability.
2. To build on the analytical foundation of measuring managed clinical response models to provide an indicative assessment of the pilot.

Research questions

A trend descriptive quantitative study will be used to answer the following three questions:

1. What is the baseline for ambulance service performance in Wales?
2. Does the clinical model pilot seem to impact ambulance service performance?
3. What tentative conclusions can be drawn from AQI trend analysis?

Framework

Having understood the limitations the available data accords this evaluation, we developed a quantitative methodology that encompasses some longitudinal comparison and describes how key indicators have changed since pilot introduction. The first component uses seven indicators where changes in measurement have not compromised the robustness of longitudinal analysis and relies on a combination of the data specification requested specifically for this evaluation and performance measurement recorded through the AQIs. These are subsequently analysed using AQI data to assess how WAST performance has developed during the implementation of the new clinical model.

Below we describe how the respective quantitative performance analyses are framed methodologically and discuss the relevant data sources for the indicators to be evaluated in the quantitative component of this evaluation. All data wrangling and transformation which was performed to facilitate analysis and increase comparability is also mentioned so as to ensure the replicability and transparency of this evaluation. Together these approaches result in a feasible quantitative assessment of ambulance service performance in the past year and provide us with the opportunity to draw up tentative conclusions regarding the clinical model pilot's impact on that performance.

Indicators

This section relies on a few KPIs whose measurement has not changed under the new CRM such as *Calls*, *Incidents*, *Hours lost waiting* and *Serious adverse incidents*. Additionally we have also included *Response type*, *Response-time reliability*, *Clinical success rates* and *Vehicle allocation* because of their relevance to pilot rationale and policy priorities. These indicators lack in comparability however, which precludes us from moving towards quasi-experimental design and renders inferential testing meaningless.

These indicators are all displayed in integrated thematic dashboards comprising the baseline (2011 – September 2015) and pilot timeframes, thus visualising change between the two periods. The clinical model pilot is not expected to induce major changes in the former two measures, which are primarily determined by exogenous factors such as demographic change, weather patterns and other external shocks. On the other hand Step 1 of the APCP is meant to reduce the overall number of calls & incidents in the long term as increased dissemination of health-related information should enable citizens to self-care and prevent. Comparison between the pilot and baseline timeframes for the other latter three indicators is expected to portray some change, as the clinical model pilot was specifically designed to reduce the number of vehicles allocated per incidents due to perverse incentives in the previous model, the hours lost at over-encumbered hospitals and prevent serious adverse incidents from being a regular occurrence.

AQI analysis

An extensive descriptive analysis of information contained in the Ambulance Quality Indicators follows on from the impact framework design described above. This section shows use for the AQIs by extracting those that hold the highest relevance to ambulance performance. The AQIs are also described in greater detail in Appendix II, with information regarding what the Indicator measures, whether there is any comparability with previous timeframes and how ambulance service performance has evolved within the pilot timeframe for that Indicator.

This section is limited to that timeframe because of the issues of longitudinal and latitudinal comparability highlighted previously and discussed in Appendix I. Comparing the RTR for Red-classified calls in the baseline and pilot models would greatly improve the explanatory power of this evaluation, but such comparison is hampered by the significant changes in measurement & codification for all performance-impacted measures in NHS Wales. The overall goal of this section is to determine the positive or negative direction of travel for the 7 selected indicators during the pilot timeframe, with some indicative discussion of the underlying causes that are investigated further in

the qualitative components of this evaluation.

Value for Money

The logic model does not deal directly with value for money considerations as the new clinical model was delivered within the same financial envelope as the old. Any improvement in clinical outcomes is thus in effect an increase in value for money. The new model was expected to contribute to the efficiency of the ambulance service in many ways as set out above, such as decreasing the number of vehicles allocated to each call, decreasing unnecessary conveyance to hospital, and increasing hear-and-treat rates. Therefore we also provide a brief discussion of budgetary trends encompassing total expenditure on human resources allocated to the service.

Assuming that total expenditure does remain roughly constant, any improvement in quality of outcomes will also contribute to an improvement in value for money. If however the picture is more complicated – for example, if both quality and expenditure rise, or if the changes in quality indicators are mixed - we would need to assess value for money qualitatively using a cost-benefit balance sheet approach, setting out the list of impacts attributable to the expended resources.

One potential consequence of the new clinical model will be to shift resources from the later steps of the 5-step model of care to steps 1 and 2 ("Help me to choose" and "Answer my call"). Currently, some 80% of direct expenditure is allocated to step 4, "Give me treatment", and step 5, "Take me to hospital", and it is a goal of the new model to ease resource pressure on these steps by increasing the efficiency of vehicle allocation and increasing the proportion of calls dealt with at early stages, either by reducing the number of inappropriate decisions to call 999 through public education or increasing the "hear and treat" rate at step 2.

Resource Envelope schedule 6 of the framework agreement provides detail on the resources and expenditure attributable to each step of the care model. This schedule informs the brief economic assessment in section 4.11 of this evaluation.

3.3.2 Staff Survey

An important effect of the new clinical model is the impact on ambulance service staff who deliver the service. For Clinical Contact Centre (CCC) staff (emergency medical call takers who triage 999 calls, dispatchers who allocate resources, clinicians who provide assessment and advice, and managers who organise the CCC) the new clinical model involves changes in staff behaviour as their jobs have changed. For operational staff in the field the changes in allocation of calls to categories and reduction in the number of calls requiring an 8 minute response may also effect changes as, for example, they may be "stood down" less often and potentially can be more likely to be assigned to calls that fit their skills.

Ambulance staff are also the only people to treat patients face to face under the clinical model pilot, just as before. They should hence have views on the appropriateness of the revised call categories and how well clinical needs are being matched to categories at the time of the call. To establish opinions of how well the new model has worked in the "real world" and what further improvements could be made we conducted an anonymous online survey of clinical hub and operational staff, the results of which are discussed in chapter 7. This enabled us to efficiently build up a picture of how the new clinical model has affected those tasked with its implementation, how they have adapted their behaviours and work practices, their levels of satisfaction with the new model and whether it is viewed as an improvement on the old model (in terms of perceived quality of outcomes, time pressure, efficient use of resources etc.).

The MCRU has already conducted a survey of staff working in pilot services as part of the ongoing work evaluating the NHS England Ambulance Response Program. We used this existing survey as

the basis for the WAST evaluation but, as there was the additional feature of the new call categories, we expanded the current survey to include more discriminatory questions about the new call categories. The expanded and amended survey was piloted using a small number of staff to refine the final version. The survey was predominantly comprised of structured questions using scaled "tick box" responses to reduce the completion burden on respondents but also provided some restriction-free input boxes so that respondents could provide more narrative comments if they wished to. The analysis combines quantitative methods such as frequency statistics with the qualitative interpretation of these results to provide additional insight in to how the new clinical model is working in practice.

3.3.3 Qualitative study to assess whole service and system operation and lessons learned

This evaluation builds on this survey and the preceding quantitative impact analysis by continuing with qualitative assessments of the new clinical model's functionality and efficiency. This provides context for understanding and interpreting the findings of the other stages of the evaluation but can also generate real-world insights in to what has worked well, what hasn't and where further improvements can be made.

A preliminary qualitative study with key clinicians and service providers was performed during phase 1 of this evaluation, setting out the context and development of the new clinical model. Some findings were reported in the interim report, but these consultations primarily served to inform and refine the approach taken in this evaluation. During phase 2 a broader qualitative study was performed to address these issues, which had two components:

- Interviews with a wider group of stakeholders in addition to the key delivery and management staff: commissioners and representatives of organisations that were engaged for feedback on the Clinical Model Pilot prior to its launch. This specifically included EASC and WAST clinical and operational staff responsible for developing and monitoring the new clinical model (including those set out in the initial stakeholder consultations); staff from clinical contact centres and operational units (urgent care, emergency ambulance, other vehicles, management teams); and representatives of patient groups. We also included staff-side representatives (such as the four trade unions recognised by WAST) to gain their views on the impacts of the new clinical model on staff workloads, satisfaction, recruitment and retention.
- Qualitative assessment of the impact of the new clinical model on the wider emergency and urgent care system, as WAST is an integral part of this system. We selected two well-defined geographical areas (one rural/remote, one urban) in consultation with the evaluation commissioners. In these two areas we conducted a series of telephone and face-to-face interviews with representatives of the broader health economy including Emergency Department Clinicians, primary care clinicians and service commissioners. We combined these interviews with the broader consultations to provide additional local and frontline detail on the new operational method, and the role it plays in meeting the emergency and urgent care needs of local populations.

This qualitative component, when combined with the other components of the evaluation, enables us to efficiently build up a picture of how the new clinical model has affected those tasked with its implementation, how they have adapted their behaviours and work practices, their levels of satisfaction with the new model and whether it is viewed as an improvement on the old model (in terms of perceived quality of outcomes, time pressure, efficient use of resources etc.) both in the ambulance service and the wider health care system. We have found that this approach worked very well in our previous evaluations as a range of perspectives can then be considered.[33] The

[33] For example: Evaluation of NHS 111 pilot sites, University of Sheffield August 2012 (Janette Turner et al).

analysis is pragmatic in that the focus is on identification of practical issues such as challenges, barriers, and successes, and how future improvements to the ambulance service model might be undertaken.

Interviews were held by telephone. We developed a topic guide of questions framed around the key objectives of the WAST model and how these relate to other services in the wider system.

This process produced a comprehensive description of the operation of the WAST model in the wider emergency and urgent care system, with a particular emphasis on the perceptions of other stakeholders on any changes following implementation of the new model. A list of individuals consulted for the qualitative study, and the topic guide, are set out in Appendix III.

3.3.4 Patient experience

The evaluation takes account of patient experience indirectly through the quantitative information gathered on response times, patient safety, and clinical outcomes. The timescales and scope of this project did not permit direct primary research with emergency service users, i.e. through a user survey. We have instead gauged patient perceptions of the new model, and their experiences, through the qualitative consultations. As part of the qualitative consultations we contacted the Picker Institute for advice on how EASC and WAST could explore perceptions of patient experience in future.

3.4 Summary

The logic model and evaluation framework described in this chapter represent a comprehensive mixed-methods research methodology through which PACEC evaluated the clinical model pilot of ambulance service delivery in Wales. Subsequent chapters describe the implementation of research according to its component methods, beginning with the quantitative evaluation of operational performance. The remainder of the research in this evaluation is more qualitative than quantitative, including staff surveys, stakeholder consultations and frontline/local interviews building on the insights generated by the quantitative research and analysis described above.

4 TREND ANALYSIS

4.1 Introduction

In this chapter we describe changes in ambulance service performance indicators and provide indicative conclusions regarding the possible impact the clinical model pilot has had on **clinical outcomes**, **patient experience**, and **value for money** using the Ambulance Quality Indicators as a vehicle for analysis. We deploy a methodologically sound, replicable and pragmatic approach to discuss this impact and showcase the crucial role AQIs play in monitoring and evaluating the 5-step Ambulance Patient Care Pathway.

Firstly, this section sets out the methodological framework that was constructed to conduct this research and explore the logic model underlying the clinical model pilot. Next, we combine a baseline review with AQI data to compare performance during the pilot against a relatively robust benchmark. This comparison is conducted in two parts, the first being a walkthrough through the key indicators of ambulance service performance and their relationship to the AQIs and the second detailing trends in overall expenditure and resource utilisation.

This chapter is focused on measurable changes in clinical outcomes, patient experience and value for money, which is looked at both directly through analysis of expenditure data and by searching for measurable improvements in systemic efficiency. There is little to no contribution regarding staff perceptions, as no meaningful information has been collected regarding these, nor can it be gleaned from the AQIs; these are dealt with in our staff survey and stakeholder consultations.

The results show that the clinical model pilot has improved ambulance service performance by:

- increasing response-time reliability for code RED emergencies
- allocating fewer vehicles per incident
- reducing the number of serious adverse incidents
- more cases resolved telephonically or on scene as opposed to conveyance

On the other hand there have been continued issues with lost hours to handover and timely & appropriate care for less serious emergencies. These are explored in greater detail through qualitative analysis in subsequent chapters.

4.2 Methodology

Impact analysis is best conducted using a straightforward ex post assessment of a program's theory of change with the assistance of a scientific counterfactual, which is hampered by the pilot's objectives, design and implementation, as is discussed in the methodological note provided as Appendix I. This section briefly describes the methodological framework that was developed to provide meaningful trend analysis and discussion of impact. Building from a systematic review of ambulance service delivery, we established several key metrics within aspects dealt with by the quantitative component of this evaluation. These have been selected on the basis of data availability and knowledge gained from stakeholder consultations.[34][35] The variables and their role within the wider methodological framework for this indicator analysis are described in the table two pages below.

[34] NHS Strategic Health Authorities (2009) A Comparative Review of International Ambulance Service Best Practice.
[35] Turner J et al (2015) "What evidence is there on the effectiveness of different models of delivering urgent care? A rapid review", *Health Serv Deliv Res* 3(43)

Together these variables encompass the overarching intentions of the clinical model pilot, thus forming a useful framework for exploring the possible impact this pilot has had. The variables do not map neatly onto single intended outcomes: for example an increase in hours lost when handing over patients would indicate a waste of financial resources, but also affect clinical outcomes as ambulances would prevented from attending calls. Hospital handover delays have been identified as one of two most significant negative factors influencing patient experience, the other being response times for non-life threatening emergencies.[36] Regardless, the variables displayed above all refer to inefficiencies in the previous clinical model that this pilot sought to improve.

The data that forms the basis for this analysis was extracted from the evaluator dataset and relevant AQIs, with further financial information sourced from Resource Envelope 6 of the CAREMORE® collaborative framework document. The latter dataset allows us to strengthen our cost-effectiveness analysis. Both datasets cover the complete pilot timeframe from October 2015 to September 2016.

The clinical model pilot was specifically designed to improve clinical outcomes, patient experiences and value for money. The desired direction of travel differs from indicator to indicator, with the new model specifying desired increases in RTR and resuscitation, decreases in re-contact rates, serious adverse incidents, vehicle allocation & lost hours to handover, and a more appropriate response type overall.

Simultaneously, this also measures whether the correct ambulance has been dispatched, by looking at the incidence of treatments at scene (because certain treatments are only possible with the correct vehicle and crew) and the conveyance rate. The latter is also a good example of an indicator that lacks meaning without contextual information. The conveyance rate changes both as a result of increased treatments on scene (decreases) and correct ambulances being dispatched (increases) but neither confirms the clinical model pilot having improved clinical outcomes or patient experiences. Hence the desired direction of travel listed above should be seen as indicative measure of impact

The previous clinical model had several unintended consequences, as dispatchers were incentivised to dispatch an ambulance as soon as possible, regardless of the seriousness of the incident or appropriateness of the vehicle being dispatched, in order to maximise the chance of meeting the response time target if the incident did require attendance by an emergency vehicle.

This chapter approaches the Value for Money aspect of the evaluation from two angles. The indirect one has already been discussed, but the direct one requires a slightly different methodology. Alongside AQIs EASC also developed the financial measurements split according to the 5 steps of the APCP, meaning cost-effectiveness can eventually be measured relative to specific AQIs and the distinct processes these monitor. The pathway is designed to reduce demand on the later, resource-intensive steps, and increase the number of incidents prevented or resolved telephonically as such activities cost far less than S&T or conveyance. This would be confirmed if expenditure falls overall or less is spent on Steps 4 & 5, which currently consume 80% of the WAST operational budget.

Overall the above framework serves as a pragmatic non-experimental observational study of trends in ambulance service performance, which uses available data to provide indicative conclusions regarding the pilot's impact on WAST health outcomes, patient experience, and cost-effectiveness.

[36] WAST Partners in Healthcare (2016) *Annual Review 2014 – 2015*. Cardiff: WAST.

Table 4:1: Indicator analysis framework

Variable	Impact on	Baseline source (12/2011 – 9/2015)	Pilot source (10/2015–9/2016)	Comparable to AQI	Expected impact	Comments
Service demand						
Calls		PR1	PO1	7	n/a	These indicators track the amount of calls and verified incidents dealt with by the WAST NHS Trust. They show how demand for ambulance services has been steadily increasing and highlight the seasonal nature of pressure upon the service.
Incidents		PR4a	PO4a	8		
Response Type	CO, PE, VfM					
Hear & Treat		PR14a telephone	PR14a telephone	10.i.b	+	Response type explores the relative distribution of Hear & Treat, See & Treat and Transports over time. The clinical model pilot is supposed to increase the number of incidents resolved by Hear & Treat (telephone) or See & Treat (pre-hospital care), thus reducing the conveyance rate and in turn increasing supply of ambulance resources for emergencies.
See & Treat		PR14b scene	PO14a scene	10.ii.b	+	
Transports		PR13a	AQI19.ii	19.ii	-	
Response Time	CO, PE					
RED Response-Time Reliability		PR5a	PO5a	11 (RTR)	+	Response-time reliability remains a key variable for ambulance performance in the most critical cases. This clinical indicator is crucial for life-threatening serious incidents (category RED) in the clinical model pilot, which was expected to increase RTR as fewer calls require a time-critical response and the most appropriate vehicle resources are therefore more likely to be available. The response times similarly track the median, 95th percentile and longest wait times for the two most urgent categories, showcasing whether issue might be arising at the tail end of the distribution.
RED Response Time		n/a	AQI11.iv.a AQI11.iv.c	11 (Median & 95th %)	-	
AMBER Response Time		n/a	AQI12.ii.a AQI12.ii.c	12 (Median & 95th %)	-	
Clinical success	CO, PE	n/a	AQI16.i-iv.b	16.i-iv	+	Clinical success rates refers to appropriate or successful treatment (“care bundles”) being provided for four conditions: cardiac arrest, stroke, hip / femur fracture and acute coronary syndrome. This AQI measures how successful WAST crews are in providing appropriate and effective healthcare, which the clinical model pilot is supposed to increase as emphasis has been placed on establishing a detailed diagnosis and dispatching the correct vehicle & crew.
Re-contact rates	CO, PE, VfM					Re-contact rates are the ratio of incidents where patients re-contact WAST within 24hrs after they have had an incident resolved through H&T or S&T. Re-contacting suggests inappropriate or insufficient care was provided the first time, thus revealing negative clinical outcomes, wasted resources and poor patient experience. Pilot is designed to reduce re-contact rates through greater emphasis on ambulance services as pre-hospital care.
Hear & Treat		PR14 telephone	P014 telephone	10.i	-	
See & Treat		PR14 scene	PR14 telephone	10.ii	-	
Vehicle allocation	CO, VfM	PR8a(i-v)	PR8a(i-v)	Not comparable to 14	-	Vehicle allocation refers to the number of vehicles dispatched per incident, where no more than 1 vehicle is deemed necessary. This is meant to decrease substantially as the incentives to dispatch multiple vehicles to meet time targets have been removed from the 5-step APCP.
Lost hours	CO, PE, VfM	PR15	PO15	21	-	Lost hours to handover is a key issue in patient experience and value for money, with increased demand for healthcare overall in recent years causing issues regarding ED capacity to take in patients conveyed by ambulance, thus forcing vehicles to wait in parking lots. This is a misallocation of valuable resources, increasing costs unnecessarily and preventing ambulances from improving clinical outcomes elsewhere.
Serious Adverse Incidents	CO, PE	PR21	PO21	n/a	-	TSAIR is an abbreviation for Total Serious Adverse Incident Reports, a term for the major complaints that WAST receives regarding incidents where staff or patients feel safety and well-being have been severely compromised. By overhauling the entire process of ambulance service delivery with the clinical model pilot, WAST also hoped to reduce TSAIR incidence as greater consideration is given to the ambulance service as a systemic whole instead of a narrow focus on RTR.

4.3 Service demand

In this section we describe the evolution of service demand over the period December 2011 – October 2016 by discussing the evolution in volume of calls and incidents. This illustrates the increased pressure that has been placed on the Welsh ambulance service in recent years. The indicators used here are comparable to AQI7 (calls) and AQI8 (verified incidents).

The Welsh Ambulance Services NHS Trust received a total of 2,049,689 calls and resolved a total of 1,649,201 incidents between December 2011 and September 2015, either directly through 999 or referred from healthcare professionals (HCPs), which averages to 41,831 calls and 33,657 verified incidents a month. The number of calls per month varies throughout the year due to random variation and with the seasons, with the winter months generating the most calls. Monthly analysis of the data shows that while there are usually sharp peaks of demand during the winter months, these do not reliably fall within the same month each year; with only 5 years of data, the random variation in the number of calls per month obscures the seasonal pattern.

On the other hand there is a consistent increase in demand and divergence between call and incident volumes, with linear trend lines in figure 4.1 below showing respectively 11.6 and 2.5 more calls and incidents a month over the entire timeframe. The incidents-to-calls ratio thus dropped from 86.9% in 2012 Q1 to 71.6% in 2015 Q3. Hence the average number of calls increased to 56,811 calls and 38,534 verified incidents a month. The aggregate increase in demand between the baseline and pilot timeframes is also shown clearly in table 4.2 below, which compares the mean number of calls & incidents for Wales and each of the LHBs.

From the stakeholder consultations we have inferred that frequent callers and failure demand are two possible causative factors, as they had been identified as a problem before the pilot was introduced. Further analysis showed dramatic spikes during particular periods (Easter & Christmas especially) when disaggregated by week, thus leading us to believe that there is a substantial increase in demand for emergency medical services during major holidays. There is also a slight seasonal pattern inherent to call & incident volumes for WAST, as an uplift in total calls and incidents does seem to occur in the winter months. The volume of calls and incidents is relatively stable however, with a variation of maximum 3% between seasons once results are grouped by quarter.

Investigating the geographical distribution of total calls & verified incidents also leads to some interesting insight regarding the relationship between these two measures and their evolution over time across Wales. All LHBs appear to follow the pattern shown in figure 4.1 with calls and incidents steadily increasing at a diverging rate. Several volume-based clusters also become apparent, with BCU handling 5 to 6 times the number of calls and incidents Powys does: respectively 12,324 and 9,265 vs. 2,028 and 1,625 in September 2015. The other five health boards cluster together in the Inter-Quartile Range, as their volume of calls & incidents ranges between +/- 2,300 to 6000 and +/- 3,000 to 8,000 respectively. When taking into account the demographic growth across Wales and variation among the 7 health boards by calculating these volumes relative to population, these clusters coalesce, thus revealing a consistency in demand per head of population throughout Wales.

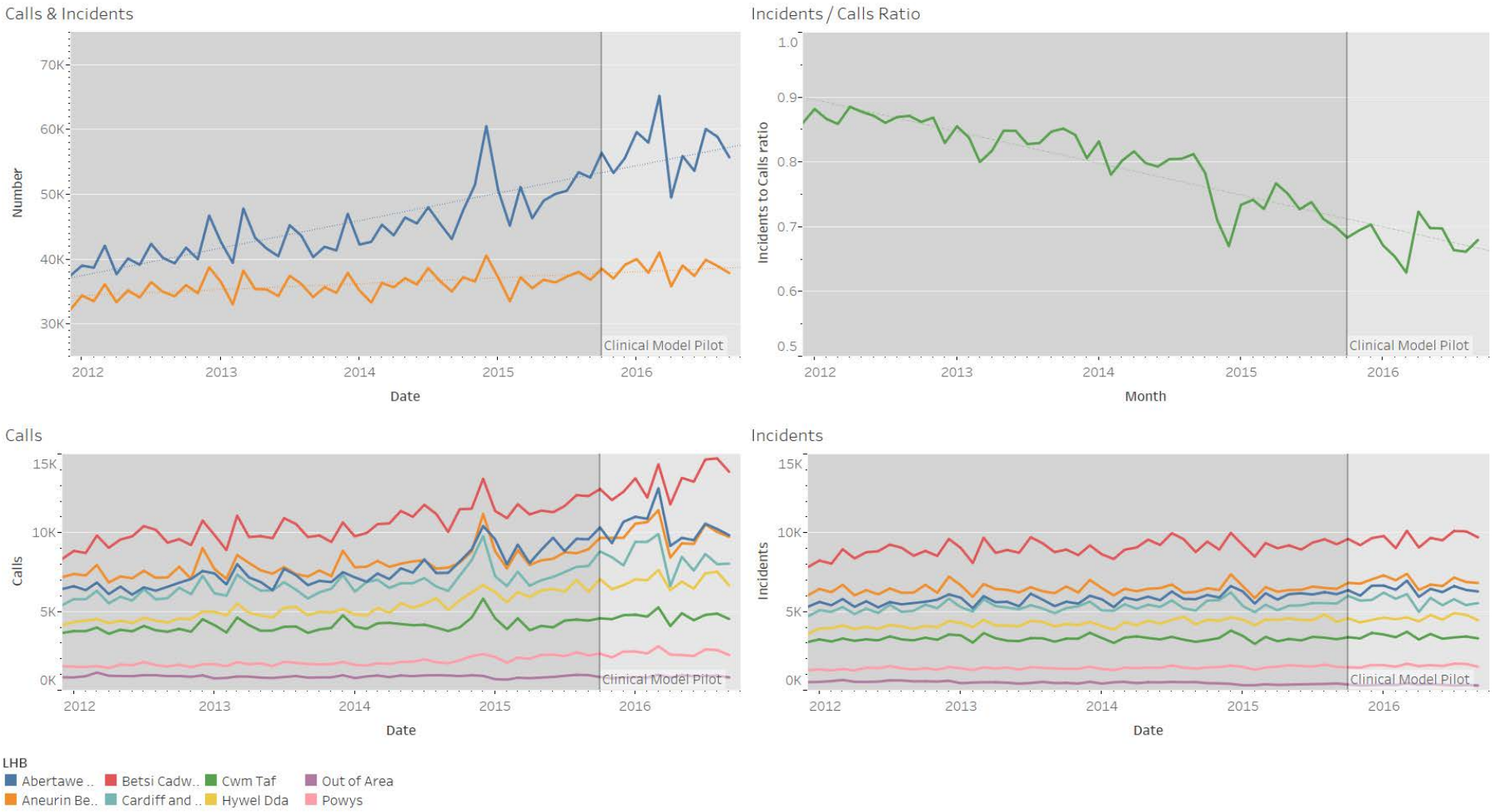
A simple analysis of call and incident volumes for the pilot timeframe, also shown in figure 4.1, reveals that these have continued to increase at the baseline pace but remained

relatively steady otherwise. Where the pilot timeframe appears to differ from the baseline period is that little to no seasonal pattern can be detected during the pilot.

Table 4.2: Mean variation in Calls & Incidents between baseline period and pilot timeframe

Area	Baseline		Pilot		Difference (volume)		Difference (%)	
	Calls	Incidents	Calls	Incidents	Calls	Incidents	Calls	Incidents
ABM	7550	5767	10341	6401	2791	634	36.97	10.99
AB	7945	6411	9920	6900	1975	489	24.86	7.63
BC	10453	8984	13268	9629	2815	645	26.93	7.18
CV	6679	5292	8443	5706	1764	414	26.41	7.82
CT	4082	3272	4680	3419	598	147	14.65	4.49
HD	5201	4226	6925	4569	1724	343	33.15	8.12
P	1775	1416	2374	1565	599	149	33.75	10.52
OoA	872	483	861	344	-11	-139	-1.26	-28.78
Total	44,558	35,852	56,811	38,534	12,253	2,682	27.50	7.48

Figure 4.1: Service demand analysis



4.4 Response type

The ambulance service response type can be visualised for the baseline period using the three closely-related indicators that depict the percentage of incidents that are resolved either by Hear & treat (H&T), See & Treat (S&T), or conveyance. Determining their relative distribution is slightly complicated because resolution by telephone counselling, treatment on scene or conveyance to hospital occurs at different stages in the 5-step APCP. For the purposes of this evaluation three indicators (H&T = AQI10.i.b S&T = AQI10.ii.b , Conv. = AQI19.ii) are pooled to provide some indication of their relative distribution.

The first, Hear & Treat, refers to the number of incidents where healthcare has been provided over the phone. See & Treat is measured as the number of incidents resolved on scene to which an ambulance was dispatched. Transports in turn refers to the conveyance rate, specifically the volume of incidents for which at least one patients was transported to hospital. The gap between the three response types and total volume of incidents therein can be explained by incidents being resolved through alternative methods (patients refusing treatment, referred to GP etc.).

The volume of transports is an interesting indicator as different forms of good practice can move it upwards or downwards. An improvement in vehicle allocation would not necessarily increase the conveyance rate, because dispatching only reduces the waiting time for conveyance when that is necessary. However, if ambulances with trained crews are successfully allocated to incidents where S&T is a possibility, and are able to provide treatment without the need for conveyance, that would tend to *decrease* the conveyance rate.

A brief glance at the evolution of these three methods in figure 4.2 below reveals that cases resolved by H&T, S&T or conveyance have remained relatively stable throughout the baseline period and pilot timeframe. The average mean for both periods, shown in table 4.2 below, reveals little variation between the two periods. The change that does become apparent in the figure below relates to the increasing gap between the three response types and total volume of incidents. This implies that more incidents have been resolved through alternative means, from which it can be inferred that the clinical model pilot is successful in directing patients to more appropriate healthcare outside the Welsh ambulances system.

Further analysis of regional variation reveals substantial differences in the incidence of H&T vs. S&T for different health boards, also shown in figure 4.2 below. Whereas BCU naturally resolved more cases overall due to its larger demographic and size, it does appear that this health board is resolving far more incidents through S&T. In September 2016 for example BCU resolved 27.4% of all cases dealt with through H&T and 36.5% of all cases resolved through S&T, implying that it is performing well in providing treatment on scene.

Overall it seems that the intended goals of the clinical model pilot are being met to an extent, as no clear increase in H&T, S&T or transports can be detected regardless of increased pressure through a higher volume of incidents. Thus some strain on later steps in the 5-step APCP (and subsequently, at emergency departments) appears to have been reduced, freeing up critical resources. Regardless the nature of these indicators renders it impossible to draw firm conclusions regarding the impact the clinical model pilot has had on increasing H&T and S&T on the one hand and conveyances occur when truly necessary on the other.

Figure 4.2: Response Type

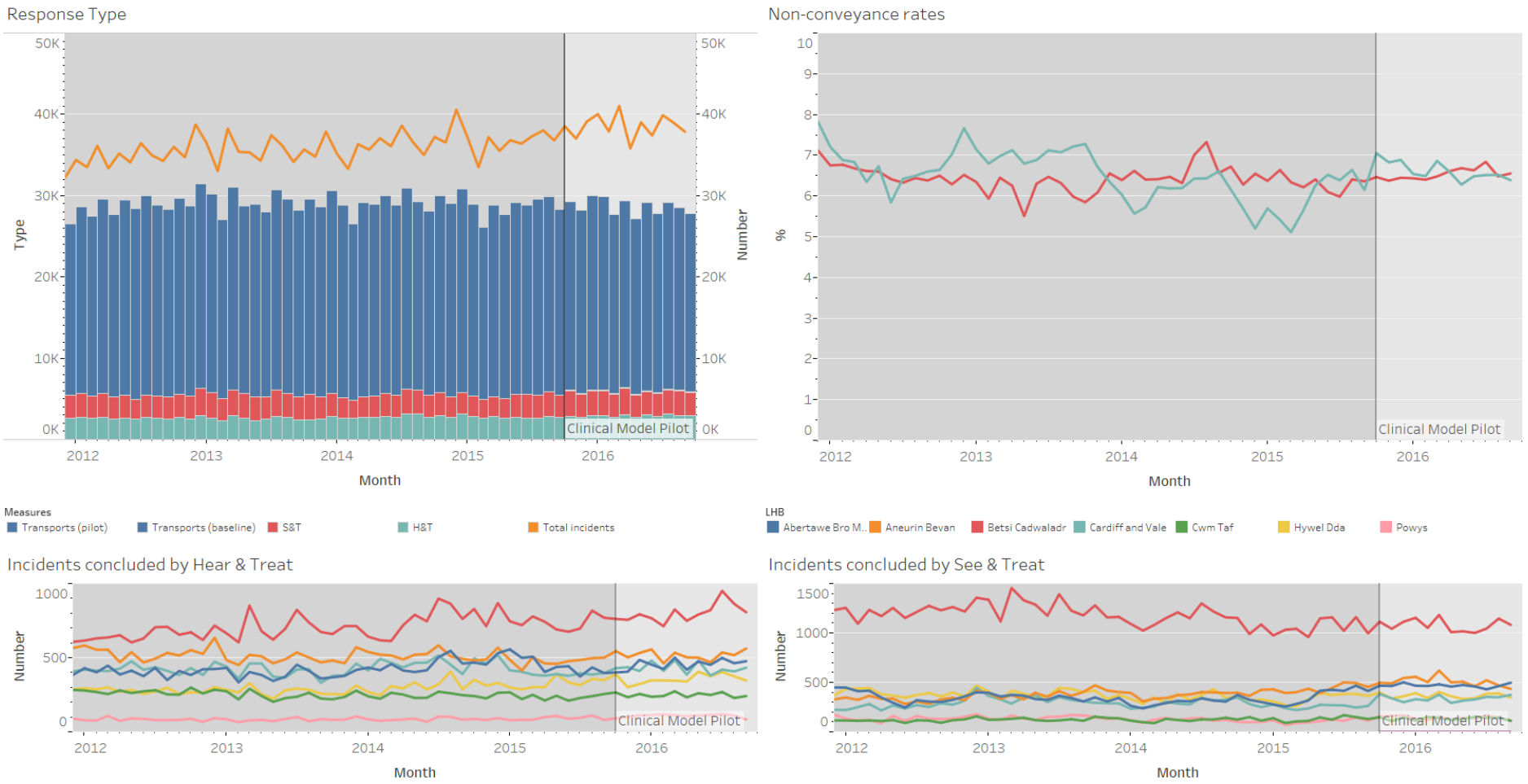


Table 4.3: H&T, S&T and transports variation between baseline period and pilot timeframe

Area	Baseline			Pilot			Variation (n)			Variation (%)		
	H&T	S&T	Transports	H&T	S&T	Transports	H&T	S&T	Transports	H&T	S&T	Transports
ABM	423	340	3790	454	468	n/a	31	128	n/a	7.32861	37.6471	n/a
AB	509	378	4438	518	508	n/a	9	130	n/a	1.76817	34.3915	n/a
BC	708	1176	5700	799	1079	n/a	91	-97	n/a	12.8531	-8.2483	n/a
CV	422	285	3488	429	337	n/a	7	52	n/a	1.65877	18.2456	n/a
CT	250	122	2432	248	133	n/a	-2	11	n/a	-0.8	9.01639	n/a
HD	295	368	2810	357	365	n/a	62	-3	n/a	21.0169	-0.8152	n/a
Powys	85	128	927	107	142	n/a	22	14	n/a	25.8824	10.9375	n/a
Wales	**2691**	**2797**	**23606**	**2912**	**3032**	**22706**	**221**	**235**	**-900**	**8.21256**	**8.40186**	**-3.8126**

Table 4.4: Response Times

Month		Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Apr-16	May-16	Jun-16	Jul-16	Aug-16	Sep-16
RED	Median	00:05:44	00:05:30	00:05:13	00:05:44	00:06:02	00:06:15	00:05:30	00:05:02	00:05:01	00:05:05	00:04:43	00:04:38
	95th %	00:18:05	00:16:54	00:16:44	00:17:16	00:17:54	00:18:24	00:15:30	00:15:31	00:14:20	00:14:55	00:14:53	00:13:24
	Longest wait	01:13:41	01:00:12	00:45:02	00:49:22	00:56:33	00:55:01	00:42:28	00:45:26	00:52:46	00:33:07	00:50:07	00:28:51
AMBER	Median	00:11:10	00:11:34	00:11:04	00:13:09	00:15:27	00:16:36	00:11:57	00:11:59	00:12:16	00:13:06	00:13:20	00:13:23
	95th %	00:49:40	00:52:22	00:48:50	01:09:07	01:45:44	01:54:04	01:00:24	01:00:11	01:05:57	01:16:23	01:12:47	01:19:35
	Longest wait	06:36:50	06:40:36	08:31:17	12:50:45	21:27:51	21:11:58	11:52:10	13:50:17	17:57:22	12:43:49	09:56:46	19:29:46

4.5 Response time

Response-Time Reliability, or RTR in short, was the key indicator of ambulance service performance under the previous clinical model. Even though the clinical model pilot sought to diversify WAST operating procedures from focusing solely on achieving the specified targets for RTR, it remains a key measure of its core mission: providing timely pre-hospital care to patients experiencing life-threatening and serious emergencies. The operating procedures for both the legacy and pilot clinical models specify that the highest category of emergencies should have an ambulance on site within 8 minutes, with a target rate of 65%.

Figure 4.3 below displays the evolution of RTR for all-Wales averaged by months. This monthly trendline for is however not directly comparable across the clinical model pilot. Instead of visualising the RTR rate for a specific set of medical conditions, this figure displays the rate at which ambulances attend to the highest category of emergencies under both the legacy and new response model. See Appendix I for more detail regarding comparability and details regarding the components of relative call categories.

The figure does show that this target was met in most of the baseline months. There is a clear downward trend however, with RTR also falling below the target rate in 7 out of 46 months in the baseline period. The clinical model pilot appears to have halted this decline, as the rate has consistently remained above 65% since its introduction. Additionally there also appears to be a clear increase, with the RTR reaching 79.6% in September 2016 (compared to 64.64% YTD). There is a slight reversal in the Winter (Q1) 2016 months, from which we infer that environmental factors and the strain they placed on ambulance services might have hindered further improvement. Naturally the limited pilot timeframe remains insufficient to state confidently that the underlying trend has been reversed permanently.

Nonetheless it seems as if this trend is consistent throughout Wales. This is confirmed by figure 4.4 below where RTR is disaggregated by LHB both as a boxplot visualising the range of RTR achieved per LHB in 2016 and the temporal evolution thereof during that year. All LHBs have hit the 65% target since June 2016, and all bar Powys have met it since April. Powys merits special consideration: as it is the least populous LHB, and takes a correspondingly low volume of calls (typically 50-70 RED calls per month), the random variation in RTR month-to-month is very high. It is also a large and sparsely-populated area, with remote settlements that cannot conceivably be reached within 8 minutes from the ambulance stations, and if in a particular month a large number of RED calls happen to come from these areas by random chance, the target will not be met.

Figure 4.3: Response-Time Reliability

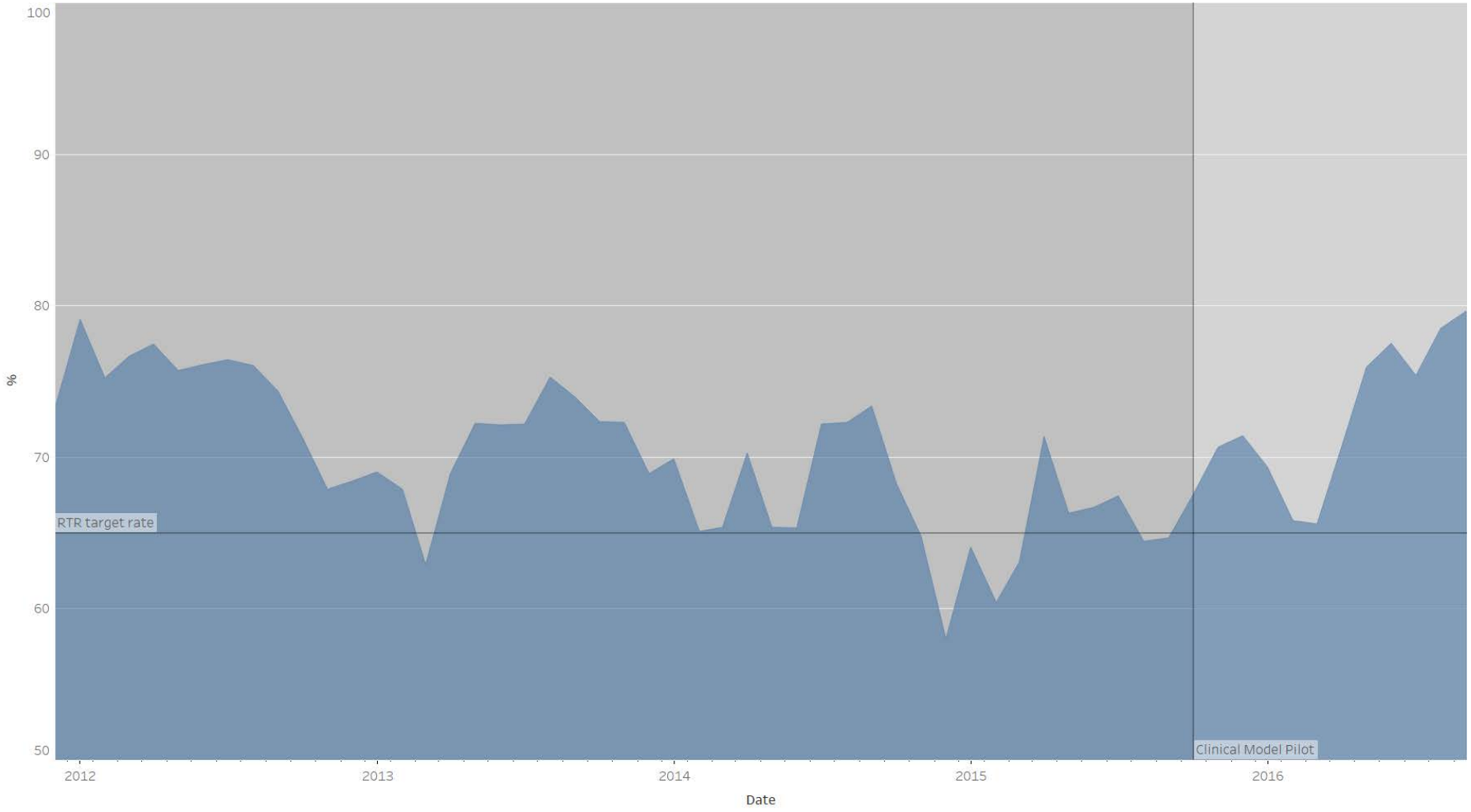
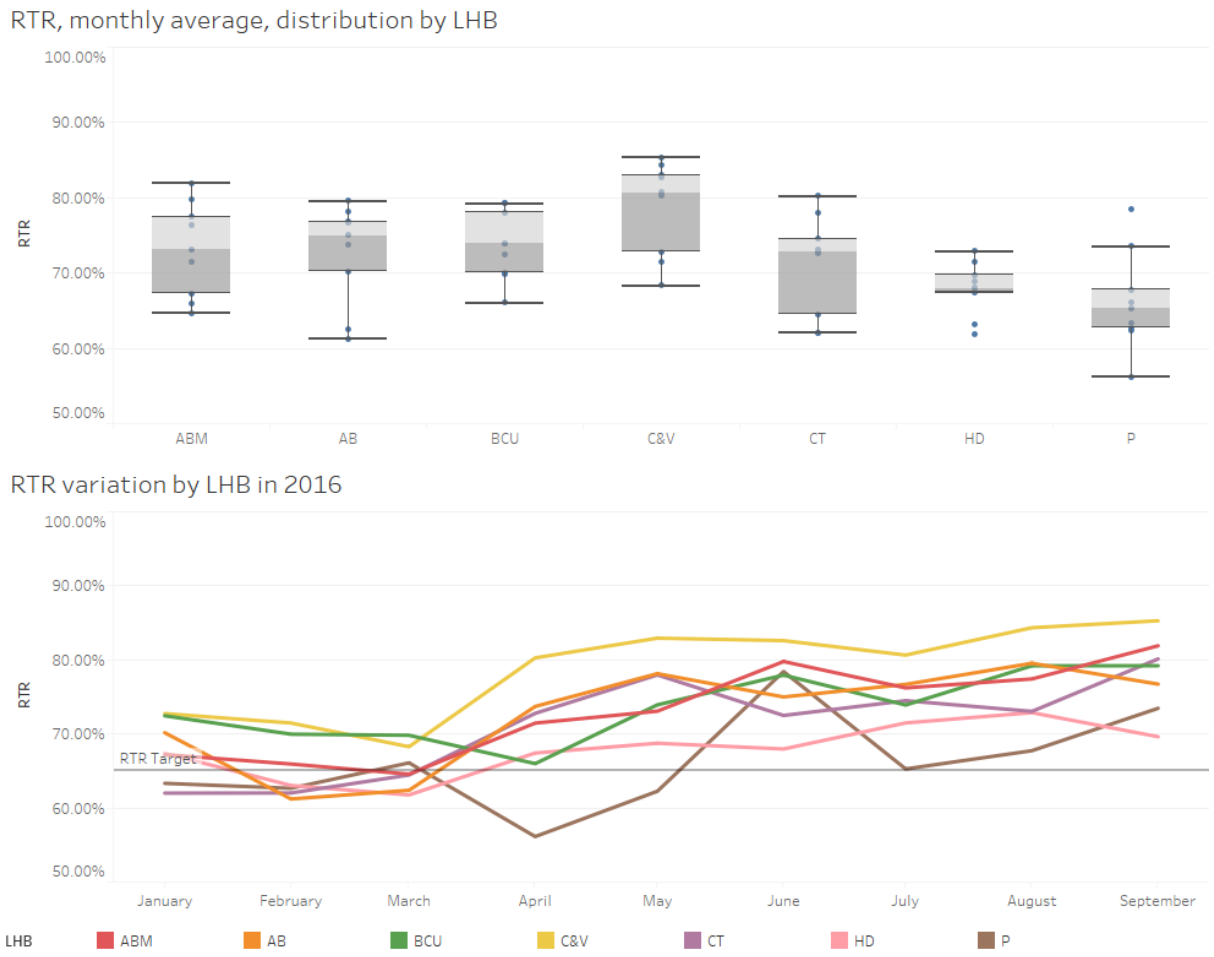


Figure 4.4: Response-Time Reliability by LHB in 2016



4.6 Re-contacting

The re-contacting rates for Hear & Treat and See & Treat are crucial in establishing whether an increase in their respective rates overall is accompanied by a decline in clinical effectiveness. If more patients are treated in such ways but WAST is also re-contacted by those same patients more often, then this suggests that some decisions on the right management option were suboptimal. This of course takes out of consideration those incidents where symptoms have worsened naturally and correct medical care was provided regardless.

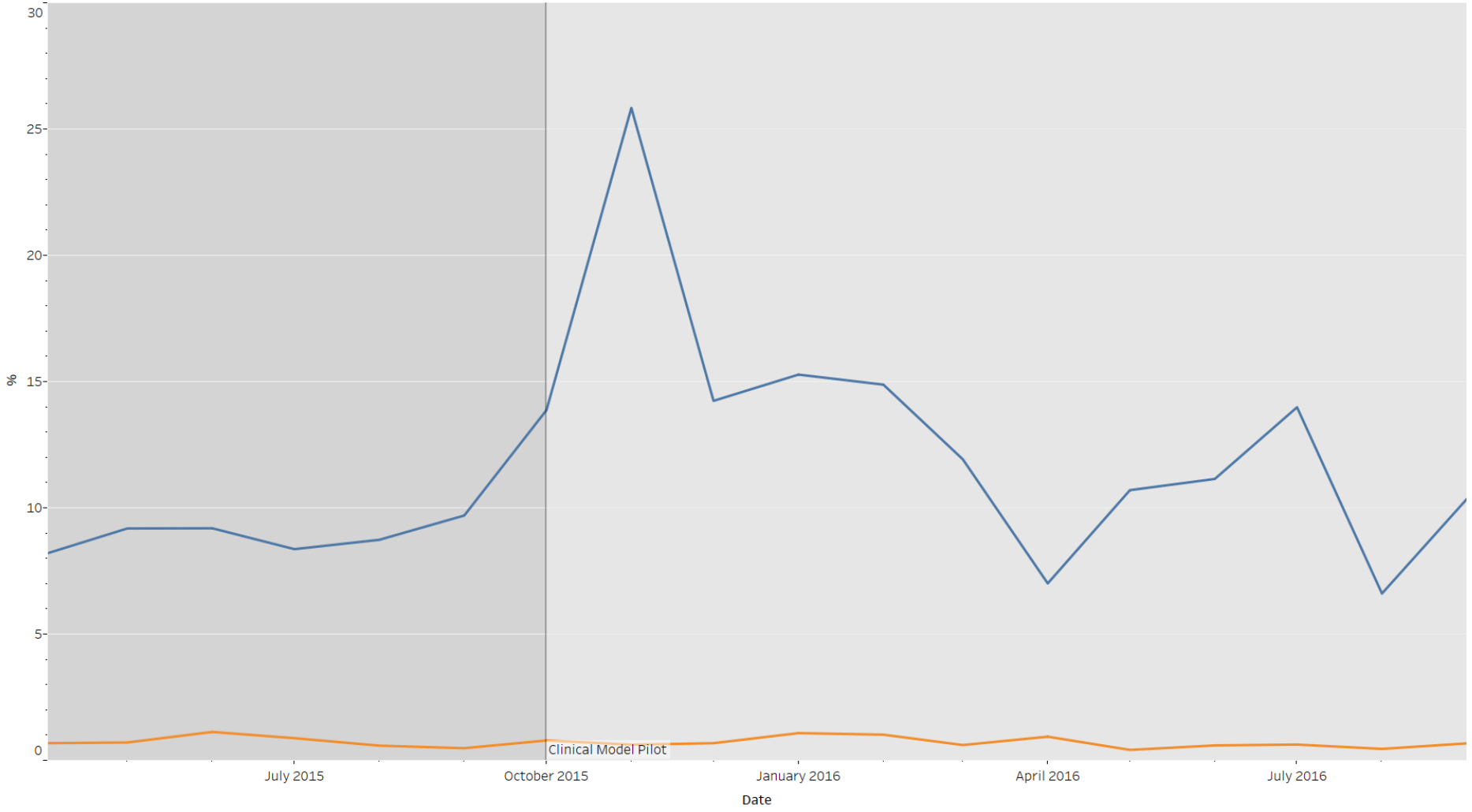
The baseline review however contains limited information regarding re-contacting rates beyond the six months directly prior to the clinical model pilot. This data shows that on average 9.1% of patients treated over the telephone and 0.74% of patients treated on scene re-contact WAST within 24 hours of being treated.

Looking at these rates for the pilot timeframe, visualised in figure 4.5 below, shows that his has decreased very slightly for S&T compared to the baseline, as the average mean for the pilot timeframe is 0.71%. On the other hand the average mean for H&T re-contacting has increased to 12.98%.[37] This increase can most likely be attributed to a re-contacting rate of 25.83% in November 2015, which was partially caused by a single address making 65 repeat calls to the service during the month. Even when excluding this anomaly, some increase could still be attributed to early difficulties with the new systems, as H&T has been reformed in a substantive way. Whereas clinical assessment over the phone was previously provided by NHSDW, this has been changed to the new Clinical Desks integral to Clinical Contact Centres in the Clinical Model Pilot.

Thus H&T re-contacting rates increased initially, but overall declined from 17.9% in Q4 2015 to 10.9% in Q3 2016. Visual analysis of the monthly H&T RCR also shows that the situation appears to have improved since April 2016. There does not appear to be any discernible change in RCR for S&T during the same period, with the slight variation corresponding to the seasonal pattern evident throughout the baseline review. Regardless it remains positive that the slight uptick in overall S&T rates have not been accompanied by increases in re-contacting, thus implying that the reorientation of ambulance service provision towards See & Treat has not negatively impacted clinical outcomes or patient safety.

[37] Comparable indicators from England in September 2016: mean Hear and Treat re-contact rate 6.3%, range 1.9%-14.8%.

Figure 4.5: Re-contacting rates



4.7 Ambulance clinical outcomes

Cardiac arrests, strokes, acute myocardial infarction and hip / femur fractures are four key conditions targeted by the clinical model pilot and measured through AQI 16, points i. to iv. This is because all four best require correct and timely pre-hospital care in order to ensure a successful clinical outcome. These are inherent to the new clinical model pilot and its intended redirection of measuring performance related to clinical rather than time based measures.

Because these conditions were only targeted from October 2015 onwards, little data exists concerning WAST performance in this regard except for some retrospective measuring of clinical indicators prior to clinical model pilot introduction. Hence there is little information regarding these variables prior to October 2015 as no such information had been collected over the baseline period clinical model.[38] Given that no data exists for most of these beyond what is provided in the AQI database, which is limited to April – September 2015, little comparison is made here with the situation ex ante. In England, the mean ROSC rate for all patients[39] was 29.7% in June 2016 (range 16.7% - 34%).

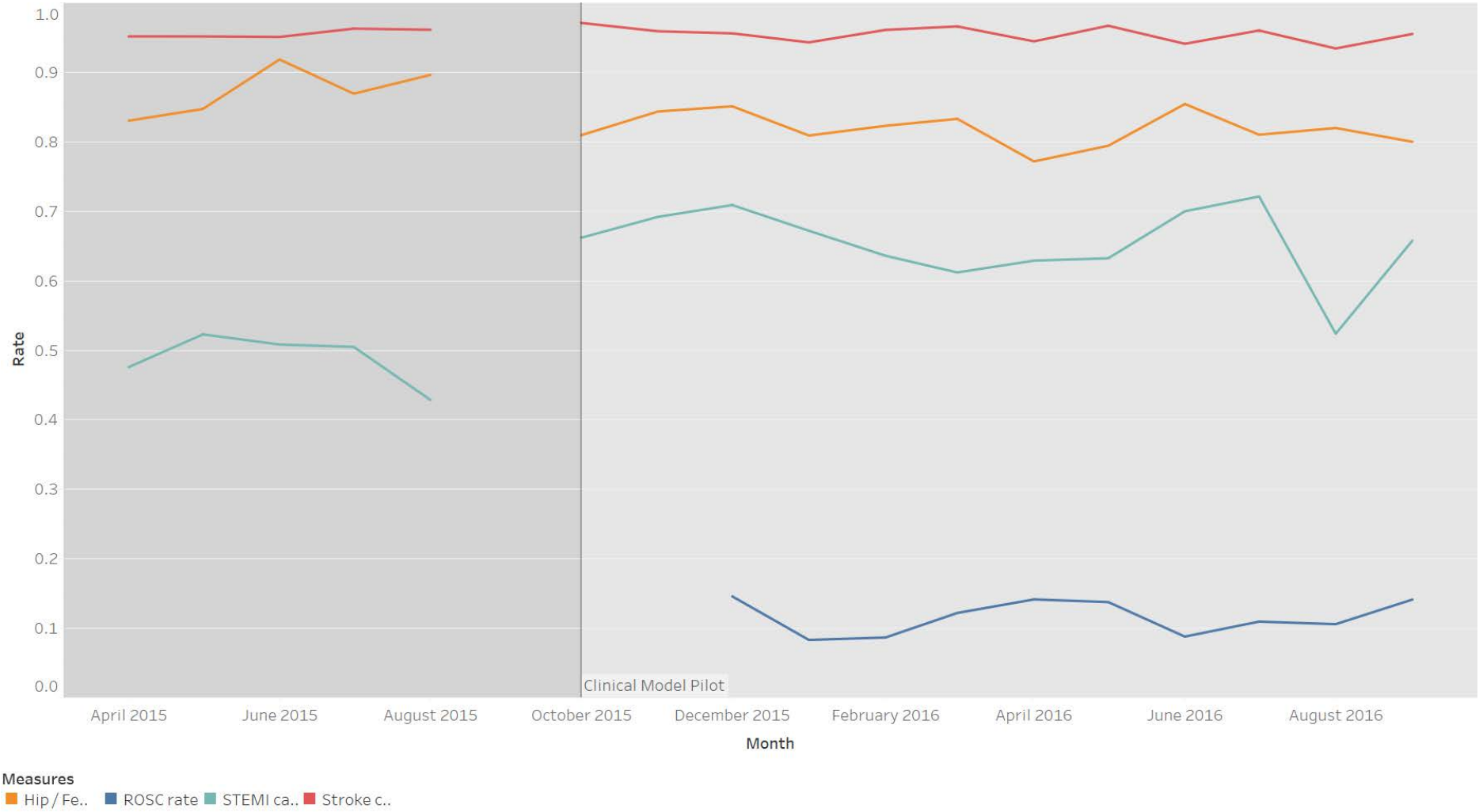
The figure below shows the compliance with delivering care bundles for all three conditions, and the ROSC rate. It is immediately apparent that a far greater rate of compliance is being achieved for the three care bundles. That substantial difference can be explained because the sub-indicators measure success differently for ROSC. Whereas the other three rely on whether an appropriate care bundle had been provided, ROSC is focused on the clinical outcome achieved.

Analysing the results compared to whatever limited data there is for the pre-pilot period does show significant improvement in providing the STEMI care bundle for acute myocardial infarctions and continued success in providing appropriate care for stroke patients. On the other hand there is a significant dip in compliance for hip / femur fractures, with only 3 months in the pilot reaching beyond the pre-pilot minimum of 83.03% in April 2015.

Regardless the average rate of compliance has remained at 81-83% throughout the pilot timeframe, this dip thus being a minor decline in compliance. The averages for strokes and AMI are 95.48% and 65.40%. On the other hand the ROSC rate in Wales is somewhat below that observed in England.

[38] The McClelland review references an improvement of the ROSC rate in Scotland (15.9%) after similar reforms but does not contain any information regarding the situation in Wales.
[39] Mean in England for patients meeting Utstein criteria 52.1%, range 44.4% - 64.7%.

Figure 4.6: Ambulance clinical outcomes



4.8 Vehicle allocation

The number of vehicles allocated per incident is a crucial measure for WAST and an indirect method of ascertaining developments in the efficiency and cost-effectiveness of the Welsh ambulance system. This indicator is currently measured using AQI14, but is visualised below in figure 4.8 for the four main call prioritisation categories using a different variable that measures unfiltered vehicle allocations. Whereas the latter includes all incidents, AQI14 excludes incidents for which multiple vehicles are the correct response.

Stakeholder consultations allowed us to determine that the previous clinical model contained some perverse incentives which led to an ineffective allocation of vehicles. The prioritisation of response-time targets caused dispatchers to allocate several closely located vehicles to a specific incident in the hope that one of these would reach the patient within the specified target. Such dispatching does however give little consideration to the appropriateness of the allocated vehicle(s) and prevents these crucial resources from being sent elsewhere. These allocation procedures also led to many ambulances spending most of their time en route to newly allocated incidents, thus creating a situation where they are 'idling' on the road.

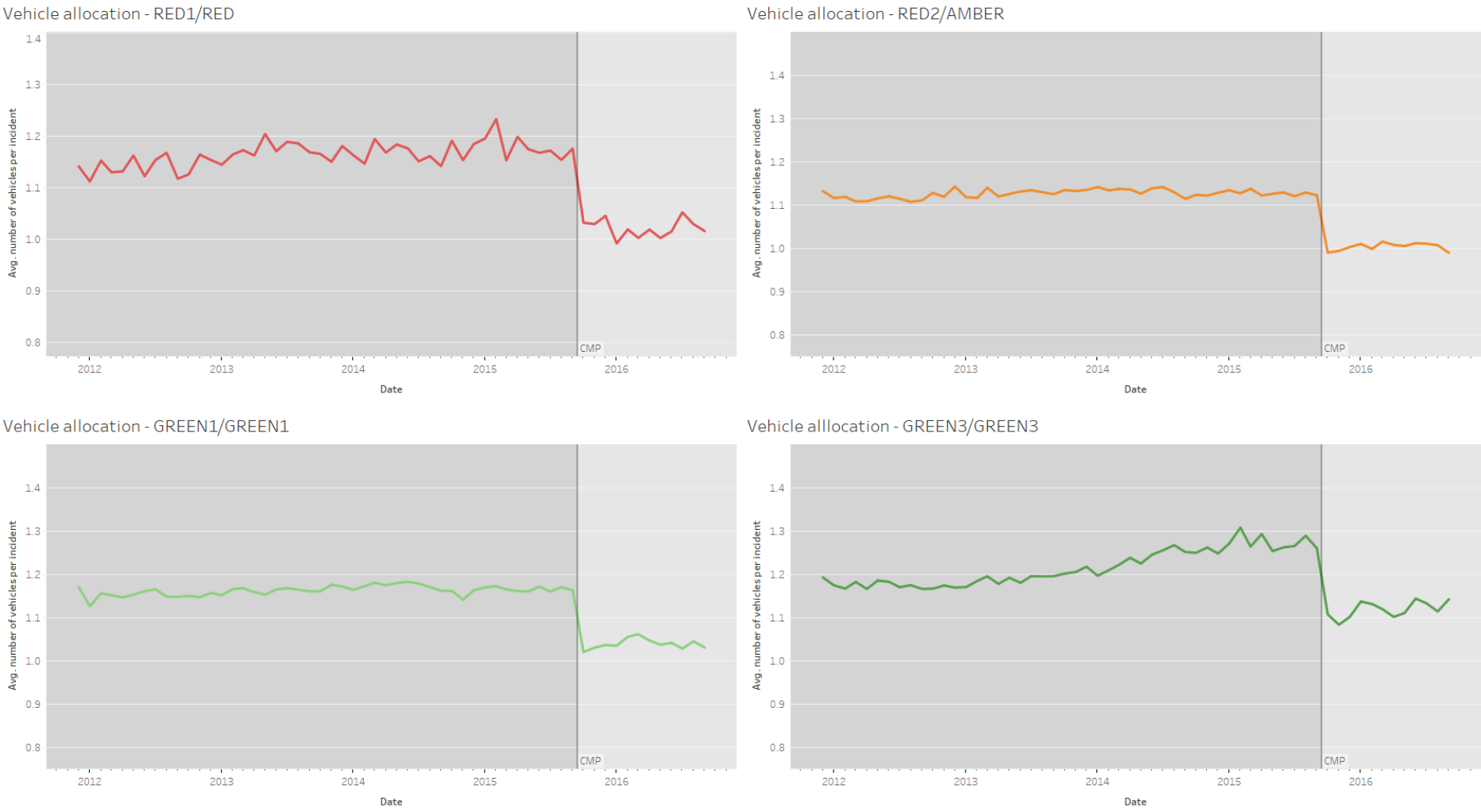
The figure below clearly confirms the concerns listed above for the baseline period, with vehicle allocation averaging 1.145 in December 2011 and increasing to 1.185 by September 2015. An average increase of 0.04 vehicles per incident might seem minimal at first sight, but implies an additional 1,600 allocations a month when assuming a call volume of 40,000.

Removing the 8-minute targets for non-urgent incidents and granting the dispatchers another 2 minutes to establish the precise nature of the complaint and determine an appropriate response were both specifically meant to reverse the trend described above by identifying the most suitable single vehicle for each call. Fewer but better vehicle allocations should in turn lead to improved clinical outcomes and increased cost-effectiveness.

This is precisely what the step change between September and October 2015 appears to reveal in figure 4.8. Allocations per incident declined respectively 0.1436, 0.1323, 0.1429 and 0.1527 for Red1/Red, Red2/Amber, Green1 and Green3 between September and October 2015. Even though the categories might not be entirely comparable, the consistency of this decline does imply that the clinical model pilot has had a positive impact on vehicle allocation.

Thus substantial gains in efficiency seem to have been made, notwithstanding that certain incidents (i.e. multiple vehicles colliding) do require several vehicles to be dispatched. WAST attempted to take this into consideration using AQI 18, which ascertains whether the ideal response as dictated by the clinical model was sent. Data is however only available for this indicator from April 2016 onwards, precluding it from being included here and providing any meaningful information. Regardless the clinical model pilot appears to have removed the perverse incentives of the previous clinical model. The steep decline in allocations per incident the month this pilot was implemented is a clear instance of the new clinical model working as intended.

Fig 4.7: Average vehicle allocation per incident



4.9 Lost hours to handover

This performance measure records the amount of time ambulances spend waiting outside hospitals when they have to wait longer than 15 minutes to handover a patient to the relevant Emergency Department. It is a key indicator of systemic efficiency but very difficult for WAST to address directly, as the delay is caused by a lack of available space or staff at the hospital, which is run by an LHB. The statistics for this measure correspond to AQI21 and are visualised in figure 4.8 below, which shows total monthly hours lost waiting for handover by LHB.

This graph shows a gradual increase in hours spent waiting, with a mean of 3,034 hours lost during the baseline period. There is significant variance from the mean, with particularly noticeable spikes occurring around Christmas 2012 and 2014. Further analysis for the baseline timeframe revealed that more time is lost in Winter (10,971 hours), which is 53% more than the during Autumn (7,165 hours).

During the pilot this number seems to have increased substantially, with the mean for this timeframe averaging 4,811 hours lost a month. The seasonal pattern has also clearly remained, with a 201.5% increase in hours lost between December 2015 and January 2016. In actuality this pattern appears to have been far more pronounced in the past year as the total number of lost hours recorded in Q1 2016 (22,610) is double that of the three other quarters in the pilot timeframe (respectively 12,233, 11,830 and 11,055).

The severity of this issue also varies considerably throughout Wales. Cwm Taf's contribution to the total number of lost hours drops very significantly from April 2013 onwards: from 444 to 86 in a month, and thereafter never reporting more than 100 lost hours for any month over the next 2.5 years.[40] Ambulances in CVU and ABU consistently lose between 400 and 1200 hours a month, with variation matching the seasonal pattern described above. BCU and ABMU have the highest overall and most variable levels of lost hours.

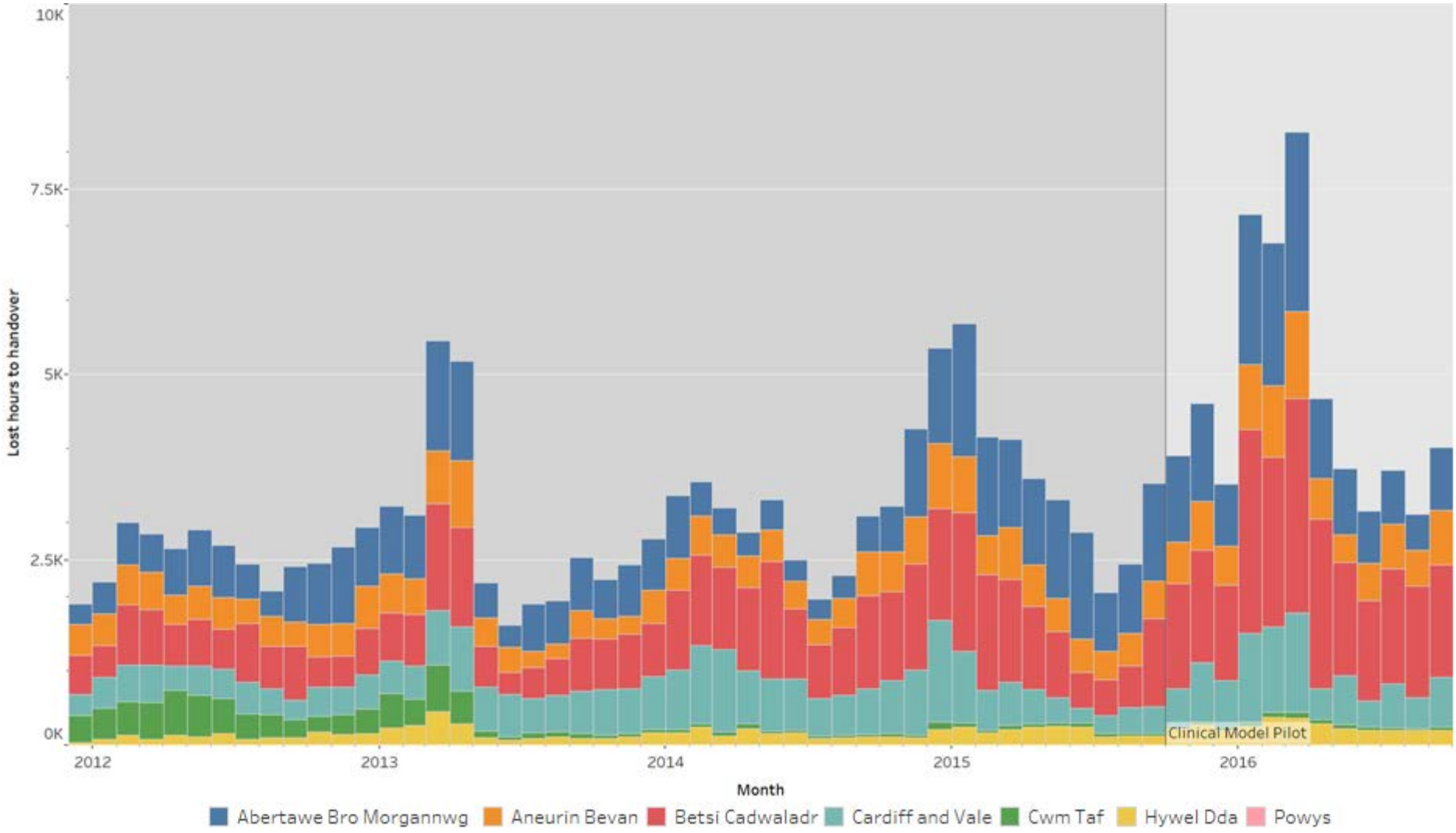
Further analysis of lost hours as disaggregated by LHB reveals that this increase and seasonality is not present throughout Wales for the pilot timeframe. It appears that the pilot confirms BC, ABM, CV and AB as the boards accounting for the great majority of lost hours to handover, with the other three LHBs making a minimal contribution to lost hours totals. Cwm Taf also continues to consistently manage its handover queue, never contributing more than 1.09% of total lost hours even though 9.57% of the population of Wales resides within its boundaries.

The clinical model pilot thus does not seem to have had any significant positive impact on the evolution of lost hours to handover, with this measure reaching a record-breaking 22,160 total hours lost in Q1 2016 and the distribution of lost hours remaining the same as in the baseline period. To view that result from the opposite perspective, the number of hours loss

[40] Cwm Taf is unique among the Welsh Local Health Boards in terms of its geography, as it is surrounded on all sides by other Boards, three of which (Aneurin Bevan, Cardiff and Vale, and Abertawe Bro Morgannwg) contain over half Wales's population, its largest cities, and major hospitals. Cwm Taf ambulance crews are therefore uniquely vulnerable to being sent to calls in other Health Boards and subsequently to emergency departments some distance from their home stations, which led to regular shift overruns and missed meal breaks. To address this, in March 2013 Cwm Taf adopted an "Explorer" project during which all calls in Cwm Taf were responded to by a Cwm Taf vehicle, and with the exception of (then) Red 1 calls or requests for backup to Red 1 calls or major incidents, no Cwm Taf vehicles were to be dispatched outside the Cwm Taf boundary. This had an immediate effect on performance against time targets in Cwm Taf.

to handover have been a significant confounding factor in realising the efficiency gains provided by the new model.

Fig 4.8: Lost hours to handover



4.10 Serious Adverse Incidents

A final negative measure of ambulance service performance is the number of serious adverse incidents where unexpected or unwanted effects have had an undesired outcome on patient or staff health & safety. Each one of these is transmitted to the Director of the WAST, a dedicated patient Safety Team and reported to the Welsh government. Initial stakeholders' discussions revealed that the clinical model pilot is also meant to reduce the overall number of SAIs as part of its focus on clinical outcomes and patient experience; partly by ensuring that the right resources are sent to calls first time, and partly by increasing response time performance for the most serious calls.

There is some information regarding SAIs, but these cannot be disaggregated according to call category or LHB because the data is collected outside the main ambulances CAD system. This indicator does not rely on the AQIs, as these incidents are recorded separately through the DATIX adverse incidents system, which measures the number of incidents where a severe breakdown in operating processes led patients experiencing an unwelcome experience or undesired clinical outcome. This indicator will have been reviewed carefully during the pilot, particularly during the first few months, as a sharp increase in the number of serious adverse incidents would have suggested that the pilot was not safe in some regard.

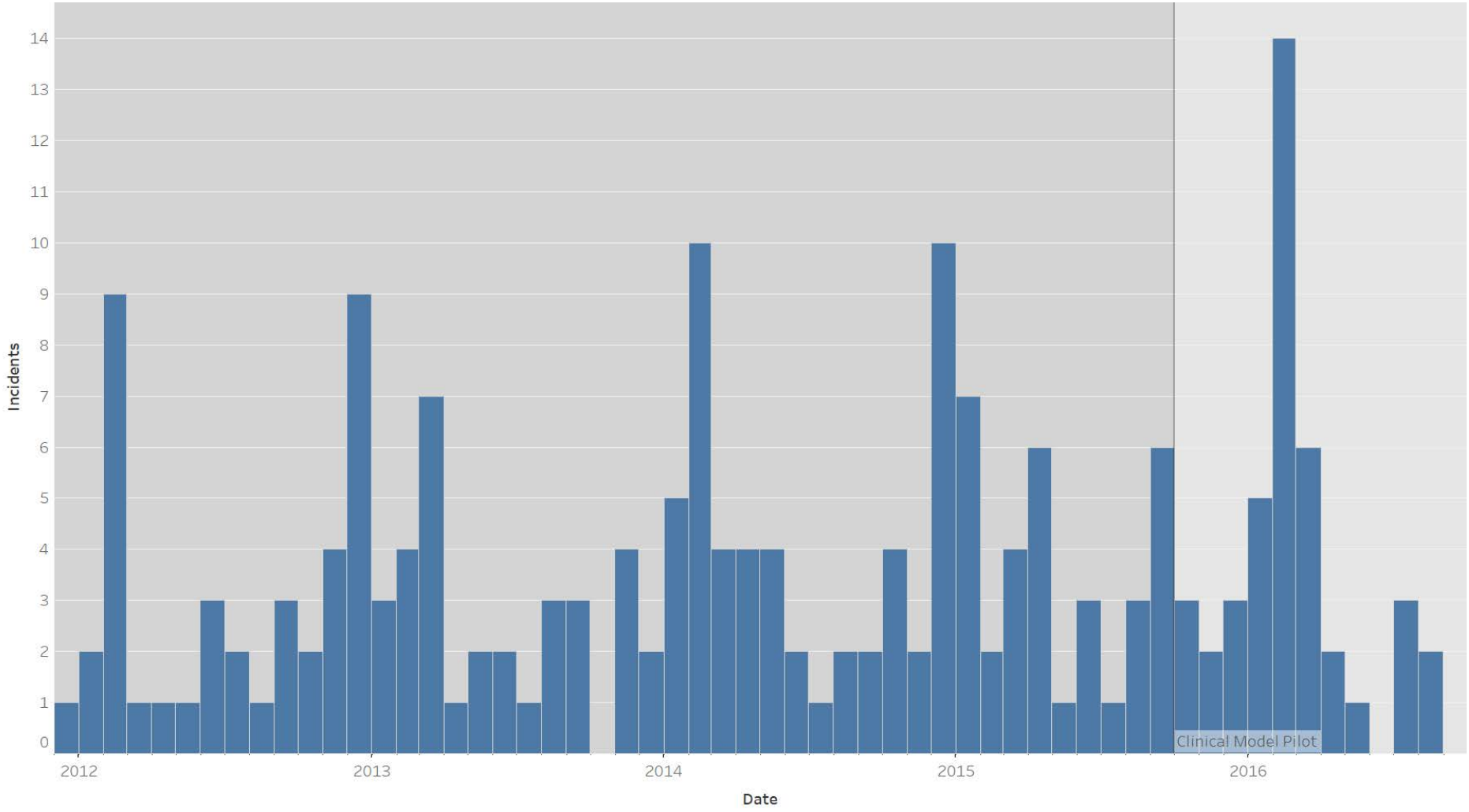
This analysis can thus only focus on Wales overall, where the incidence of such SAIs has also been steadily increasing between December 2011 and September 2015, as shown in figure 4.9 below. There is only one single month in the baseline period without incident, that being October 2013. Further seasonal analysis also reveals a marked seasonal variation, with twice as many incidents recorded in Winter (Q1) compared to Spring (Q2) and Autumn (Q4): 14.5 vs. respectively 7.5 and 7.

Looking at the data for the pilot timeframe, also visualised in figure 4.9 for October 2015 to September 2016, reveals that this pattern has continued. Additionally there was also a spike of 25 serious adverse incidents in Q1 2016. This has decreased substantially since as there were only 4 and 5 incidents in respectively Q2 and Q3 overall. There was a noticeable spike in February 2016, shortly after the clinical model pilot implementation and during relatively strong Winter demand, but the cause of this is unknown and may simply be a random event.

Of particular interest here is that no serious incidents were recorded in June and September 2016, which are the first incident-free months since October 2013. With incidents numbering 0 during these months, they become actual outliers in the overall TSAIR dataset as the stated months clearly fall below 1.5 the Inter-Quartile Range (= 1) for the past 60 months. From April 2016 onwards, the number of incidents has also consistently fallen below the overall mean of 3.55.

Overall this leads us to believe that the clinical model pilot seems to have been accompanied by a reversal in the gradual rise in serious adverse incidents recorded by WAST. The February 2016 spike in incidents is worrying on the other hand, but results since then continue to be very positive. Regardless attribution to the pilot is not directly possible on the basis of this data alone.

Figure 4.9: Total Serious Adverse Incidents Reported



4.11 Value for Money

The above impact analysis has already established that the clinical model pilot has brought about certain improvements in cost-effectiveness for ambulance service delivery. These are rather indirect however and not directly quantifiable. The logic inherent is relatively straightforward though: an ambulance in operation comes at a fixed financial cost to WAST regardless of the clinical outcomes it achieves. If fewer vehicles are allocated to individual incidents and less hours lost to handover, these ambulances are logically expected to provide more pre-hospital healthcare than ambulances that are incessantly being redispatched, thus simply circling the streets, or stuck waiting to handover patients.

In this section we reach beyond such indirect measures and seek to perform a brief analysis of direct costs associated with the respective steps of the Ambulance Patient Care Pathway. From the stakeholder consultations it became very clear that WAST, under pressure by central government austerity, was also looking to improve the cost-effectiveness of its ambulance services. Prior to the pilot's introduction, over 80% of its budget was dedicated to the latter two cost-intensive steps: *Come and See Me* and *Take Me to Hospital*.

In order to provide improved clinical outcomes, EASC took the distribution of costs into consideration when developing the 5-step pathway. In the medium-to-long term the NCCQDF and the clinical model pilot are designed to shift demand from those steps towards earlier steps by providing appropriate & timely care without necessarily dispatching or conveying with ambulances. This would free up critical resources for actual emergencies.

WAST operating expenses are listed as schedule 6 in the Resource Envelope of NCCQDF, which results in a dataset that focuses on the costs of whole-time equivalent staff (wte's) directly associated with each one of the respective steps. This dataset only ranges from April 2015 to October 2016 though, thus providing a mere 6 months of baseline and 12 months of pilot data.

The evolution of the respective direct expenditures during those 12 months is shown in table 4.5 and figure 4.10 below, which lists the number of wte's and total costs for wte's in £1,000. From this information it is immediately evident that the later steps are considerably more costly. More importantly, these figures show that wte expenditure has remained relatively stable throughout the pilot timeframe regardless of increasing demand in the form of more calls and incidents (plus a small amount of underlying cost/wage inflation in the economy). There has been a 2.65% decrease in expenditure when comparing September 2016 to YTD. This reduction in overall costs might seem low, but represents a substantial achievement when taking into consideration the practical difficulties of implementing cost-saving measures throughout the public services while ensuring the same level of service is provided at increasing demand. In turn this implies that the same amount of resources have been reorganised[41] in such a manner that they are able to cope with a higher volume of medical emergencies, from which it can be inferred that the clinical model pilot has most likely had some positive effect on cost-effectiveness.

This decrease in direct expenditure also corresponds with the intended direction of travel when taking into consideration the relative distribution of costs along different steps. Whereas expenditure for Step 1 and Steps 2 & 3 has increased by respectively 30.6% and 11.6% during the pilot timeframe, it has decreased by 5.8% for the resource-intensive Steps

[41] It is also possible that the source of expenditure may have changed – for example, through reduced use of costlier outsourced services – although the data provided does not record this.

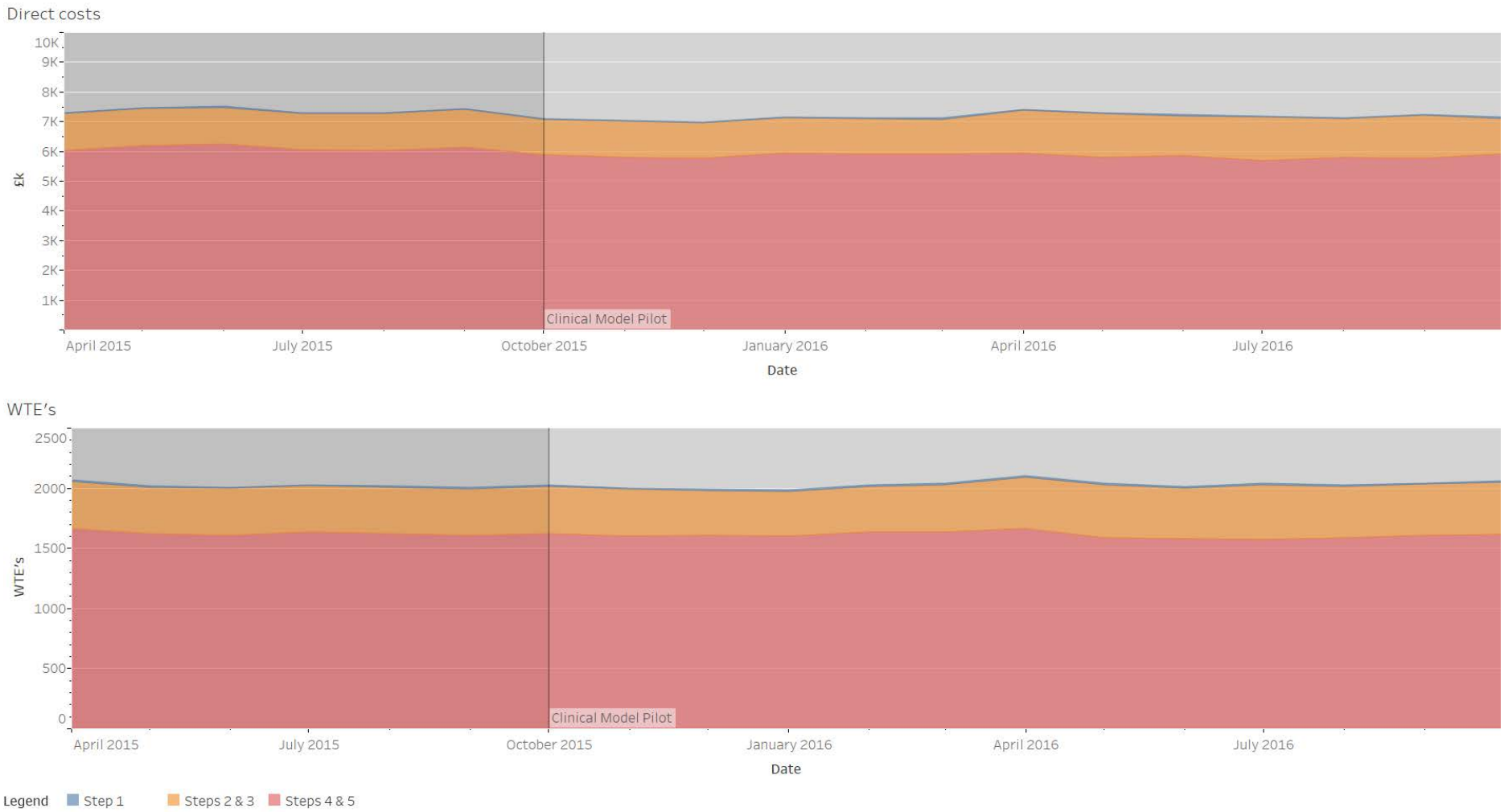
4 & 5.

Overall it is plausible that the clinical model pilot has had some impact on overall WAST expenditures and their relative distribution within the different step groupings, as intended during its design. This impact can however not be solely attributed to the clinical model pilot, as the maturing commissioning arrangement and 5-step pathway must also have had some influence on changes in expenditure.

Table 4:5: Expenditure by month and Step (£k)

Month	Step 1		Steps 2 & 3		Steps 4 & 5	
	WTE's	£k	WTE's	£k	WTE's	£k
Apr-15	9.93	32	394.41	1233	1659.93	6025
May-15	10.09	33	387.01	1245	1620.23	6192
Jun-15	11.12	38	389.9	1212	1605.06	6253
Jul-15	11.12	35	379.41	1228	1635.77	6033
Aug-15	10.36	44	385.17	1230	1621.42	6024
Sep-15	12.59	36	384.48	1272	1607.57	6128
Oct-15	11.12	38	388.29	1180	1623.13	5873
Nov-15	11.12	33	388.23	1195	1600.45	5798
Dec-15	11.12	31	376.63	1181	1603.05	5760
Jan-16	10.87	31	371.83	1188	1597.22	5931
Feb-16	11.26	37	380.89	1204	1631.13	5890
Mar-16	12.36	61	389.78	1168	1636.31	5892
Apr-16	12.36	40	425.74	1453	1664.09	5920
May-16	12.36	35	437.47	1470	1587.38	5777
Jun-16	11.7	47	420.8	1327	1577.11	5844
Jul-16	11.6	39	458.67	1462	1569.41	5672
Aug-16	11.6	37	431.66	1292	1582.13	5798
Sep-16	11.6	47	426.56	1420	1604.26	5773

Figure 4.10: Evolution of direct costs & wte's by Step



4.12 Conclusions

This chapter built on the AQIs and a bespoke data set provided by the NHS Wales Informatics unit to provide some analysis of the clinical model pilot's impact on key indicators of ambulance service performance. The variables chosen for this observational trend study are detailed above in table 4.1, and have been chosen due to their significance in regards to clinical outcomes, patient experience and cost-effectiveness. The overall limitations of this methodology and monitoring techniques implemented alongside the clinical model pilot in October 2015 are described in further detail in Appendix I.

The results discussed above show that **the clinical model pilot appears to have had a somewhat positive impact on the performance of the Welsh Ambulance Services Trust**. Simultaneously this analysis also confirmed that there is a consistent increase in demand for emergency medical services in Wales, with calls and incidents both increasing at a substantial rate but the former slowly outpacing the latter.

Even though changes in performance cannot be directly attributed to the clinical model pilot because of the constrained methodology, the following dynamics appear positive:

- response-time reliability for top-categorised emergencies has increased substantially;
- re-contacting rates have not increased regardless of substantial reorganisation
- appropriate care bundles are being provided for key ailments;
- fewer vehicles are being allocated per incident for all categories;
- the number of serious adverse incidents appears to be decreasing;
- increasing demand is most likely being effectively funneled through alternative methods of care;
- direct costs are being redistributed to earlier steps in the 5-step pathway;
- expenditure has declined slightly regardless of increasing demand.

There are however continued issues with lost hours to handover and timely & appropriate care for less serious emergencies, which might lead to some concern and could require further adjustments to be made to the clinical model pilot in future years. The impact on staff perceptions can also not be ascertained because the AQIs contain no information regarding this. All of these factors are however discussed in greater detail in subsequent chapters.

5 QUALITATIVE FINDINGS

5.1 Introduction

This section of the report sets out the findings of the qualitative research undertaken at the end of the first year of evaluation. It is designed to give an assessment of how the new clinical model has worked in practice, based on over 20 interviews with members of staff (in addition to the consultations undertaken at the planning stage of this evaluation). It provides context for understanding and interpreting the findings of the other stages of the evaluation, and also contributes useful insights into what has worked well, what hasn't, and where further improvements could be made in future.

The aim of this component of the work is to build up a qualitative picture of how the new clinical model has affected those tasked with its implementation, how they have adapted their behaviours and work practices, their levels of satisfaction with the new model and whether it is viewed as an improvement on the old model (in terms of perceived quality of outcomes, time pressure, efficient use of resources etc.) both in the ambulance service and the wider health care system. The analysis presented here is pragmatic, in that the focus would be identification of practical issues such as challenges, barriers, and successes, and how future improvements to the ambulance service model might be undertaken.

The chapter is based on assertions and recollections made by the interviewees. Where possible we have cross-referenced these with the available data, but in other cases it is possible that inaccuracies may be present due to the verbatim inclusion of stakeholder responses. In many cases, as stakeholders with a wide range of specialisms were interviewed, responses presented below are the opinion of a single interviewee; this is not wholly satisfactory for evaluation purposes but is an inevitable side-effect of interviewing a range of subject specialists with specific roles. Where views are shared by multiple stakeholders this is made clear in the text.

The consultees included members of EASC, operational and executive staff at WAST and at individual Health Boards, and the clinical modernisation leads responsible for each of the five steps of the care model. The interviews were conducted using a structured discussion guide based upon the logic model, comprising the following elements:

- Overview - broad successes and any failures of implementation of the new model;
- The revised call assessment procedure;
- Improvements in on-scene decision-making;
- Outputs: early findings from the AQIs and how they are used;
- Emerging evidence on improved care outcomes, patient satisfaction, experience;
- Resourcing (staff + vehicles) and staff satisfaction;
- The role of the Collaborative Commissioning Framework, including the impacts of the new clinical model on the five step care model
- The fit with the wider healthcare system;
- Lessons learned from year 1, avenues for enquiry for the evaluation to discover areas of best practice.

The remainder of this section covers the findings of the qualitative research point by point following the structure of the discussion guides as set out above.

5.2 Overview - broad successes and any failures of implementation of the new model

As reviewed against its original objectives by the consultees, the new clinical model is judged universally to have been a success – a "resounding success" in some quarters. Specifically, the removal of time-based targets apart from the 8-minute target for the new RED classification has resulted in an improved speed of response for these most time-critical cases, and the new response matrix and call assessment procedure have resulted in a high percentage of "most appropriate" responses being delivered, reduced multiple dispatches of vehicles, and reduced the number of vehicles being stood down and returned to base after dispatch on address, which has reduced the demand on the service. This data is monitored internally and is borne out by the AQIs. The reduction in demand has had the effect of making the system more resilient

Elsewhere in the UK similar changes are being implemented and evaluated indicating a widespread recognition and agreement that the response time target based operating model is not delivering a clinically focussed and efficient service.

Qualitatively, those consultees with knowledge and/or responsibility for resourcing and performance reported that if the new model had not been implemented, the system would have been under extreme pressure; performance would have continued to degrade and the increased demand over winter would have been very difficult to deal with, presenting real clinical risks for patients.

The clinically focussed nature of the new system is designed to have clear benefits for patients but it has also had wider reaching benefits for WAST in that it has changed the nature of the conversations that can be had with other services. Before, the targets, information, and conversation all revolved around the 8 minute targets. Now, the impetus and information are available to discuss alternative resources, dispositions and pathways with other services to improve patient outcomes and reduce demand on the most highly-stressed parts of the Welsh healthcare system. There was a view both from WAST and supported by other stakeholders that the process which started with the McLelland review, and which was continued by EASC, that supported the development and implementation of the new clinical model has provided an environment for collaborative working. WAST is now an active participant rather than a passive receiver in the wider system planning and development process.

While effective and efficient use of WAST resources appears to have been made in getting to the current level of performance on the RED calls, these only account for ~5% of all calls and the impacts of the focus on Amber calls are less well understood. The interviewees have provided a very clear message that delays at Amber are being caused by the focus on RED and that there are subsequent impacts on clinical outcomes. The full nature of any difficulties within Amber are not fully understood yet as most of the clinical information now being collected is new. There is work to be done to more fully understand what is happening with AQIs at the Amber level, and to be assured about what part (if any) time is playing in those calls. The view from frontline operational staff is that the Amber category is too large and not sufficiently discriminatory as it contains conditions and problems with a wide range of clinical acuity. Overall the general impression is that the new model is sound, and at least as safe as the prior model, and that any work within Amber needs to focus on specific serious conditions, higher prioritisation of acute problems or a more general split of priority between Amber 1 and Amber 2.

5.3 The revised call assessment procedure

Under the new call assessment procedure, Emergency Medical Dispatchers are given additional time to triage calls that are not immediately identified as being potentially life-threatening, so that they can accurately identify the nature of their condition, and either dispatch the correct type of ambulance resource or pass the call to a clinician.

The call assessment procedure has resulted in a significant reduction in the number of vehicles allocated per incident. AQI 14 shows that, of those incidents which result in resource dispatch, and excluding those for which a multiple vehicle dispatch is appropriate, the proportion that were allocated a single vehicle rose from under 50% in the previous system to consistently over 50% using the 5-step pathway, and rising to consistently over 60% in 2016. While the reduction in the observable statistics (vehicles per incident) does not appear very large in percentages terms, the cumulative effect on allocations over time is substantial and contributes to improving the efficiency of the service.

The reduction in the number of vehicles allocated is an indication that the most appropriate allocation is being sent more often and that "gaming" by sending multiple responses to stop the clock is being reduced. This is despite the limitations imposed by the current CAD, and the current composition of the fleet, which is designed for the old response model and the resources which accompanied it (i.e. with speed of response paramount and a fleet including many Rapid Response Vehicles). The potential of the new call response model has not yet been maximised.

The impact which the call assessment procedure can have on ensuring that the most appropriate vehicle is sent to incidents is therefore an area which will be affected by the ongoing ORH Demand and Capacity Review. This will use the call information gathered over the first year of the new clinical response model to design a fleet and staff/skill mix which will be suited to the requirements of the new model and allow the most appropriate response to dispatched even more frequently.

Going forward, there may be room to consider the exact timings that are measured under the new clinical response model – specifically, whether the time is recorded from the moment that the call is received or from allocation. From the point of view of patient experience, the full time of the call is important. In terms of planning ambulance responses efficiently, the question may be as to whether a more accurate measure may be the time from call allocation.

5.4 Improving on scene conveyance decisions

One objective of the new clinical response model is to try and increase the number of calls where patients can be appropriately and safely treated and, if needed, referred to other services and then left at home. This has the potential to both reduce unnecessary attendances to hospital (and reduce the queue of ambulances outside) and, importantly, provides a more appropriate and clinically responsive service for patients. In part this is achieved by the changes made to the call assessment process providing more scope to try and better match the clinicians who have the skills to make conveyance decisions to calls that might most benefit. The improvements made in allocation efficiency and a higher proportion of calls receiving the right response first time suggest this matching process is improving although there is as yet no demonstrable increase in the see and treat rate. There are a number of factors which could explain this.

Firstly, although the absolute number of cases resolved by see and treat may be increasing, the change may not yet be large enough to detect a measurable change in rate – particularly in an environment of rising demand.

Secondly, whilst the right vehicle may be being sent it may not have the right clinician. For some conditions paramedics can use the paramedic pathfinder tool to help with their conveyance decisions. However for other, more complex problems the enhanced skills of an advanced practitioner will be needed to provide safe decision making. At present advanced paramedic practitioners comprise a relatively small proportion of the WAST workforce. So, there will be a group of calls which are most likely suitable for see and treat but which, at the moment, there is insufficient capacity in terms of the right type of clinician to service this need. Resolving this is part of the ongoing development plans, for example by creating "community paramedic" roles which may be better targeted to urgent problems in localities and, on a bigger scale, within the ongoing ORH

Demand and Capacity Review which will identify the resource and staff / skills mix needed to optimise the delivery of the three different hear, see and convey management approaches.

Thirdly, and importantly, successful see and treat is dependent not just on changes within WAST but also on the development of integrated care pathways with suitable alternative services. Without these ambulance clinicians cannot make safe decisions and if they cannot confidently transfer care where needed to other agencies they will default to hospital conveyance as the only safe option even when it is not the "right" option. The ability to share clinical information between different parts of NHS Wales so that, for example, ambulance clinicians were able to access GP records, and care plans (such as those applied in nursing homes) would also support on-scene decisions.

Both WAST and external partners understand and have identified the scope for better clinical care at scene and within the community but the new clinical model alone cannot deliver substantive changes in see and treat rates. Fulfilment of this potential will be dependent on both internal developments at WAST as they better align the resource and skill profiles to the principles of the clinical operational model and external partnerships and developments of care pathways and clinical support outside hospital which is more challenging.

5.5 Outputs: early findings from the AQIs and how they are used

The AQIs are undergoing continuous development as part of the Collaborative Commissioning Framework. EASC required a suite of indicators which would give them a broad understanding of all aspects of emergency ambulance services, and therefore support them in decision-making by making them better informed as a commissioning group. They are designed to provide the information required to take action – they are not just data points, but rather indicators of performance measures that add value. The AQIs are widely reported to WAST staff at all levels, and the members of the EASC. The AQIs themselves are supplemented by more timely reports on data to allow performance to be tracked – for example, a daily report is produced that shows, by LHB, key indicators such as call volumes by category, category RED performance against the 8 minute response time target, and hospital handover delays for that day and a cumulative total for the month.

The early results from the available AQIs are showing that reducing the number of calls that are coded as requiring the fastest possible responses (the RED category is now around 5% of total calls) and dealing with these as a priority, has resulted in these calls being managed better and the time target being hit more often. The next step however will be to monitor outcomes at the AMBER call level, which accounts for 80% of all calls resulting in a response, and includes patients with very serious conditions (if not immediately life-threatening).

Improvements are reported as necessary for Hear and Treat and Card 35 (conveyance on behalf of other healthcare professionals) indicators. The clinical desk for dealing with calls over the phone has expanded significantly but the full potential impacts of this are not yet being realised. Calls that potentially could be managed by H&T cannot be queued to wait for a clinician assessment but increasing the number of clinicians in the clinical hub will allow more of these calls to be managed by this process. Nevertheless, the Hear and Treat rate has increased since the beginning of the pilot, which has resulted in lower demand for allocation of vehicles and thus greater efficiency in the system (that is, advice from a nurse or a paramedic completes the incident satisfactorily without the need for a face-to-face assessment and possible conveyance). It is perceived that this improvement to service is in its early days and could be improved. As more time is available under the new clinical response model to deal with Card 35 calls, it will be possible to improve the appropriateness of response to these; however, this requires cooperation with Health Boards on issues like access to records, "batching" of Card 35 calls, and the ability to refer to community based services.

The introduction of the Digipen to record clinical information on the scene, which occurred at the same time as the beginning of the clinical model pilot, has improved the ability of team leaders to use the more detailed information in clinical appraisals with staff. There is only one year of information on the clinical indicators and outcomes available but that is a resource that WAST is looking to utilise.

The available clinical indicators record such things as the use of appropriate care bundles for patients with certain conditions (e.g. cardiac arrest, STEMI, stroke, older people with suspected hip/femur fracture). This is an indicator of the provision of appropriate care during the ambulance phase of the patient pathway. The information available does not record the eventual clinical outcomes if patients are conveyed to hospital for further treatment, as patients are recorded on two separate IT systems by WAST and by the Health Boards, and these systems do not share a unique reference number which would allow each patient to be identified. As a result, it is only really possible to look at the contribution of ambulance response to clinical outcomes in the most critical patients, those where the immediate response is most crucial.

WAST is currently carrying out work with WAG, the commissioning team and NHS Wales to link these datasets so that the complete map of the patient journey can be traced, through the five steps of the ambulance care model and the subsequently the care provided in hospital. This would provide a much clearer picture of true patient outcomes than the current ambulance-only data. It was believed by respondents that the first results from this data linking operation could be seen within the next three months.

The emphasis on clinical care as measured by the AQIs has improved the ability of senior management, the executive team, and the WAST board to focus on areas for development, and culturally it has embedded the perception of WAST as a clinical, quality-driven organisation, rather than a transport organisation, which impacts upon the organisation's sense of purpose and on staff morale. The AQIs have been very useful in terms of measuring some of the fundamental elements of the service, and have also increased the level of information available at earlier steps of the ambulance care pathway. While additional information could be collected on additional elements of service – including patient satisfaction and ultimate care outcomes, as discussed below – there is agreement at the commissioning level that in the first year of the pilot the focus on measuring the "mission critical" elements of service, and the initial steps taken to improve the service based on these indicators, has been appropriate.

5.6 Emerging evidence on improved care outcomes, patient satisfaction, experience

The available data clearly demonstrates a much better performance on RED calls. The absolute number of calls in the new highest category (RED) is smaller than the old total Red (Red 1 + Red 2), but the comparison between the old Red 1 and the new RED (which are broadly equivalent, with some differences as discussed earlier in this report) shows that there has been a clear improvement in the percentage of responses that arrive within eight minutes. The RED calls are those where patients' lives are at immediate risk and clinical intervention needs to arrive as soon as possible.

The statistics for the STEMI care bundle (an Amber condition) demonstrates that not only is the time response improving, the use of the appropriate care bundle appears to have undergone a step improvement at the point where the new model was introduced.

The reduction of the number of calls classed as needing attendance within 8 minutes means that the system is not "snowed under with large numbers of reds" any more, and resources can be used in a more intelligent way. This includes improved equity of the quality of the ambulance service across the regions of Wales. There had previously been a problem in equity of service provision across rural and urban areas, but the latest information appears to show that this is reducing. This is a particularly positive result as Wales is a large area with great variation in population density, and a

rational (though inequitable) response to a request to improve time responses to Red calls would be to focus on urban areas, to the detriment of sparsely-populated rural areas such as Powys, Gwynedd, and the counties of South-West Wales. However the AQIs demonstrate that this has not been the case.

The Amber category (Amber 1 + Amber 2) on the other hand has suffered slightly in comparison to Red. The category is broad, and separating Amber 1 and 2 with a differential priority of response (or even recoding some cases to Red) may improve the speed of responses for the most seriously ill patients in Amber 1. When available resources are dedicated to Red calls at times of highest demand, waiting times for Amber can increase – the AQIs show that Amber waiting time are typically under 15 minutes at the median and under 20 minutes at the 65th percentile, but at the 95th percentile (one in 20 patients) waiting times are around an hour. In interviews with staff there was a very real concern that the amber category is not sufficiently discriminating in terms of clinical acuity and that some very sick patients are waiting too long for a response.

Patient satisfaction over the year of the pilot is reported as positive. The consultees reported a reduction in the total number of complaints. Complaints to the ambulance service from the public generally focus on waiting times – there have been very few complaints around what actions the ambulance crew actually took on arrival. For RED calls in particular, the key driver of patient outcome is survival – a few minutes' delay is not likely to register with the patient if effective treatment did arrive (and the AQIs show that significant delays at RED level are extremely rare as they take priority over all other calls). The most difficult areas for WAST in terms of complaint generation will therefore be patients below the RED category whose calls have been delayed at a period of high service pressure. Those tend to be people who are not clinically at great risk, frequently elderly people with "non-injury falls". WAST staff have expressed a view that in some instances waits for these calls that get pushed further and further back in the queue as resources are diverted to Red and amber calls is excessive and potentially harmful – an elderly faller lying on the floor for several hours will begin to develop additional problems that would be prevented by a more timely response. In response to that, WAST has been investigating different ways of managing non-injury fallers. In Cardiff, WAST are now working with community responders and the council so that there are extra resources available for non-injury fallers. It is anticipated that this will improve patient experience considerably for these cases.

There are many aspects of staff and patient experience that have not been measured in the first year of the pilot or as part of this evaluation. These include the ease of transition through the 5 Step APCP and the explanation of patient options during in (and prior to) the 999 call, as well as interactions with ambulance staff on scene. If patient experience is to be taken into account in the further development of the model, along with staff experience, there is a need to integrate patient views into decision making systematically and routinely to inform process and practice. This is an acknowledged weakness of the Clinical Response Model at present. However, NHS Wales have a Memorandum of Understanding with Picker Institute Europe (PIE) to develop robust and effective measures of patient experience to support excellence in the delivery of commissioning and providing health and social care, in line with the CAREMORE® framework. In addition, PIE have representation on the NHS Wales Quality Assurance and Improvement Panel. An initial response to the challenge of incorporating patient experience would be to develop a survey of a subset of patients at the Amber band, as this is the group that has changed most with the new model: it is a larger category that has been superseded in priority by the most urgent Red calls and is receiving a different level of service than before.

There was a risk ahead of the introduction of the pilot of unfavourable press coverage driven by the fact that fewer calls would be given the highest priority and that the 8-minute time target was being abandoned below the Red category. This was dealt with during the model development by briefing press and politicians about the model, stressing the message that time is only critical for life-

threatening cases, and in all others what matters is dispatching the right people with the right type of vehicle. The old model was in danger of "hitting the targets but missing the point". The media environment for the pilot launch and the first year has been favourable, and the fact that Red response times did indeed improve and targets are regularly hit has reinforced the positive messages (and improved staff morale – see 5.7 below on staff satisfaction). EASC and WAST report generally good relationships with health correspondents and work with the media is ongoing. There is however an issue that the target that is reported on a monthly basis is still the 8 minute response time for RED – it would be useful if the other published indicators were somehow to become more widely circulated, to increase the visibility of the ambulance service as a clinical service among the wider public. There is more information in the public domain about the ambulance service across the whole pathway than there has ever been before, this carries with it the danger of misinterpretation. This is true to an extent of the political examination of the indicator data, which can also still be focused on the time targets. It has been mitigated to an extent by inclusion of the AQI narrative which is available alongside the AQI reports over the web.

5.7 Resourcing (staff + vehicles) and staff satisfaction

There is a resourcing issue associated with the new clinical response model in that the system was developed at speed and went live independently of any effort to develop a vehicle fleet that would maximise the available capacity. A modelling exercise to estimate the vehicle demand could have been carried out given more time, but instead the new model went ahead and a demand and capacity review is under way using live data from the new system.

There is therefore a mismatch between the resources that were commissioned and used to deliver the old model, which focused on response time only, and the new model. Certainly in some areas the fleet focuses on Rapid Response Vehicles. This is a justifiable response to an eight minute response target, but it does not necessarily mean that it was the right clinical response, or one which brings the right crew to an emergency call. The ORH demand and capacity review is ongoing, and over the next few years it is anticipated that WAST will adjust its fleet expenditure, and is very likely to invest in more emergency ambulances.

As mentioned above, the CAD systems used in Wales' three clinical contact centres are relatively old, and this is causing problems. They are no longer fully-supported by their designers, and in need of upgrading so that the ideal resource can be identified more quickly, the clinical helpdesk can be fully integrated with the telephone system, and additional data on timings and the nature of resources despatched can be collected. A further problem is that the three CCCs use CADs that are not fully interoperable, making transferring calls between regions problematic. A business case for a new CAD has been submitted which will enable further efficiency gains and help the staff and vehicle loadout to be used to its fullest potential.

According to the consultees, staff satisfaction seems to be much better in general than was observed under the previous model. There is a reduced number of shift overruns, more staff are getting meal breaks on time, and staff seem to be getting greater job satisfaction according to the views of the consultees. Staff discussions under the old model revealed that having achievement time targets recorded as "successes" even when patients died at the scene was bad for morale. The new model encourages paramedics to work in Wales, to feel more part of the unscheduled care system, and use their skills more effectively – as a clinical service, not a transport service.

The Welsh ambulance service used to attract negative stories in the media when monthly results were published and targets were missed, and a reduction in external negative feedback has given the staff greater satisfaction, and a different perspective. This perception of staff satisfaction was reflected in the original staff survey conducted during model development, and is something that WAST clearly understood was likely to be of great benefit to staff. The greatest increase in

satisfaction is in the Clinical Control Centres – there is less pressure to allocate call within seconds, and the staff now feel much more supported by the clinical desk.

5.8 The role of the Collaborative Commissioning Framework, including the impacts of the new clinical model on the five step care model

5.8.1 The NCCQDF

The National Collaborative Commissioning: Quality and Delivery Framework Agreement for Emergency Ambulance Services sets out the key areas of the service delivery between NHS Wales Health Boards and WAST, detailing "what is required" (commissioning), how assurance is given for "what is required" (quality), and how "what is required" will be achieved (delivery).

The commissioning arrangement carries within it the paradox that WAST is accountable to a committee formed by all Health Board chief executives, who have a direct impact on WAST's ability to carry out its duties through their unscheduled care roles (such as the timeliness of transfer of patients from ambulances to emergency departments).

The collaborative nature of the framework has enabled WAST to make improvements to the system where they have the agency to do so. The new clinical response model is a case in point – it was not developed in response to a direct request from the commissioning group, but rather emerged as an internal response to the pressures of service demand. The development of the model was a collaborative enterprise, facilitated by Welsh Government and involving WAST, Health Boards, Commissioners and professional bodies. Information from English ambulance services carrying out their own dispatch on disposition pilots was also used.

The Framework Agreement sets out a five-step process for supporting the delivery of emergency ambulance services within NHS Wales. The five steps are:

- Step 1: Help Me Choose
- Step 2: Answer My Call
- Step 3: Come To See Me
- Step 4: Give Me Treatment
- Step 5: Take Me To Hospital.

The qualitative assessment of the new clinical response model's impacts on each step are set out below. All Clinical Modernisation Leads for Steps were consulted as part of this evaluation and the following sections are largely based on their feedback (although information from other consultees has been included where relevant). Steps 4 and 5 are grouped together as they are the responsibility of a single Clinical Modernisation Lead.

5.8.2 Step 1: Help Me Choose

This step focuses on public education regarding the services provided by WAST and how/when to access them appropriately. This step will include the development of appropriate linkages between WAST and the future 111 service, building on the success of NHSDW and its website. Considerable work has been undertaken to identify and reduce demand from frequent callers.

The new model has helped focus what work needs to take place at Step 1 for improved effectiveness and efficiency. The aim is to reduce the number of inappropriate 999 calls made through public education, but the first year of the pilot has revealed that the 999 service is being used to cover for problems in the wider health and care services, and addressing these can also reduce demand.

One source of inappropriate 999 calls is the group of "frequent callers" who are regularly dialling 999 with non-urgent health issues. The new clinical response model, with its focus on accurate identification of the caller's problem and improved data collection, has helped the service to look at alternative pathways for treatment and care. This is part of a wider public health issue on how patients are cared for in the community. Often, a frequent 999 caller has an underlying need which is not being met elsewhere, which could be a failure of another service provider.

The majority of the frequent callers that have been identified have a care plan, which could include clinical support officers, their GP, the police, social services, or third sector partners, depending on the patient's specific needs (which might include "frequent fallers" or people with mental health care needs). The clinical desk now has access to that care plan and can signpost the caller to appropriate support rather than dispatching an ambulance and potentially conveying them to an emergency department. The WAST Step 1 team are meeting with providers and working in partnership with them to ensure that they are aware of the demands on the 999 service and that their health and care needs are being met in a more efficient and effective way. This "first phase" of Step 1 demand reduction work (relative to the status quo ante) is viewed as a great success by the staff consulted, including the Step 1 Clinical Modernisation Lead.

The next phase of potential improvements at Step 1 will be to focus on "frequent localities". Examples of this could include nursing homes that are using 999 services inappropriately because they lack the facilities and skills to deal with patients with complex needs, deal with non-injury falls, or require assistance with lifting of patients. To assist with winter planning, WAST clinical support officers are starting to identify the frequent calls that emanate from nursing home locations and proactively assessing whether staff need training, lifting equipment, hoists etc.

These two phases of work have been enabled by the clinical response model and the information it provides on demand and the most appropriate response to calls. There is also an issue of wider public knowledge and education on health conditions and available services. Resources on the web, such as descriptions of common conditions and interactive symptom checkers, have been in place since well before the implementation of the new clinical response model. One of the new AQIs is to monitor the NHS Direct Wales web site and phone lines to assess what types of conditions patients are investigating and what services they are using. That gives an indication that the right information is available for patients to make decisions, which can have an indirect impact upon 999 call demand in that a distressed patient who is unable to find advice may dial 999.

The model has flagged up a particular issue in the Amber category (also Green) with elderly fallers, some of whom are suffering lengthy delays in ambulance attendance if there are sufficient active Red category calls to divert resources away from them. A number of "patient stories" have been researched which express the patient experience as a result of a long delay, which assist in the presentation of these issues to trust boards, executives, and third sector providers. This assists in the development and awareness-raising of new pathways to care, and spread the key message that not all elderly fallers need a 999 response, but the ambulance service does need to be able to refer to alternative services and be confident that these will be followed up.

Another area of current investigation, based on feedback from users and staff, and a survey of user experience, is a mental health care pathway for WAST. Alternative pathways have already been developed in some Health Board areas that avoid hospital admission altogether. For example, in Cardiff and Vale mental health experts are available for consultation or booking a next-day appointment, and the result has been a decrease in the percentage of known mental health referrals that have been conveyed to hospital. This removes the need to expose these patients to stressful ambulance and emergency department environments which may exacerbate their conditions and may not be well-equipped to deal with them in any case, and additional education and training work with staff is under way to assist in this process.

The information from the CRM has flagged up some inconsistencies in local service provision. Referring to the mental health example presented above, some Health Board areas have a mental distress crisis team available 24/7 but others do not. WAST is working with these to understand the consequences – if this resource is not in place, patients will be conveyed to Accident and Emergency which will not be the best option for them.

In terms of wider education among the general public, a survey has been conducted on the reasons for calling 999 as opposed to other services. The results in the first phase of surveying have showed that the majority of calls were indeed appropriate for 999, and 25% of those patients surveyed had accessed another service first (e.g. NHS Direct Wales, a GP, GP Out Of Hours). These are encouraging results in general. The second phase of the research is to run some engagement events to see if there is a difference in knowledge and appropriateness of use of 999 in vulnerable communities and communities in poverty.

The Department of Health and Social Services in Wales has a patient involvement and community engagement team which works nationally with local communities to look at local needs. Particular emphasis has been focused on education for children, to ensure that key messages are carried by them into adulthood. Teams have visited over 100 schools in Wales to provide education and training for school age children on issues such as assisting someone who is choking, the recovery position, identifying vital signs and critical conditions requiring a 999 call, CPR and the use of a defibrillator.

In general, the ambulance service can make a difference for patients “in the here and now” but if patients do not change the way that they behave and use the service, there are longer-term consequences. A new NHS Wales wide initiative, “Make Every Contact Count” is training front-line staff to give public health messages at every opportunity. An example for a paramedic might be to discuss assistance in stopping smoking with a patient presenting an exacerbated chronic chest condition.

5.8.3 Step 2: Answer My Call

This step focuses on the response to 999 and Health Care Professional (HCP) calls by WAST‟s Clinical Contact Centres (CCCs). This step incorporates the provision of adequate time to assess a call and the use of the Medical Priority Dispatch System (MPDS) to identify the priority of the call before offering / sending the most appropriate response.

The perspective from the Clinical Contact Centre management staff consulted is that the new system is clearly working – the call assessment procedure is working as intended and identifying the most appropriate response, there are no patient safety issues, and the data on the number of allocations per incident has shown an improvement as expected, which reduces pressure on the whole system. The Hear and Treat rate has also risen gradually throughout the pilot.

The improvements in performance, while there has been a clear step change in efficiency, have perhaps been less than if the system was working to its full potential. The IT systems used in the CCCs are outdated, which means that they are slower than they could be and there are certain things that they cannot do which equivalent systems in other locations can – for example, the Hear and Treat rate could be improved if the call triaging system were more sophisticated and the system could pass calls to an external clinician queue. The number of clinicians available for telephone support could also be increased. At present potential hear and treat calls cannot be queued so clinicians are looking for potentially suitable calls in the call stack. These calls are re-triaged using the Manchester Triage System (MTS) which is a relatively simple tool and is used mainly to identify calls that can be downgraded rather than provide enhanced clinical assessment with self care advice or referral to other services. Further improvements may also be possible if the time

allocation for call assessment were increased from the current 120 seconds to 240 seconds, and this is supported by the findings in England where the Ambulance Response Programme has identified 240 seconds as the optimum time to allow triage completion and vehicle allocation without compromising patient safety. Allocative efficiency may also be further improved when the new IT system allows the call queue to be hidden from dispatchers. CCC managers recognise that dispatchers can still alert and mobilise vehicles before a disposition (call category allocation) is reached and one frontline paramedic described occasions when they can be mobilised and start moving only for the call to be subsequently downgraded once triage is complete. Nevertheless, there was a common view from both responses to the staff survey and from 5 frontline clinicians that stand downs and up and downgrading calls occurs far less frequently with the new model.

There are some delays on Amber and Green calls (not Red), particularly in the "tail" of the distribution of response times (the patients waiting longest). These are not felt to be related to the new model, although the AQI evidence is not available to demonstrate this as the tail data by category is new to the CRM (and the classifications were not equivalent pre-CRM in any case). Even if the system were working perfectly, the growing and ageing population is acting to increase the level of demand and the pressure on the system.

The major external confounding factor affecting the efficiency of the system is the level of hospital handover delays, which reduces the number of available vehicles for allocation. The number of hours, particularly over the winter, was concerning, and the absolute number of vehicles being held outside hospitals can be a significant proportion of the available resources ("a third of the fleet" not being uncommon). Resolving this problem alone would support further WAST performance improvement within existing resources.

In summary, the clinical model has made a definite improvement on efficiency of allocation, which was one of the biggest issues at Step 2 when the pilot went live. It has also provided more responsive clinical care thanks to the focus on the most appropriate response to each call. The demand and capacity review has been designed to investigate another major issue (the staff/fleet mix), but the number of vehicles waiting at hospital is at least as significant an issue as these – and is external to WAST. Upcoming IT upgrades will improve the efficiency of the system and allow it to maximise its capability.

5.8.4 Step 3: Come to See Me

This step focuses on how WAST makes decisions about what resources to dispatch to assessed/prioritised calls. Broadly, three response options will be available:

- Emergency Medical Services (EMS – Emergency Ambulances [EAs] and Rapid Response Vehicles [RRVs]) will be allocated to RED calls, and Amber calls ('See & Treat')
- Clinical Telephone Assessment (CTA – "hear & treat") will be offered to all other low acuity GREEN calls
- A dedicated patient transport service will be provided by Urgent Care Service (UCS) for low acuity GREEN patients who are assessed by HCPs as requiring admission to hospital.

The new clinical model is central to Step 3. Its impact comes from the revised call assessment procedure, MPDS coding of calls, and the Patient-Centred Response Matrix (PCRM) which maps each MPDS code on to a single most appropriate response (in terms of the ambulance asset) for each code. The decision on the most appropriate response arose from a group of clinicians reviewing the codes (WAST's Clinical Prioritisation Advisory Software Group, or CPAS), using guidance provided with the MPDS system along with data such as the frequency of incidents, the previous conveyance rates under the old model, and the number of serious adverse incidents for each code. This procedure was clinically-focused and aimed at improving clinical outcomes.

The review of the appropriateness of the Step 3 decisions made under the new model is it its early days, but there is a "good overarching feeling" around the outputs from the response matrix. The AQIs have measured the ideal responses, and the percentage of cases in which they were dispatched first time, for the last six months. The outcomes of calls having secondary triage using MTS can also be used to identify MPDS codes that have been routinely downgraded and which could therefore be reassigned to another category. For the cases where an emergency ambulance is the ideal response, they were dispatched around two-thirds of the time.

The new model has provided a significant change in working for staff. The old model was "frontloaded" in that vehicles would be dispatched upon receipt of address, at the very beginning of the call. Now, the 120 seconds available to identify the most appropriate response and compare that with what is available changes the structure of the call and workload.

The principles of the MPDS software is to prioritise calls in terms of urgency and guidance the type (ALS or BLS) and speed (lights and sirens or no lights and sirens) of response. (although the software as implemented is concerned only with the clinical priority of the patients). Part of the Step 3 thinking around the new model has involved ensuring that the paramedics with the most appropriate skill sets are dispatched to the right calls, depending upon whether or not patients will require on-scene paramedic intervention as well as or instead of conveyance to hospital,. More complex cases may need advanced paramedic assessment and treatment skills to support non-conveyance but at the moment, there is quite a small cohort of advanced paramedic practitioners performing "see and treat", and attempting to target these to the right calls as part of the model is very difficult. Trying to improve the matching rate between patients and advanced practitioners is an ongoing problem. One possible way to use the new model to facilitate this has come from examining the profile of demand by day and time and attempt to match advanced paramedic shifts to those times where their skills are more in demand (which appear to be weekday evenings and weekend afternoons through to evenings).

Now that the response matrix is in place and working well, the next step will be to look at reviewing and improving the coding and responses, particularly in calls that are amenable to alternative pathways or where a rapid response is required and a community response would be suitable. This can apply at the Step 3 (Come to See Me) and Step 4 (Give Me Treatment) stage via a specialist community first responder, or at Step 5 (Take Me To Hospital) via direct entries to specialist departments. Another would be for an imminent delivery: if a 999 call could result in a local midwife being sent to the scene, followed by a vehicle for conveyance to hospital. For lower-priority codes such as non-injury falls, emergency ambulances may not be the appropriate response. The model has started to make it possible to integrate with the wider health service and make persuasive cases for partnership solutions to care provision such as referral to a falls service based on the newly-available data.

5.8.1Step 4: Give Me Treatment and Step 5: Take Me to Hospital

4. This step focuses on the development and delivery of a range of clinical care services able to offer a variety of treatment options. The selection of the most appropriate treatment will be supported by decision support tools e.g. Paramedic Pathfinder for "see & treat"; the Manchester Triage System and the Clinical Assessment System for "hear & treat"). Treatment options will include the use of Alternative Care Pathways or ACPs (set out in a Directory of Services) allowing patients to be referred to primary and community care. WAST will develop a Clinical Hub to coordinate the delivery of care to patients ("sign-posting" for clinical advice, managing referrals to alternative care pathways, and arranging non-emergency transportation i.e. managing any element of WAST's services that is not time critical or an emergency transport to ED).

5. Patients who require ongoing care and treatment will be transported to hospital or to alternative care settings (e.g. Minor Injury Unit or a primary/community care facility). The clinical acuity of the patient will dictate the level of transport. For critical care patients or patients requiring ongoing treatment, EAs will be utilised. All other patients will be transported by a combination of Urgent Care Services (UCS) and non-emergency patient transport services (NEPTS).

The model has segregated Red and Amber (1 and 2) incidents and provided information, time and impetus to start to measure clinical indicators and therefore monitor the quality impacts of the care that paramedics are able to deliver on the scene, insofar as they can measured from the ambulance service contribution to overall treatment. Care bundles are defined for certain conditions and the percentage of cases where some of these are administered are tracked in the AQIs (e.g. resuscitation following cardiac arrest, suspected stroke patients, STEMI heart attacks, older patients with suspected hip fracture, sepsis, hypoglycaemia).

Red-category calls are very well taken care of under the new model thanks to the focus on prioritisation and improving response times. The new model has been designed to provide this speed and appropriateness of response for the most critical conditions – however, these cases form a very low share (5%) of all 999 calls. The Amber 1 category contains some very serious (if not immediately life-threatening) conditions and are much more common than Red calls. This will involve use of the new response model to use staff well, identify ideal and suitable responses, and ensure that the most senior clinicians attend these calls where possible (rather than Red calls only). The emerging evidence from the use of appropriate care bundles for these conditions is positive.

A specific aim of the new clinical response model was to focus resources on the most serious, time-critical calls to improve performance against their time targets. This has been achieved, but the next step is to address the large number of Amber cases, particularly the most serious, and ensure that these are being handled efficiently. Currently, the sense is that "90% of our caseload is 10% of our training". The ongoing demand and capacity review has the potential to help WAST develop its resource mix to be able to handle the observed range of calls, which are now being documented in more detail under the new model. Management of staff numbers, skill levels, training and deployment will enable further performance gains to be realised.

A business case for a new CAD system has been approved. If implemented, this will put WAST in a stronger position to manage Amber and Green calls more effectively with an integrated digital triage system. This may require recoding, effective segregation of Amber 1 and 2 so that they are not treated at the same priority, and more effective monitoring of patients whose conditions may deteriorate rapidly and require an elevated priority response. Potentially, paramedics will arrive at scenes knowing that there is a defined pathway which will enable them to treat patients on scene or take them to a specialist resource. Even if the defined pathway is not available in a particular location or at a certain time, using the new triage system will enable WAST to gather and analyse

data and formulate requests to Health Boards along the lines of "we had 50 patients in November that did not have access to a falls pathway, what can be implemented".

Increasing the number of patients who can be managed at home and in their local community and away from acute hospitals, where this is clinically appropriate, is an objective of both WAST and the wider health service across Wales. One Health Board Chief Executive described intensive developments to keep more patients with long term conditions at home as for this to be achieved it is essential to provide safe and secure alternatives in local communities. The ambulance service can play a clear role if it is able to access and refer to these services in a timely manner. However, the interviews with a small number of WAST clinical team leaders and paramedics revealed a clear consensus that increasing see and treat is about more than just providing alternatives (although these are important). There are more fundamental changes needed to provide ambulance clinicians with the knowledge, skills and confidence needed to make these decisions safely. Alongside this the service culturally also has to be one which provides an environment that will support paramedics and other clinicians to make these decisions. As said by one interveiwee "no one ever got sacked for taking someone to hospital". There will always be clinical risk attached to a decision not to take a patient to hospital and recent research on patient safety and decision making in the ambulance service has shown that fear of blame and the risk to their jobs plays a major role in paramedic decision making (O'Hara 2015[42]). This serves to illustrate that the new operational model itself cannot achieve some of the intended benefits and that other changes are needed to support and empower staff to work in different ways.

The advanced paramedic practitioner also has a key role to play in conveyance decisions and clinical management. This is a highly skilled role but one that suffers from high turnover: the work is stressful and involves unsociable hours (in common with all frontline ambulance roles), and the skills are easily adaptable to other health service roles. As a consequence they are becoming highly sought after in other parts of the health care system, particularly primary care, where they can utilise their skills in roles that offer better pay and working conditions. Currently WAST has only a small cohort of advanced practitioners but have already seen these issues played out with highly skilled staff leaving. The ambulance service invests a considerable amount of time and money in supporting postgraduate training for this specialist role but reaps little benefit if clinicians then leave. There is not a pool of advanced practitioners to recruit from to replace leavers and so it becomes a long process to train a new cohort. The GP cluster lead interviewed saw a clear role for advanced paramedic practitioners, particularly in managing long term conditions in the community. This could be done within and ambulance service role but of course there is also a risk that clinicians will take up this type of work within primary care. The GP, and a number of WAST interviewees described a number of solutions that are being explored including joint working between different services to provide rotational posts for example, paramedics spending a portion of their time on clinical desk, on response vehicles, in primary care and in ED's; further development of clinical leadership roles and the use of a "golden handcuff" requiring advanced practioners to stay with the organisation for a specified period once training is complete..

Hospital handover delays are a source of frustration for ambulance crews who are being prevented from providing a better service. Such power as WAST has to circumvent these involves the use of alternative dispositions if required, and improved potential for "hear and treat" and "see and treat".

[42] O'Hara R, Johnson M, Siriwardina A.N, Weyman A, Turner J, Shaw D, Mortimer P, Newman C, Hirst E, Storey M, Mason S, Quinn T, Shewan J. A qualitative study of systemic influences on paramedic decision making: care transitions and patient safety. J Health Serv Res Policy 2015, Jan;20(1 Suppl):45-53. doi: 10.1177/1355819614558472.

5.8.2 The fit with the wider healthcare system

Now that the five step model set out in the Collaborative commissioning Framework is in place, it helps to break down the clinical model and its indicators into different areas. There is more work that could be done through EASC and WAG, in terms of managing some of that work with the local Health Boards by looking at how the ambulance clinical model relates to the unscheduled care pathway as a whole. Considering the system in this way demonstrates that there is a limit to what can be accomplished by WAST acting alone: there are points of interaction between the various components of the system that could be improved, such as management of 999 calls from healthcare professionals and the delays caused at handover to emergency departments if staff and/or beds are not available. A whole-system review of NHS Wales resources would result in changes to all aspects of the unscheduled care system at the same time, rather than leaving it to the individual components themselves. The Unscheduled Care programme is considering these issues. The Chief Ambulance Services Commissioner is also the director of the unscheduled care programme, highlighting that collaborative solutions are fundamental to the programme's success.

WAST seem to have provided some additional impetus for changes in the unscheduled care system with the new clinical response model and the new information that is being collected. An example of efficient joint management of 999 calls by health professionals to avoid "batching" of calls and unbalanced demand on the system would be to link information on non-urgent healthcare professional calls, ambulance availability, and the availability of beds for non-urgent patients so that the ambulance is only dispatched when the bed is available. The patient experience in such cases is that the HCP places a call on their behalf, and some time later they are taken straight to a ward for treatment, which is a more positive experience than a delay outside the hospital.

In general, there is scope for more sophisticated triage of simpler cases away from local emergency departments, including cases which did not arrive through the ambulance system.

5.9 Lessons learned from year 1, avenues for enquiry for the evaluation to discover areas of best practice

5.9.1 Areas for improvement

From the evidence that has been accumulated so far under the new model, a critical action for WAST is to ensure that the new CAD is installed as soon as possible (perhaps spring/summer of 2017 according to consultees). This will enable the service to further realise the potential of the model and deliver the efficiency gains which the new model and supporting information has revealed. Of particular importance is to ensure that those calls that could best benefit from clinical advice are routed directly through to the clinical desk.

The Ambulance Quality Indicators need to be reviewed. The impetus behind the model was that it should be clinically based rather than time performance based, and not all potential indicators are in place to review and improve performance in this regard. New indicators could be developed that enable measurement of clinical outcomes and performance across unscheduled care, not just waiting times. There are some key areas where time is indeed critical, and as delays are currently easily measurable these have formed the basis of the early indicators – e.g. STEMI, cardiac arrest, stroke. What is not currently available is a whole system measurement of performance or patient experience. To further improve patient experience would require looking at quality indicators that ambulances contribute to but are not the only parameter (which would require linkages with other health service databases, such as outcomes after conveyance to hospital). Indicators could also be developed that would apply to some alternative care pathways. However, alongside all these possibilities it does need to be borne in mind that the AQIs are new, and intended to drive

improvement within WAST; therefore it is important to utilise and improve upon the current set of measures and ensure that they are used to improve practice before expanding them further.

Another area that the new model and its data have highlighted is that some Health Boards have greater availability of alternative dispositions than conveyance to an emergency department, such as community-based pathways. Looking at the unscheduled care system as a whole, it would be of benefit to the ambulance service if these alternative pathways were to be developed in all areas as part of an integrated unscheduled care system, as the current dispositions available to paramedics are not equal across Wales. This however requires a nuanced response as in rural areas of lower demand it may not be cost-effective to provide this coverage.

5.9.2 Lessons learned from design and implementation

A strong feature of the design phase of the clinical response model was the unanimity of the clinical opinion presented to WAG, time-based targets were introducing an element of risk into the system and the system needed to change away from this model. Intuitively, removing time-based targets sounds as if it is introducing risk for individual patients who may receive a slower response, but the unified clinical opinion that was presented was that the whole system risk introduced by the targets was the key problem in Wales, and that the clinical evidence for prioritising the new RED codes identified was strong. The requirement to work to time-based targets drives up demand for vehicles (i.e. not patient demand) without clinical benefit: the mechanisms include dispatching vehicles where not clinically necessary at the expense of future callers that may have immediately life-threatening conditions, dispatch of multiple vehicles to incidents to increase the chance of hitting time targets etc. Clinical leadership, particularly at medical director level, was secured across Wales, and this level of support meant that the model could secure political approval quite rapidly. The consultees reported feedback from political decision-makers that if a unified clinical opinion can be presented, it is much easier to support that politically.

The way that this clinical risk was communicated was in terms of the solution: it was not just a complaint that "the system isn't working and we do should do something about it", it was accompanied with a well-researched plan for improvement. This was viewed as a strong argument for winning the wider support of clinicians and other staff, politicians, and patient support groups. Individuals could be sceptical about the new model but the amount of information presented made it clear that the new system was a viable alternative and was worthy of a pilot to test it in the real world. The choice of key parameters to measure to demonstrate improvement under the new Clinical Response Model was also important to inspire confidence that it was now the way to be taken forward. This approach is supported by developments in ambulance services around the UK that are implementing similar models.

In summary, the strengths of the development approach were:

- Focus on the development of the clinical message and the potential benefits
- Engagement with staff, particularly senior clinicians to support the message
- Engagement with politicians
- Engagement with the wider public

These principles can be taken forward to any future developments where an improvement to a public-facing system needed to be made.

One weakness of the way that the changes to the system were implemented was the short timescale that was available. If more time had been available, a more coherent approach would have been to change and upgrade multiple components of the system at once: the clinical response model, the CAD which powers it, the fleet, and the staff resources. However, such system-wide changes are very difficult to accomplish in practice, and some are long term objectives and so the

approach to make a single major step and then adjust the components which feed into that is defensible. The change that was made – the new model pilot – has had a demonstrable impact on patient safety and observable clinical outcomes, perhaps the greatest change that could have been accomplished by changing a single component of the wider system, and WAST is looking to make the other changes over coming months and years. In addition, because the system is now measuring clinical indicators and attempting to dispatch the most appropriate resources, there is a year's worth of real-world data which can be used in future modelling of resources – this provides a more powerful case for change than an ex-ante model without real-world data. The new data[43] means that WAST Informatics have been better able to support WAST over the last 6 months than previously.

A business case for a new CAD has been approved. If that had been in place from the commencement of the pilot, it would have helped with speed of allocation of calls, triage and transfer to clinical desk, and collection of certain indicators such as ratios of ideal dispatch by code.

Because the ambulance service is part of a wider unscheduled care system, there is a certain delay between identification of issues by WAST and a response such as a change in practice elsewhere in the system. The consultees reported that there had been "several" incidents where they felt that they had demonstrated a need for rapid change and it had taken the system longer than it should have done to respond. It was not clear to the consultees whether this is issue could be solved by altering the commissioning arrangements or by the framework of clinical leadership. Currently, there is a limit to the level of improvement that the ambulance service can make without recourse to support from the Health Boards and other organisations - to maximise its potential, the whole system would need management.

5.9.3 Hospital delays

WAST have been able to develop enhanced responses to RED calls such as the expansion of community first responders, and work with the fire department, and the consultees report that this is working well. An impact of the new clinical model and the reclassification of calls is that when a co-responder is contacted and asked to attend a RED call, there is no doubt that life is threatened and a rapid responses is required.

There is a current problem with alternative pathways for patients outside RED codes (which is around 95% of all calls) who do not necessarily need conveyance directly to an emergency department. There is not currently a directory of services including opening times, so unless these pathways are operating 24 hours a day, 7 days a week, they are not ideal for paramedic referrals as there is a risk that they will be close. If a paramedic attempts to use these pathways, and cannot access them as they are unavailable, that will waste time and the response will be not to attempt to use them in future.. It is therefore crucial to develop a directory of services showing locations, specialisms, opening times and (ideally) availability of beds and staff. This would need to be accompanied by mobile staff access to an in-vehicle computer or a tablet that would give immediate access to this information. This is an area that WAST intends to make progress on.

The biggest impact on efficiency over the past year has come from hospital handover delays. If vehicles are delayed outside hospitals this counteracts any efficiency gains and improvements in appropriateness of responses made via the clinical response model ("*it doesn't matter what code you've assigned to a call if you don't have a vehicle!").* This issue falls outside WAST's direct influence and is a matter of prioritisation for health boards. If they prioritise patient flow through

[43] This is made possible by the new Digipen technology used to capture patient data in real time, which was introduced at the same time as the new clinical response model; but the impetus and ability to collect clinical information derives from the new model.

emergency departments, that improves WAST's ability to provide ambulance cover to their population. However if they prioritise a system whereby they do not have to "flex" to respond to external demands, e.g. by putting extra nursing staff in to manage patients, or open extra capacity under pressure, then ambulance delays result. Purely from a WAST perspective, the patient at greatest risk is the one waiting for an ambulance to arrive. The hospital management team operates under Royal College of Medicine guidelines on the level of clinical risk associated with holding patients in crowded emergency departments. Currently, there is no overall system analysis which can consider the greatest risks, and frequency of risks, so as to minimise overall risk to the population.

An example of a Board that has decided to prioritise ambulance handovers is Cwm Taf, as is evident from the AQI information (and the impact analysis in this evaluation). There is a tension between retaining ambulances prior to handover and risking an overcrowded emergency department by admitting additional patients, but in Cwm Taf the clinical decision has been taken that if an ambulance arrives they will free it up for a subsequent call as soon as possible. As a Health Board, their remit is to see and treat but also prevent, and the biggest risk is judged to be to cases that are waiting to be seen by an ambulance.

In order to admit ambulance patients to hospital as safely as possible, flow through the entire hospital system is important, not simply admission. An important principle is to identify the most seriously-affected patients and get them the right diagnosis and management as soon as possible, and deal with the remaining patients as efficiently and effectively as can be done (this is analogous to the prioritisation of RED calls in the ambulance system). In Cwm Taf, senior medical staff often assist with triage decisions in A&E which reduces the likelihood of double-assessment (if patients are likely to be referred on to consultants or surgeons in any case). Access to physical space, beds, and efficiently-run diagnostic facilities is obviously important. Finally, the discharge process is an important component of flow through the system to free up space for incoming patients. Data on emergency room waiting times is monitored daily.

This initiative clearly has a significant effect on Cwm Taf's ambulance performance that is borne out by the data. It is difficult to disentangle any further improvements made by the new model from this.

If demand continues to increase, WAST will eventually need to employ more staff (and commit more resources) to meet demand. If the hospital handover delays were to be reduced to the extent that all vehicles were released from hospitals within 30 minutes, this would reduce the staff numbers required to provide the service. This tension between ambulance risk and ED risk can only be appreciated as part of a whole system, rather than as a single agency within the health service.

At the time of finalisation of this report, a set of 8 priority actions (for WAST and for Health Boards) that could be taken to minimise handover delays was being prepared by the members of EASC – this step would have been very difficult to take without that increased whole-system understanding that the 5-step APCP, new CRM, the AQIs and internal indicators have provided. The specific contribution of the new CRM to improving the ambulance system has been in the collection of new information, better prioritisation of resources, and reduction in the pressure on allocation of vehicles. The new model provides time to investigate alternative solutions for patients and measurement of associated outcomes.

5.9.4 Final points

One final area that could benefit from a whole system level examination would be value for money, which would add a new layer of complexity to the analysis of demand and risk described above. From a health economics perspective, the potential for changing the ambulance model, if everything else changed with it, could be transformative. At the moment a significant change has been made at the level of the ambulance service but there is more to do to obtain whole system change.

6 STAFF SURVEY

6.1 Introduction

An important effect of the new clinical model is the impact on ambulance service staff who deliver the service. For clinical hub staff (Emergency Medical Dispatchers who triage 999 calls, Dispatchers who allocate resources, clinicians who provide assessment and advice and managers who organise the clinical hub) the new clinical model involved changes in staff behaviour as their jobs have changed. For operational staff in the field the changes in allocation of calls to categories and reduction in the number of calls requiring an 8 minute response has also effected changes as, for example, they may be "stood down" less often and can potentially be more likely to be assigned to calls that fit their skills. As they see patients face to face, they will also have views on patient satisfaction, the appropriateness of the revised call categories and how well clinical needs are being matched to categories at the time of the call.

To establish opinions of how well the new model has worked in the "real world" and what further improvements could be made, PACEC conducted an online survey of ambulance service staff who deliver the service. The survey was designed in order to gain insights into how the new clinical model had changed their behaviours and working practices, and to gain their views on its effectiveness. The purpose of the staff survey was also to assess the level of satisfaction of those tasked with the implementation of the new clinical model and to gauge suggestions for improvements.

We used SurveyMonkey to design the online survey which was distributed in the form of a web link. Staff also had the option of using a hard copy version of the questionnaire. The distribution process was facilitated by senior WAST members.

The survey was open to responses over two weeks. The staff survey generated a total of 82 useable responses. Forty seven useable responses came from Clinical Contact Centres (CCC) staff and thirty five were from operational staff.

Overall, Clinical Contact Centre staff thought that life threatening calls were immediately identified most or all of the time, and that the longer time allowed for call assessment increased effectiveness, as did the reduction in the number of calls qualifying for an 8 minute response. Most felt that the introduction of the Amber category helped them deal with calls more effectively and improved their ability to dispatch the right response. They had been able to reduce the number of multiple dispatches and reduce the number of vehicles which were stood down.

Operational staff felt Red calls were being handled more effectively, by a large margin. Amber and Green calls were also handled better. A small majority of operational staff felt they were more likely to be assigned to calls which fit their skills.

Overall, staff thought the service was handling demand better, and that they were working more effectively. Most staff were satisfied with the changes, with CCC staff in general more satisfied than operational staff. Majorities thought the changes offered the opportunity to improve clinical outcomes, that staff had been well informed about changes, that they had receive appropriate training, and that resources were being used more effectively.

Key disadvantages included insufficient resources to respond to the triaged calls, and longer waits for lower acuity patients.

6.2 Background information

We asked respondents about their role. 43% of respondents were operational staff, and 57% were Clinical Contact Centre (CCC) staff. Almost a third (32%) of the CCC staff were dispatchers who

allocate resources, just over one in ten (12%) were emergency medical dispatchers who triage 999 calls, 5% were managers who organise the clinical hub, and 5% were duty care managers. A small minority of 4% described their roles as "MPDS facilitator", "assistant dispatcher" and "CCC allocator". See Table 6:1.

Table 6:1: What is your role? (Tick one)

Answer Options	Response Percent	Response Count
Clinical Contact Centre - Emergency Medical Dispatcher who triages 999 calls	12%	10
Clinical Contact Centre – Clinician who provides assessments and advice	0%	0
Clinical Contact Centre – Dispatcher who allocates resources	32%	26
Clinical Contact Centre - Manager who organises the clinical hub	5%	4
Clinical Contact Centre – Duty Care Manager	5%	4
Operational staff	43%	35
Clinical Contact Centre – Other (please specify below)	4%	3
answered question		**82**
skipped question		**0**

6.3 Impacts and effectiveness of the new clinical model

This section seeks to assess the impacts and effectiveness of the new clinical model.

6.3.1 Clinical Contact Centre staff

The questions in this section were for Clinical Contact Centre staff only, and we received 47 useable responses.

Almost half of the respondents (47%) worked for the North Region Clinical Contact Centre, 30% worked for the South East Region CCC and 23% for the Central and West Region one. See Table 6:2.

Table 6:2: Where is the Clinical Contact Centre (CCC) which you work for? (Tick one)

Answer Options	Response Percent	Response Count
North Region	47%	22
Central and West Region	23%	11
South East Region	30%	14
answered question		**47**
skipped question		**0**

The majority of respondents thought that the pre-triage and the nature of call questions identified life-threatening calls immediately most of the time (60%) or all the time (8%). Additionally, over a quarter (28%) felt that those calls were identified immediately some of the time. See Table 6:3.

Table 6:3: How often do you think the pre-triage and nature of call questions identify immediately life-threatening calls? (Tick one)

Answer Options	Response Percent	Response Count
All the time	8%	4
Most of the time	60%	28
Some of the time	28%	13
Never	2%	1
Don't know	2%	1
answered question		**47**
skipped question		**0**

We asked CCC staff what effect they thought the additional time of 120 seconds for a call assessment had on patient triage and allocation of the right response category. The majority of respondents (68%) found this aspect of the new model to be more effective. One respondent commented: *"The extra 120 seconds give the allocator time to make a better decision on the right resource to send to the call. I feel this has improved relations between allocating staff and crews, as it has reduced the amount of stand downs the resources are receiving and we're making the right decisions."* Another member of staff added: *"the extra time allows a little autonomy and more reasoned decision making, within the many constraints the dispatcher faces."*

Around one in six respondents did not think it had made any difference, and a small minority of 4% found it to be less effective. See Table 6:4.

Table 6:4: What effect do you think the additional time (120 seconds) for call assessment has had on patient triage and allocation of the right response category? (Red, Amber or Green etc.) (Tick one)

Answer Options	Response Percent	Response Count
Much more effective	32%	15
A little more effective	36%	17
The same as before	15%	7
A little less effective	4%	2
Much less effective	0%	0
Don't know	11%	5
Not applicable	2%	1
answered question		**47**
skipped question		**0**

The consensus was that the reduction in the number of calls requiring an 8 minute response had made the process of patient triage and allocation of the right response category more effective. Less than 10% did not think it had made any difference. See Table 6:5.

One dispatcher who allocates the resources said: "I think our sickest patients are now getting the best response that we can offer. The reduction in the number of calls in the 8 mins category has shifted the focus to concentrate on the sickest patients. There is also the input form the Clinical desk that try to ensure that the calls are genuinely Red calls." Another dispatcher added: "Patients who need an 8 minute response are attended quicker but other patients might possibly have a longer wait time than before. Stroke patients who code as Amber 2 can wait up to an hour for an ambulance if the call falls at shift change over time."

Table 6:5: What effect do you think the reduction in the number of calls requiring an 8 minute response has had on patient triage and allocation of the right response category? (Tick one)

Answer Options	Response Percent	Response Count
Much more effective	36%	16
A little more effective	44%	20
The same as before	9%	4
A little less effective	4%	2
Much less effective	0%	0
Don't know	7%	3
Not applicable	0%	0
answered question		**45**
skipped question		**2**

The majority of Clinical Contact Centre staff (51%) felt that they were able to deal with patient triage and allocation of the right response category more effectively with the introduction of the new Amber call category. Just over a quarter (26%) thought that the introduction of the new Amber category made no difference and 17% thought it had made it less effective. See Table 6:6.

Staff felt that there were too many calls in this category and that patients had to wait too long, especially with Amber 2 calls. There also seemed to be concerns about the lack of resources. One respondent said: "Amber response targets not being met due to demand and resourcing". Another explained: "*I feel as there are so many calls in this category, the triage queue doesn't work well. For example, an unconscious stroke patient categorised below a person who is drunk and not alert."*

Table 6:6: What effect do you think the new Amber call category has had on patient triage and allocation of the right response category? (Tick one)

Answer Options	Response Percent	Response Count
Much more effective	17%	8
A little more effective	34%	16
The same as before	26%	12
A little less effective	6%	3
Much less effective	11%	5
Don't know	6%	3
Not applicable	0%	0
answered question		**47**
skipped question		**0**

Over a third of respondents (34%) thought that the new Green category had produced the desired effect on patient triage and allocation of the right response category, as they found the new Green category more effective than the old one. One person commented: *"The majority of calls within this category are correctly coded and some can be dealt with by clinical desk."*

However, three in ten of the respondents found the new Green category to be less effective. The main concerns were high demand, long waits, and lack of resources. One member of staff said: *"Patients are left waiting much longer for an ambulance response".* Another one commented: *"Green 2 calls do have a tendency to stack for longer although the clinical desk do help with this and can/do upgrade where necessary."* It was also suggested that Green calls should have been Amber as they can be upgraded when necessary. One respondent said: *"These are simply upgraded by the Hub when they are out of time. They might as well be Amber calls from the start."*

Over a quarter of staff (28%) reported the new Green category to be as effective as the old one. See Table 6:7.

Table 6:7: What effect do you think the new Green call category has had on patient triage and allocation of the right response category? (Tick one)

Answer Options	Response Percent	Response Count
Much more effective	17%	8
A little more effective	17%	8
The same as before	28%	13
A little less effective	24%	11
Much less effective	7%	3
Don't know	7%	3
Not applicable	0.0%	0
answered question		**46**
skipped question		**1**

The majority of CCC staff (52%) thought that the change in triage processes and the availability of more information had improved their ability to dispatch the most appropriate resource, and 26% did not think it had made any difference. See Table 6:8.

Table 6:8: What difference has the change in triage processes and availability of more information made to the dispatch of resources? (Tick one)

Answer Options	Response Percent	Response Count
Improved ability to dispatch the most appropriate resource	52%	24
Reduced ability to dispatch the most appropriate resource	0%	0
No change	26%	12
Not applicable	22%	10
answered question		**46**
skipped question		**1**

Just under half of the respondents (47%) said that the introduction of the new Amber category had improved their ability to dispatch the most appropriate resource, and one in five had not noticed any changes. Only a small minority of 2% thought that it had reduced their ability to dispatch the most appropriate resource. See Table 6:9.

Table 6:9: What difference has the introduction of the Amber category made to the dispatch of resources? (Tick one)

Answer Options	Response Percent	Response Count
Improved ability to dispatch the most appropriate resource	47%	21
Reduced ability to dispatch the most appropriate resource	2%	1
No change	31%	14
Not applicable	20%	9
answered question		**45**
skipped question		**2**

Almost a third of CCC staff (32%) reported that the new Green category had improved their ability to dispatch the most appropriate resource, and 13% thought it had reduced it. Two in five respondents did not think it made any change. See Table 6:10.

Table 6:10: What difference has the introduction of the new Green category made to the dispatch of resources? (Tick one)

Answer Options	Response Percent	Response Count
Improved ability to dispatch the most appropriate resource	32%	15
Reduced ability to dispatch the most appropriate resource	13%	6
No change	40%	19
Not applicable	15%	7
answered question		**47**
skipped question		**0**

Three in ten of the respondents found that the changes in call assessment and categorisation had increased Hear and Treat. Almost a quarter (24%) thought it had made no difference, and 39% were not sure. No respondents felt that the changes had decreased the Hear and Treat rate. See Table 6:11.

Table 6:11: What effect have the changes in call assessment and categorisation had upon Hear and Treat? (Tick one)

Answer Options	Response Percent	Response Count
Increased it	30%	14
No change	24%	11
Decreased it	0%	0
Don't know	39%	18
Not applicable	7%	3
answered question		**46**
skipped question		**1**

A majority of 67% of the respondents agreed that the change in call categories had allowed them to reduce the number of multiple resource dispatches. Only a small minority of 2% said it had not, and 7% did not see any changes either way. See Table 6:12.

Table 6:12: Overall, has the change in call categories allowed you to reduce the number of multiple resource dispatches? (Tick one)

Answer Options	Response Percent	Response Count
Yes	67%	31
No	2%	1
No change	7%	3
Not applicable	24%	11
answered question		**46**
skipped question		**1**

We then asked Clinical Contact Centre employees to explain any issues that had arisen from the new clinical model.

The main issues were:

- Low priority calls waiting longer for a response, which is creating more work within the Clinical Contact Centre with regards to call backs.
- The Amber 1 category is too big and covers too many call outcomes.
- Amber calls tend to wait excessive amounts of time due to hospital delays, shortfalls, and meal break policy. This especially affects Amber 2 codes.
- Health Care Professionals need to be made more aware of the changes to the service.
- There are still not enough resources to attend Amber and Green calls.
- RTCs are still coming out as an Amber 2, when CCC staff have been told to treat these as Amber 1.

Other comments included:

- *"A high proportion of calls are appropriately categorised as red and are given a priority response, sickest patient first, where previously up to 40% were categorised inappropriately as immediate threat to life."*
- *"The outcome new clinical model have been very positive, and appropriate responses to all category of patients."*
- *"Good patient experience* and expectations."

Over half of the respondents (53%) reported that the new call categories had allowed them to reduce the number of vehicles they stood down, and 17% said it had not. See Table 6:13.

Table 6:13: Has the change in call categories allowed you to reduce the number of vehicles you stand down? (Tick one)

Answer Options	Response Percent	Response Count
Yes	53%	25
No	17%	8
No change	4%	2
Not applicable	26%	12
answered question		**47**
skipped question		**0**

- The majority of Clinical Contact Centre respondents (68%) thought that the pre-triage and the nature of call questions identified life-threatening calls immediately most of the time or all the time.
- The majority of respondents (68%) said that the additional time of 120 seconds for a call assessment has made patient triage and allocation of the right response category more effective.
- The consensus was that the reduction in the number of calls requiring an 8 minute response had made the process of patient triage and allocation of the right response category more effective.
- The majority of Clinical Contact Centre staff (51%) felt that they were able to deal with patient triage and allocation of the right response category more effectively with the introduction of the new Amber call category.
- 34% of CCC staff found the new Green category more effective than the old one.
- 52% thought that the change in triage processes and the availability of more information had improved ability to dispatch the most appropriate resource.
- 47% of respondents said that the introduction of the new Amber category had improved ability to dispatch the most appropriate resource.
- A majority of 67% of the respondents agreed that the change in call categories had allowed them to reduce the number of multiple resource dispatches.

- Over half of the respondents (53%) reported that the new call categories had allowed them to reduce the number of vehicles they stood down.

6.4 Operational staff

The questions in this section were for Operational staff only, and we received 35 useable responses.

We asked operational staff their views on how the new model affected triage and accurate identification of Red calls, compared to the old model. The majority were positive, with 62% who thought that the new model was a little better or much better; a minority of 6% were negative, and 12% had not noticed any changes. One respondent commented: *"Calls seem to be filtered more appropriately, however, some calls which are still being passed as Red calls transpire to be of low acuity."* Another noted: *"There is still confusion regarding life threatening jobs."* See Table 6:14.

Table 6:14: How do you think the new model has affected triage and accurate identification of Red calls? (Tick one)

Answer Options	Response Percent	Response Count
Much better	18%	6
A little better	44%	15
No change	12%	4
A little worse	3%	1
Much worse	3%	1
Don't know	21%	7
answered question		**34**
skipped question		**1**

Almost a third of operational staff (32%) said that the new model had not affected triage nor accurate identification of Amber calls, and just over a quarter said that the process had improved with the new model or didn't know (26% for each). One respondent said that there were fewer stand downs with the new model. A minority of 15% felt that the processed has worsened. See Table 6:15.

There were some concerns that a number of Amber calls had been waiting a long time to get to and that, on occasions, the information given to operational staff regarding a call was not always appropriate. One member of staff commented: *"Sometimes Amber calls are not appropriate, for example in a case of mild epistaxis."* Another respondent noted: *"Identification of call priority is only as good as the information obtained from those making the call. I have noted on numerous occasions that the information taken regarding a call by North and South East call takers appear to be not as comprehensive as the information taken by their Central and West region colleagues."*

Table 6:15: How do you think the new call categories have affected triage and accurate identification of Amber calls? (Tick one)

Answer Options	Response Percent	Response Count
Much better	6%	2
A little better	21%	7
No change	32%	11
A little worse	9%	3
Much worse	6%	2
Don't know	26%	9
answered question		**34**
skipped question		**1**

Over a third of operational staff (35%) said that the new model had not affected triage and accurate identification of Green calls, and just under a quarter (24%) had noticed an improvement. One member of staff noticed that more suitable green calls are now being passed on to NHSDW. See Table 6:16.

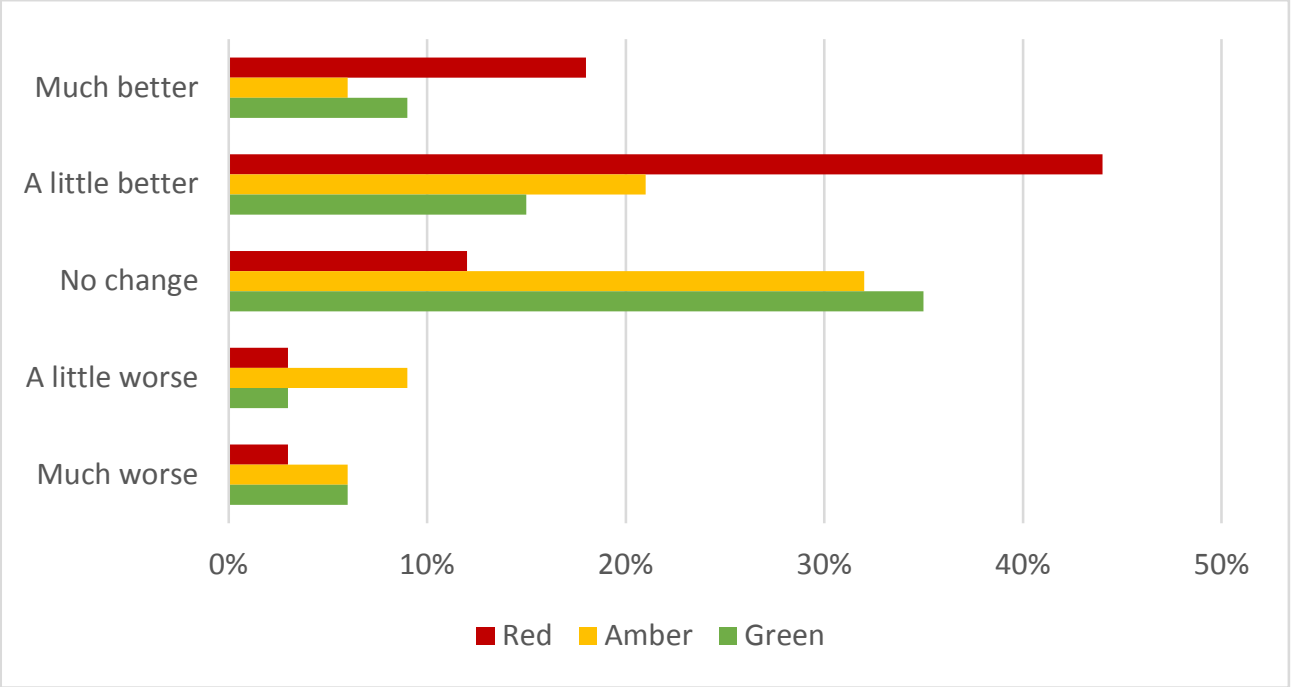
Although respondents felt that the process had improved, there were still some concerns about some of the calls not belonging to the Green category. One respondent explained: *"Some Green calls appear to be Amber when we arrive at the scene and take the history of incident."* Another said: *"I find that some Green calls should be Amber."*

Table 6:16: How do you think the new call categories have affected triage and accurate identification of Green calls? (Tick one)

Answer Options	Response Percent	Response Count
Much better	9%	3
A little better	15%	5
No change	35%	12
A little worse	3%	1
Much worse	6%	2
Don't know	32%	11
answered question		**34**
skipped question		**1**

On the whole, the strongest effect was an improvement in the identification and triage of red calls (Figure 6:1).

Figure 6:1: Effect of the new call categories on triage and accurate identification



Almost two in five members of staff agreed that the new call categories had not affected the amount and type of information about a call that was available to them, or were not sure (38% for each). Around one in six of the respondents said the amount and type of information available to them about a call was much better or a little better with the introduction of the new call categories (6% and 9% respectively). Less than 10% thought it had become worse. See Table 6:17.

Respondents commented that sometimes clinical information was missing and that the quality of the information varied depending on which centre took the call.

Table 6:17: How have the new call categories affected the amount and type of information about a call available to you? (Tick one)

Answer Options	Response Percent	Response Count
Much better	6%	2
A little better	9%	3
No change	38%	13
A little worse	6%	2
Much worse	3%	1
Don't know	38%	13
	answered question	**34**
	skipped question	**1**

Just over half of operational staff (52%) said that they had not seen any changes in the number of times that they had been stood down since the new call category trial began. The remaining respondent were equally split, with 24% reporting an increase in being stood down and 24% reporting a decrease in being stood down since the introduction of the new call category trial. See Table 6:18.

Table 6:18: Overall (accepting there are day to day fluctuations) have you seen a change in the number of times you have been stood down since the new call category trial began? (Tick one)

Answer Options	Response Percent	Response Count
Increase in being stood down after being allocated	24%	8
Decrease in being stood down after being allocated	24%	8
No change	52%	17
answered question		**33**
skipped question		**2**

Almost a third of operational staff (32%) felt that they were more likely to be assigned to calls that fitted their skills since the new clinical model pilot began, and 27% did not. See Table 6:19.

Table 6:19: Do you feel that you are more likely to be assigned to calls that fit your skills since the new clinical model pilot began? (Tick one)

Answer Options	Response Percent	Response Count
Yes	32%	11
No	27%	9
Don't know	41%	14
answered question		**34**
skipped question		**1**

Over a quarter of respondents (27%) thought that the revised call categories had improved the way in which clinical needs are being matched to categories at the time of calls. A minority of 15% did not think so. See Table 6:20.

Table 6:20: In your view, how have the revised call categories affected the way in which clinical needs are being matched to categories at the time of calls? (Tick one)

Answer Options	Response Percent	Response Count
Much better	6%	2
A little better	21%	7
No change	18%	6
A little worse	9%	3
Much worse	6%	2
Don't know	41%	14
answered question		**34**
skipped question		**1**

The majority of respondents (53%) said that the new clinical model had not affected their meal breaks, and 9% felt the new model had enable them to take more timely meal breaks. See Table 6:21.

Table 6:21: How has the new clinical model affected your meal breaks? (Tick one)

Answer Options	Response Percent	Response Count
More timely	9%	3
About the same	53%	18
Less timely	3%	1
Don't know	35%	12
answered question		**34**
skipped question		**1**

- 62% of respondents thought that the new model had made triage and accurate identification of Red calls more effective.
- Just over a quarter said that the new model has had a positive effect on triage and accurate identification of Amber calls.
- 24% said that the new model has had a positive effect on triage and accurate identification of Green calls.
- Almost a third of operational staff (32%) felt that they were more likely to be assigned to calls that fitted their skills since the new clinical model pilot began.

6.5 Staff satisfaction with the new clinical model.

The questions in this section were for both CCC staff and operational staff, and were aimed at understanding their level of satisfaction with the new model.

We asked staff how they thought the new call categories and response time standard had affected their service's ability to manage demand. Just over two in ten (41%) said that their service was better equipped to manage demand, and 10% felt that the new model had made this worse. Just over a quarter (25%) had not noted any changes. See Table 6:22.

Table 6:22: How do you think the new call categories and response time standards affect your service's ability to manage demand? (Tick one)

Answer Options	Response Percent	Response Count
Much better	8%	6
A little better	33%	24
No change	27%	20
A little worse	7%	5
Much worse	3%	2
Don't know	22%	16
	answered question	**73**
	skipped question	**9**

A third of respondents agreed that the new call categories and response time standards had contributed to them being able to do their jobs more effectively, and 10% did not think so. Over a third had not seen any changes. See Table 6:23.

Table 6:23: Have the new call categories and response time standards had an impact on your ability to do your job effectively? (Tick one)

Answer Options	Response Percent	Response Count
Much more effectively	7%	5
A little more effectively	26%	19
No change	36%	26
A little less effectively	5%	4
Much less effectively	5%	4
Don't know	16%	12
Not applicable	4%	3
answered question		**73**
skipped question		**9**

Almost half of the respondents (49%) felt satisfied overall with the new clinical model for ambulance services. Less than 10% were dissatisfied, and 41% were neutral. See Table 6:24.

Clinical Control Centre staff tended to be more likely to be satisfied with the new clinical model (66%), compared to operational staff (30%).

Table 6:24: Overall, how satisfied are you with the new clinical model for ambulance services? (Tick one)

Answer Options	Response Percent	Response Count
Very satisfied	11%	8
Somewhat satisfied	38%	28
Neutral	41%	30
Somewhat dissatisfied	8%	6
Very dissatisfied	1%	1
answered question		**73**
skipped question		**9**

We then presented respondents with a number of statements, and asked them about the extent to which they agreed or disagreed with each of them.

- The majority (52%) felt that the new way of working was providing an opportunity to improve clinical outcomes for patients, and only 6% disagreed.
- 56% agreed that they were well informed about the changes that affected them with the new clinical model, and a minority of 7% disagreed.
- Almost three in five members of staff (59%) agreed that they received appropriate training to work effectively with the new clinical model, and 10% disagreed.

- A majority of 58% agreed that the new clinical model allowed more efficient use of resources, and 5% disagreed.
- 52% of staff did not think that their job had become more or less stressful since the introduction of the new model, under a quarter (22%) agreed that it had, and 12% felt it had become less stressful. See Table 6:25.

Table 6:25: Please rate the extent to which you agree or disagree with each of the following statements. (Tick one per row)

Answer Options	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree	Don't know
I feel that the new way of working is providing an opportunity to improve clinical outcomes for patients.	7%	45%	32%	5%	1%	10%
I was well informed about the changes that affected me with the new clinical model.	16%	40%	29%	6%	1%	8%
I received appropriate training to work effectively with the new clinical model.	15%	44%	23%	5%	5%	8%
The new clinical model allows more efficient use of resources.	10%	48%	27%	4%	1%	10%
My job has become more stressful since the introduction of the new clinical model.	12%	10%	52%	14%	5%	7%
					answered question	**73**
					skipped question	**9**

Just over half of the respondents (51%) had noticed both positive and negative changes in their work practices since the introduction of the new clinical model pilot for ambulance services. A minority of 4% reported having noticed negative changes and 16% noticed positive changes. Over a quarter (29%) had not noticed any changes. See Table 6:26.

Some of the comments included:

- "Some positive changes, some negative. Chest pain & CVA patients seem to wait longer but Red patients are getting a faster response. There are some issues with coding and some calls code as Red when there is not an immediate threat to life."
- "Red calls answered quicker, better care for patients. Some conditions (chest pains, fits. MIs) potentially left for extended period as they are now Amber."
- "Less stand downs."

- "More pressure is put upon staff to 'hit' red calls, and then to explain why they have been missed which leads to more stress. I feel that we don't hear much about the clinical outcomes that we are aiming for with the new model."
- "We are able to liaise with other divisional allocators to swap vehicles attending calls."
- "Generally calls are downgraded appropriately."
- "There are not enough responding resources of the appropriate grade."

Table 6:26: Have you noticed any changes in your work practices since the introduction of the new clinical model pilot for ambulance services? (Please tick one)

Answer Options	Response Percent	Response Count
Positive changes	16%	11
Negative changes	4%	3
Both positive and negative changes	51%	36
No change	29%	20
answered question		**70**
skipped question		**12**

The majority of staff (87%) said they felt as a happy as before at work since the introduction of the new model, 6% felt happier, now and 7% felt more content before. See Table 6:27.

Clinical Control centre staff were more likely to feel happier at work since the introduction of the new model than Operational staff (10% compared with 3%).

Table 6:27: Do you feel happier at work now since the introduction of the new clinical model pilot for ambulance services? (Please tick one)

Answer Options	Response Percent	Response Count
Happier now	6%	4
As happy as before	87%	61
Happier before	7%	5
answered question		**70**
skipped question		**12**

Over half of the respondents (52%) were not sure that the overall quality of service for users had improved since the introduction of the new clinical model. Over a quarter (29%) thought it had not and 19% said that the overall quality of service had improved. See Table 6:28.

CCC staff were more likely than operational staff to think that the overall quality of service for users had not improved since the introduction of the new model (34% compared to 21%)

Table 6:28: Do you think that the overall quality of service for users has improved since the introduction of the new clinical model pilot for ambulance services? (Please tick one).

Answer Options	Response Percent	Response Count
Yes	19%	14
No	29%	21
Not sure	52%	38
answered question		**73**
skipped question		**9**

6.6 Advantages and disadvantages of the new clinical model

We asked all staff about their views on the advantages and disadvantages of the new model.

The main advantages of the new clinical model pilot for ambulance services were thought to be:

- Patients more likely to receive ambulances within 8 minutes for new Red (life threatening) codes.
- More appropriate response targets both in terms of time and delivered resources.
- Less time pressure, which is really proving a success.
- Health care professional (HCP) input to specific cases at a CCC level, which has been positive.
- Better use of UCS and more even workload throughout the service.
- Faster response time and more appropriate resources there first time.
- Amber calls allow the service more time to get to calls.
- Fewer stand downs.
- More freedom to make decisions regarding allocating resources to an incident and being able to send the most appropriate resource rather than the nearest.
- Control staff to more effectively manage resources.
- Avoiding multiple responses/double dispatching.
- Enhanced hear and treat scope.

The main disadvantages of the new clinical model pilot for ambulance services were thought to be:

- Appropriate resources are still lacking, in order to allow responses to the call in the way they have been identified by the new clinical model.
- Some patients might be waiting longer.
- Lower acuity patients are waiting longer for a response as ambulances are continually diverting to higher priority calls at busy periods.
- Amber and green calls polling for extended timeframes.
- Not enough UCS crews on daily.
- There is no necessity to report response times, so poorly patients can be waiting a long time.

6.7 Suggestions for improvement

We finally asked all respondents their views on how the new clinical model for ambulances could be improved. The key actions suggested were:

- There is a need for resources to meet demand (more vehicles and more staff).
- Change of tone to radios: Red 1 and 2 a long tone, short bleeps for Green calls.
- More clinical triage when call taking, and penalties for people who misuse the service and lie when ringing ambulance about what condition they are in.
- Red category calls need more thorough screening, as many of them could have been safely managed as Amber 2 or even Greens, specifically if they related to breathing problems.
- More hospital space would free up ambulances waiting outside hospitals.
- To focus more on patients and not only targeting a reduced number of Red calls.
- Explain the new clinical model better to the public and to Health Care Professionals.
- Include a no stand down when Amber and Green incidents have exceeded their agreed time.
- More Amber 1 calls into Amber 2 category or maybe a time difference.

7 CONCLUSIONS

During 2015/16 the Welsh Ambulance Service NHS Trust (WAST) introduced a new operational model which substantially changed the way in which they provide a response to 999 calls requesting urgent health care. In common with other ambulance services across the UK, the existing operational model was driven by response time targets that favoured operational behaviours focused on "stopping the clock" rather than the clinical needs of patients. In particular the proportion of calls (almost 50%) categorised as needing an 8 minute response was counterproductive given the true proportion of life-threatening calls is nearer 10%. In an environment of increasing demand and financial constraint WAST were unable to achieve expected response time targets and performance was continuing to degrade. This posed significant clinical risk to the patients most in need of a very fast response. The intention of new clinical model was to redress the balance and provide a service which is more clinically focused by prioritising the small cohort of patients who can most benefit from a very rapid response and allowing more discrimination for other calls so that not just the speed but type of response is proportionate to patient need.

This report is principally a descriptive evaluation of the first year of operation. As the model was implemented in all areas of Wales simultaneously, no detailed comparative analysis with the previous model could be done. This evaluation can only compare impacts and costs before and after the change – there is no comparison group of areas operating the old clinical model. This has made it difficult for the work to it assign any causal relationship between the new model and any identified changes, as the effects of external factors will not be detectable. Instead, this evaluation is designed to establish how well the current model is operating and how this aligns to the intended objectives of the changes implemented. In addition, we have conducted qualitative research with staff and stakeholders to establish how any changes have taken place, and to assess the likelihood that the new model has contributed to any changes identified in the quantitative analysis.

The new clinical model has now been operating for over a year and there is a clear and universal acknowledgement, both from WAST and external stakeholders, that moving to the new clinical model was appropriate and the right thing to do. It is likely that, without this sort of substantive change, there would have been significant risk for patients, particularly over winter, as demand continues to increase. There is broad agreement that the principles are right: the reduced Red category appears to be delivering a better service for patients with the greatest need as the decline in response time performance observed before the model was introduced has been reversed and continues to improve. Removing the eight minute response time target for a large cohort of calls allows more efficiency and better dispatching – the evidence shows a clear step change reduction in the average vehicle allocations per incident after the new clinical model was introduced. This is further supported by views expressed in the qualitative interviews and the staff survey that the number of times crews are stood down or diverted from calls has reduced indicating that some of the perverse incentives to dispatching the previous model induced have declined.

The additional call triage time is designed to support improved "hear and treat" rates, and better identification of the correct resource to allocate to calls which may be treatable at scene ("see and treat"). The early quantitative information on the H&T and S&T rates is inconclusive, but evidence from interviews suggests that the system is gradually being reconfigured to support treatment at earlier stages of the 5-step ambulance patient care pathway, and in addition alternative pathways are being made available to provide treatment away from emergency departments. This all acts to reduce the demand on resources for conveyance.

An important factor in any change is that it is safe for patients. The evidence presented shows that there have, overall, been no serious safety concerns with two key indicators – serious adverse events and re-contact rates - remaining stable or declining. The effects on patient outcomes are difficult to ascertain as little outcome data is collected and process measures, such as delivery of

care bundles, are still being developed and only reported fully as the year has progressed. Delivery of stroke and STEMI care bundles show consistent and, in the case of STEMI, improving compliance with delivery although this is not the case for the hip fracture bundle. However, it should be remembered that the clinical model itself does not directly affect this – care delivery is about clinician behaviour – but rather by incorporating the reporting of clinical outcome indicators as part of the model provides a conduit for monitoring and quality improvement initiatives.

Overall, there is agreement that the service is much more clinically focused, rather than simply being operationally driven and no-one would wish to see a return to the previous operating model. The same findings are emerging from similar changes being tested across England and there is a growing consensus that the principles used to develop the WAST clinical model and comparable models in England and Scotland are sound, the right direction of travel and are providing a mechanism for enabling ambulance services to manage demand and better use the resources they have for the benefit of patients.

It is also acknowledged this is a work in progress. As with any substantive change it takes time for new ways of working to become established and for a new operating model to mature. The clinical model is a plan, and there are multiple factors which contribute to making this work in practice. WAST have acknowledged that, ideally, some of the work that is currently in progress such as the replacement of the CAD and associated information systems and the demand and capacity review would have allowed them to make further progress. Nevertheless much of the work, particularly in changing call assessment and dispatching processes which underpin the model, has been successfully implemented. A year is a short time to effect whole service changes and experience begins to reveal where further refinement and improvements can be made in order to maximise the potential of the model. WAST have clear insights in to where they want and need to focus to gain further improvements. These are principally centred around:

- A need to review the call categories outside Red, in particular the Amber category. There is concern that this group is too large and not sufficiently discriminatory in terms of prioritising patients with high acuity illness, and that for some calls this is resulting in unacceptably long waits. The quantitative analysis uses aggregated data for this category so we cannot comment on individual condition types but does show that the 95th percentile times for Amber calls have gradually increased over the year (as the equivalent for Red has decreased reflecting the focus on fast response to the Red category) and the longest waits have also increased. There was a very clear and consistent view expressed in the qualitative study and staff survey that it is likely some Amber category patients are being disadvantaged. There was also some reflection on whether removing time targets altogether for these patients allows this still important aspect of care to be sidestepped. Similar views were expressed about some green calls, particularly where there are long waits, but the review of Amber is seen as more pressing as patients within this category can be very sick. Before the new clinical model was implemented individual AMPDS codes were mapped to the new response categories using the best evidence about calls available at the time. A year of operation means the service now has more robust call information for each code within the context of the new categories which will support the review of the Amber category which WAST have already indicated they are planning to do. A similar issue has been identified in the corresponding work in England, highlighting that the process of trying to match AMPDS codes to new call categories and “ideal response” is an imperfect science that will require ongoing review and refinement.
- Investment in information systems will provide opportunities to both enhance and make more seamless the call management and dispatch process and provide more robust information to support further development both internally and externally. The approved and planned replacement of the CAD system will be a key factor in supporting further development and improvement of the clinical model.

- A key objective of the 5 step framework and new clinical model is to provide the right type of response to 999 calls including avoiding unnecessary transports to hospital. This is better for patients and allows ambulance (and hospital) resources to be used more efficiently. For WAST this means providing hear and treat and see and treat responses where this is appropriate. Across the service the rates of both hear and see and treat have remained stable during the baseline and pilot periods with no obvious increase after the introduction of the new clinical model. However, providing these response options is multifactorial. Some factors lie within the ambulance service where dependence is not only on identifying which calls might best be served by these options but also having the infrastructure and workforce profile to provide them at necessary scale. Others are outside the ambulance service and are concerned with the wider system provision of suitable alternative services, at the time they are needed and with clear agreed access and referral pathways that will allow ambulance service clinicians to safely transfer care.
- Within the ambulance service, for hear and treat, this means having sufficient clinicians to provide secondary triage for all potentially suitable calls. The quantitative data does not have enough detail for us to assess how many calls suitable for hear and treat did not get this option due to clinicians being unavailable. However the qualitative and staff survey evidence suggests that this is a problem, particularly the references to the inability to queue these calls which indicates more suitable calls than clinicians available to respond to them. For see and treat a complex combination of issues that the simple quantitative rate cannot explain emerged from the qualitative study. For some patients the decision about whether patients can be safely left at home can be made by paramedics but this is a decision that comes with risks well described in the research literature. There was a clear message from frontline clinicians that for on scene decision making to be safe and for see and treat to increase the paramedic workforce needs to be suitably trained, confident and supported in making these decisions. There was a view expressed that more senior clinicians in the clinical hub would not only increase the hear and treat rate but would also provide support for on scene decision making – frontline staff stated they valued the opportunity to discuss decisions with another clinician. For patients with more complex needs the skills of an advanced practitioner are more appropriate but this brings its own challenges as growing and, more importantly, retaining an advanced practitioner workforce is difficult. This situation is not unique to Wales – the skills of advanced paramedic practitioners are becoming well recognized and highly sought after across the NHS and ambulance services across the UK are finding it increasingly difficult to retain these valuable staff. Within Wales there are innovative ideas being discussed, such as rotational models across different sectors, to try and support retention. Investment in upskilling the workforce is wasted if these staff cannot be retained and see better opportunities elsewhere.
- Externally, although the overall hear and treat and see and treat rates are unchanged, the analysis shows there is considerable variation between health boards indicating that wider system processes for managing calls that do not need transporting to an acute hospital are better in some areas than others. There is scope to increase hear and treat and see and treat if the right pathways are in place that allow and support confident and safe clinical decision making by clinicians in the clinical hub or at scene with a patient. There are good examples where this has already been achieved, for example in managing calls for mental health problems, but there is still a significant way to go to provide integrated care pathways for a range of urgent conditions.

In the first year of operation WAST has made considerable progress in implementing a new clinical model to support delivery of a more efficient and effective service for patients. This was a significant and in some ways brave undertaking in a difficult and highly pressured environment. The scope and vision for the service means there is a clear acknowledgement that there is further work to be done both internally and externally to realise the potential benefits of the new ways of working. Internally early initiatives such as the provision of a new CAD and the review of fleet and workforce

requirements currently taking place will provide important support and evidence for the development of future plans that can produce further gains from the clinical model. This will also allow much more detailed scrutiny of call characteristics, patient conditions and needs so that WAST will in the future be able to make decisions on further service development based in evidence and a sound understanding of the population they serve and how best to meet those needs.

Some of the workforce development issues will require longer term solutions but the implementation of the model means these are now more explicit and embedded in an overall strategy for the service. Of course, WAST is also part of a wider emergency and urgent care system and full realisation of the clinical model will also be dependent on external partners. One significant issue and a major source of frustration to staff and a substantial waste of resources is the continued and increasing problem of lost hours at hospital due to vehicles queuing at ED. This is not a problem confined to Wales, but it is particularly acute in the Principality. WAST cannot solve this problem alone, and a whole system approach is needed to find solutions. However, it is likely that gains could be made in further improving performance and potentially reducing some long waits in amber and green categories within existing resources if these resources were made available more quickly so they could fulfil their intended purpose of responding to calls.

The continued development and future success of WAST as a key provider in the emergency and urgent care system in Wales will require both the continued and evident internal commitment and joint working and commitment to a common purpose by multiple partners. A success and advantage that has grown out of the development and implementation of the new clinical model is that WAST is now much more visible to the wider health system. There is a better understanding within other services of what they do and what they could do. They are now partners and integral to wider system discussions and plans. They take a much more active role in joint decision making and service development. WAST is becoming much more a central player in the development of emergency and urgent care services, rather than the passive recipients they may have been in the past. This will be key to achieving more benefits from the clinical model, as WAST and others now have better understanding and working relationships that will support the development of both internal operations and the more broad, system wide alternative care pathways that will support the aspirations of providing high quality, clinically focused care to the population it serves.

APPENDIX I METHODOLOGICAL NOTE

The non-experimental design and availability of relevant and comparable data induce a careful consideration of the indicators to be used in assessing the clinical model pilot's performance. In this methodological note we explain the rationale behind the observational trend study and tentative impact analysis of the clinical model pilot.

Design

This evaluation of WAST's clinical model pilot attempts to determine whether this pilot has led to improvements in clinical outcomes, patient experience and value for money. From a patient's perspective, this should be described as receiving the right care, in the right place, at the right time. This in turn translates to the most appropriate resources being dispatched on time at a lesser financial burden to WAST and in turn the Welsh taxpayer.

Ideally this evaluation would determine what impact the pilot has had and how WAST performs by comparing within multiple dimensions. A comparison within Wales could have been achieved in two ways: experimental design and / or consistent measurement. Further comparison beyond Wales would have been feasible within the United Kingdom if the measurement of ambulance service performance would be comparable with methods employed in the other three countries.

Neither is the case here though, as the pilot was introduced in all of Wales simultaneously in October 2015. An experimental design was made impossible by the physical and technological infrastructure through which ambulance services are provided. Service delivery runs through a single phone number, which routes through to three regional call centres that dispatch ambulances from 7 local health boards. The geographical overlap between the call centres and LHBs is insufficiently homogenous to allow for differing methods to be employed simultaneously. This does mean that the lack of counterfactual in this analysis prevents causal relationships from being established.

The clinical model pilot reformed the way ambulance performance was measured and required substantive changes from WAST in the way services were delivered. EASC developed a range of Ambulance Quality Indicators (AQIs) to provide broader measures of the ambulance service and were asked by Welsh Government to publish the AQI's in conjunction with the clinical model pilot. This change comes at the expense of comparability in response time measurements before and after the pilot, however, and reduces the evaluatory power of the response time indicators.

Further assessment of the clinical model pilot's introduction could be undertaken by comparing WAST's performance to that of its counterparts across the United Kingdom. The respective ambulance services of the four constituent countries operate with slight variation in a still relatively centralised regulatory framework for healthcare provision, as is explained below.

Data

PACEC received two sources of data which were used to evaluate the clinical model pilot. The first is a collection of databases containing all of the performance information available from the first year of published AQIs. The second is a project-specific database produced by WAST Health Informatics in line with a bespoke data request assembled by the project team.

AQI

First of all, the evaluation team were given access to quarterly databases containing relevant information on the 24 Ambulance Quality Indicators (AQIs) designed as a component part of

the NCCQDF and explained in greater detail in Annex II. The AQIs are structured along the CAREMORE® 5-step pathway, with every AQI linked to one of the steps in the model as shown below in Table I:1.

There are 4 AQI datasets in existence, all of which have been used for this evaluation. These cover the following periods:

Q4 2015 (October – December 2015 + 6 months to date)

Q1 2016 (January – March 2016)

Q2 2016 (April – June 2016)

Q3 2016 (July – September 2016)

These datasets should in principle cover all AQIs for the periods described. However there are several gaps in these datasets in addition to some change in measurement during the pilot as the AQIs were constantly being developed and refined over the evaluation period[44], with some key points summarised below:

- There is no information regarding AQI 16.i (cardiac arrests) up until December 2015.
- Data for Local Health Board areas began to become available in the Q1 2016 dataset. The AQI datasets thus do not contain information on performance by LHB for October – December 2015.
- For AQI 18 (vehicle type allocation), data is only available from April 2016 onwards. It also differs from the other AQIs in that it is subdivided regionally according to the Clinical Contact Centre which dispatched the response vehicles. All other AQIs provide data per LHB, or Wales overall if regional detail is not available.
- AQI 11 to 13 were measured differently in October & November 2015, reducing the comparability of these indicators over that timeframe. From that date, calls which are re-coded from Red to Amber/Green have the time of the call start re-registered as the time of the re-coding, due to revised technical guidance[45].

The formatting of the datasets also varies per quarter. Full data is provided for Q3 2015 before proportions are given whereas later datasets only contain the proportions. The lay-out and separation of AQIs across 5 worksheets also does not facilitate analysis. An initial recommendation here would be to create an integrated database for all AQIs that is divided by LHB and follows a consistent methodology. Presentation-ready reports can then be produced out of this database, not vice versa.

Evaluatory dataset

In addition to the AQI dataset PACEC also received a bespoke dataset. This dataset contains 17 indicators for the pre- and post- trial period, which mostly correspond with the AQIs discussed above. Some data transformation has already been done to increase comparability, which facilitates evaluation. This dataset also describes a more comprehensive timeframe with greater resolution, with weekly observations ranging from December 2011, when ambulance service delivery was last reformed, to September 2016.

[44] It should be recognised that the AQIs are in their first year and therefore development during this time is a genuine attempt to refine them and provide more contextualised information across the 5 steps. Additional AQIs such as the ROSC data were added as soon as sufficiently robust information was available. It is therefore inevitable that the AQIs have been modified over the course of the pilot.
[45] Statistics for Wales (March 2016) *Ambulance services in Wales: Quality report*. Cardiff: Welsh Government.

The data thus covers a full year of the pilot's performance and is divided regionally by LHB throughout. The extensive pre-pilot data allowed us to create a baseline model for those indicators which have remained comparable with the pilot's implementation.

WAST budgetary data

Brief economic analysis is facilitated by the availability of some structured financial data. The cost-effectiveness of ambulance service delivery was taken into consideration when designing the CAREMORE® model, which is why there is a Resource Envelope included detailing WAST expenditure. This facilitates some analysis, as the new clinical model pilot was specifically designed to increase the efficiency of public funds by seeking to front-load more resources towards the initial steps of the response model. The actual dispatching of response vehicles, treatment on scene and conveyance are more resource-intensive and costlier than the dissemination of information or hear & treat. EASC provided a cost table classified according to the 5-step APCP, which forms the basis for trend analysis of expenditure for the pilot's first six months (October 2015 – March 2016).

Auxiliary data

In order to comprehensively evaluate the clinical model pilot's performance this evaluation requires auxiliary data regarding demographics and healthcare costs in Wales. The demographic data has been imported using the Statistics for Wales population estimates divided by LHB. Relevant numbers include total population, population aged over 65 and the proportion of that age category relative to total population.

Comparability

Ideally we would perform a comprehensive evaluation of the clinical model pilot across time and space, which would allow for the construction of a counterfactual that is crucial to impact analysis. Such an evaluation is obstructed in two dimensions: the availability of relevant data and the comparability of data that we do have across time and space. In this section we set out precisely what data we lack and why this hinders a comparative evaluation of the pilot's effectiveness.

Time-series (longitudinal)

Ambulance Service response measures in Wales were last reformed in December 2011. In principle it should thus be feasible to obtain data from the period starting then up until October 2015, when the clinical model pilot was introduced, and compare the performance of ambulance services for the two distinct periods. The new clinical model made such substantive changes to service delivery however that it also required measurement techniques to change, which hinders longitudinal comparison.

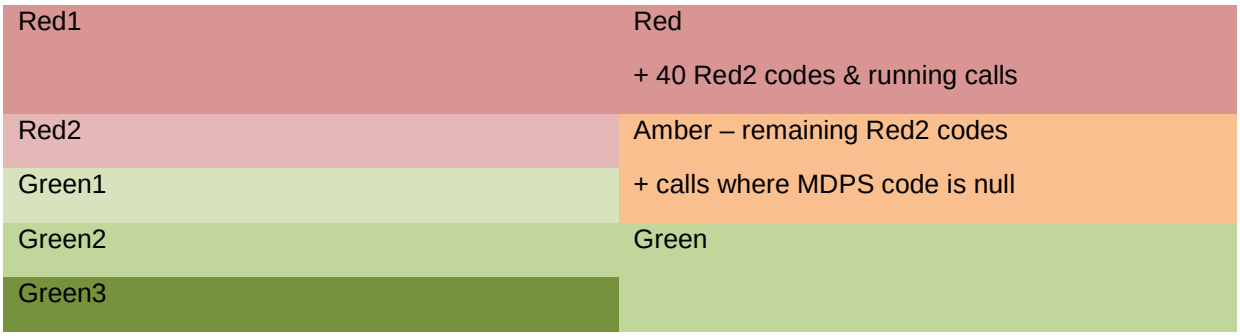
These changes are best encapsulated in the triage system used to determine the urgency and seriousness of an incident. Table I:1 below displays roughly how this classification has evolved in the past five years. The next table in turn provides more detail regarding the changes implemented as part of the clinical model pilot.

Table I:1: Evolution of WAST triage categories

Period	→ December 2011			→ September 2015			October 2015 →		
Categorisation	C	B	A	C	A.Red2	A.Red1	Green	Amber	Red
Life-threatening			•		•	•!			•
Serious		•	•		•	•		•	•
Response-time goal	•	•	•	•	•	•			•

Note: "!" denotes "most life-threatening"

Figure I:1: Response configuration



The most substantial change immediately apparent here is that colour coding has replaced the alphabetical categories. The content of these categories has changed somewhat as well, with a small proportion of Red 2 being reclassified as Red and some Red 1 categories being downgraded to Amber. The lower two categories do not have a response-time goal anymore, meaning that WAST expected there to be a reduction in the number of calls received with a time target. The 8-minute goal remains in place for the Red category, but the aforementioned reclassification prevents a completely sound comparison to be made regarding the rate at which this goal is met over time. In addition to these changes dispatchers have also been given an extra two minutes to determine the severity and nature of a patient's condition.

These changes mean that precise like-with-like comparisons of response time reliability (RTR) before and after October 2015 are not feasible, as they will not provide any meaningful information about performance in reference to the underlying emergencies but instead only show whether WAST has improved at reaching what was at the time perceived as the highest level of emergency within 8 minutes. There remain sufficient measures of quality of service that are comparable for trend observation with sufficient caution, as their underlying definitions and data collection methods have not changed – for example, some measures are a simple enumeration of distinct observations (i.e. calls, incidents, serious adverse incidents). This evaluation does therefore include an ex post vs. ex ante comparison, although for the reasons given this does not translate into a full impact assessment.

Cross-section (latitudinal)

Further comparison should normally also be feasible across the different countries of the United Kingdom as the four countries all publish statistics regarding ambulance performance and use similar concepts when measuring ambulance response times. However there is sufficient variation in the categorisation being used and time measurement methodology that comparability is limited. Ambulance performance is theoretically comparable between Wales and Scotland because the respective methodologies are most similar; however, Scotland's categorisation of calls is substantially distinct from Wales' insofar that the two countries include different incidents in different categories. True comparison between countries is thus not feasible without an extensive transformation of raw data based on the MDPS code of individual calls.

Variability

The comparability of ambulance service performance indicators is further hindered by the seasonality and variability of data. The service being analysed here is heavily influenced by industrial action and adverse weather. The latter is especially important as a harsh winter affects demand for services and the supply thereof (sickness, driving conditions) very differently from a relatively mild one. Statistics for Wales highlights the following periods of 'abnormal' performance:[46]

- 30 November 2011 public sector strike
- 10 May 2012 public sector strike
- 19 – 26 November 2012 severe flooding
- January 2013 heavy snowfall
- March 2013 heavy snowfall
- December 2013 – February 2014 stormy weather

A critical public service such as the provision of healthcare via ambulances should however be operable at all times. Excluding the above timeframes during analysis would reduce the objectivity of this evaluation because ambulance services are also meant to function during adverse weather conditions or other times of strife. The seasonal nature of ambulance provision can be overcome in impact analysis if sufficient comparable data is available regarding service performance prior to reform, but this is not the case here as discussed below with reference to AQI development. Over time, as more data on the new model become available, the most appropriate comparison will be year-on-year to even out the effect of seasonality.

Indicators

As detailed in the analysis framework presented in 4.2 and replicated at the end of this chapter, this evaluation uses 7 key process indicators of ambulance service performance to analyse how this changed following implementation of the October 2015 clinical model pilot.

[46] Statistics for Wales (28 October 2015) *Ambulance services in Wales: October 2015*. Cardiff: Welsh Government

Calls & Incidents

The total number of calls is measured according to indicators PO1 and PR1 in the WAST dataset. This measure enumerates all inbound valid calls answered by WAST via 999 designated lines but also includes calls made by HCPs. These indicators are comparable to AQI7, with the exception that this data is sourced from the MDPS priority dispatch database and not the Trusts Telephony system.

The number of calls will also be shown by category on the basis of indicators PR2a-c and PO. Next we will calculate the same (sub-)indicator for the pilot timeframe and determine whether total calls have increased overall and relative to population. Additional sub-categorisation also lets us explore changes in regional and temporal variation.

The total amount of verified incidents is measured according to indicators PR4 and PO4. These are additionally split by category. These metrics include all verified incidents processed by the MDPS system as a result of 999 calls, which renders them comparable with AQI8. Incidents will be visualised for the same timeframe and according to the same response and geographical categories as total calls described above.

Hours lost waiting

A subsequent measure of ambulance performance is the total hours lost waiting, which refers to the hours ambulances spend idling at hospitals waiting to handover patients to hospital staff before they can respond to a new incident. This indicator is included because such waiting has become a substantial problem in the Welsh healthcare system (and indeed across the UK and even Europe). This indicator is calculated on the basis of PR15 and PO15 from the evaluator dataset, both of which provide the total number of hours where ambulances have had to wait longer than 15 minutes to hand over a patient that had been conveyed to the relevant hospital.

Serious adverse incidents

The final indicator to be included in this evaluation deals with the amount of Serious Adverse Incidents (SAIs). The Trust has a responsibility to report to Welsh Government incidents which have caused death/major injury as a result of our actions or where an incident may have caused harmful media interest or police involvement – these are the SAIs. The number of serious adverse incidents can be used as an indirect measure of patient safety but also provides some insight into the overall efficacy of the clinical model pilot. The source for this measure are indicators enumerating total serious adverse incident reports, coded PO20 and PR20 in the evaluator dataset. Ideally their number should be declining over time, as the clinical model pilot is meant to improve both clinical outcomes and patient experience.

APPENDIX II AMBULANCE QUALITY INDICATORS

The Emergency Ambulance Services Committee publishes quarterly Ambulance Quality Indicators. From January 2016 these are largely disaggregated by Local Health Board or Clinical Commissioning Centre. They are organised to reflect the five steps of the Ambulance Care Pathway.

Step 1: Help me choose

This step focuses on public education regarding the services provided by WAST and how/when to access them appropriately. This step will include the development of appropriate linkages between WAST and the future 111 service, building on the success of NHSDW and its website. Considerable work has been undertaken to identify and reduce demand from frequent callers.

Figure II:1: Step 1 Indicators

AQI1	Number of Welsh Ambulance Services NHS Trust (WAST) community engagement events
AQI2	Number of local health board engagement events attended by WAST
AQI3	Number of attendances at key stakeholder events
AQI4 i	Number of NHS Direct Wales unique website visits
AQI4 ii	NHS Direct Wales number of calls by reason (top 10)
	Dental Problems
	Abdominal Pain
	Rash
	Falls Non-Traumatic
	Ingestion Toxic
	Chest Pain
	Head Injury
	Crying Child
	Back Pain
	Medication Enquiry
AQI5	Number of Frequent Callers
	Number of Incidents generated by Frequent Callers
	Total Number of Incidents
	Percentage of Frequent Callers Incidents against overall number of Incidents

Step 2: Answer my call

This step focuses on the response to 999 and Health Care Professional (HCP) calls by WAST"s Clinical Contact Centres (CCCs). This step incorporates the provision of adequate time to assess a call and the use of the Medical Priority Dispatch System (MPDS) to identify the priority of the call before offering / sending the most appropriate response.

Figure II:2: Step 2 Indicators

AQI6	Number of Healthcare Professional (HCP) Calls answered
	Central & West - HCP Urgent (0845 NGN)
	North - HCP Urgent (0845 NGN)
	South East - HCP Urgent (0845 NGN)
AQI7	Number of 999 calls answered
	Number of 999 calls answered on Primary Line
	Number of 999 calls answered on Secondary Line
	Number of 999 calls answered on Alternative Line
	Number of 999 calls answered on (Emergency Services 0845) line
	Number of 999 calls answered within 6 seconds
	Percentage of 999 calls answered within 6 seconds
AQI8	Number of 999 calls taken through the Medical Priority Dispatch System (MPDS)
	[Disaggregated into 57 protocols]
	Percentage of Incidents Coded as Unknown
AQI9 i	Number of calls ended following WAST telephone assessment (Hear and Treat)
	Number of NHSDW telephone assessments that were resolved with an 'ambulance not required' outcome
	Number of Clinical Desk telephone assessments that were resolved with an 'ambulance not required' outcome
	Percentage of calls ended following WAST telephone assessment
AQI9 ii	Number of calls transferred to NHS Direct Wales
	Number of 999 calls taken through the Medical Priority Dispatch System (MPDS)
	Percentage of calls transferred to NHS Direct Wales
AQI9 iii	Number of calls returned from NHS Direct Wales with an outcome of 'ambulance required'
	Percentage of calls returned from NHS Direct Wales
AQI9 iv	Number of calls ended through transfer to alternative care advice services
	Percentage of calls ended through transfer to alternative care advice services
AQI10 i	Re-Contact rates - Telephone
	Number of incidents received within 24 hours following WAST telephone assessment (Hear and Treat)
	Number of calls ended following WAST telephone assessment (Hear and Treat)
	Re-contact percentage within 24hrs of telephone triage (Hear and Treat)
AQI10 ii	Re-Contact rates - Attendance at Scene
	Number of incidents within 24 hours following See and Treat
	Number of Attendances at Scene that were not transported to hospital (See and Treat)
	Re-contact percentage within 24hrs of See and Treat

Step 3: Come to see me

This step focuses on how WAST makes decisions about what resources to dispatch to assessed/prioritised calls. Broadly, three response options will be available:

- Emergency Medical Services (EMS – Emergency Ambulances [EAs] and Rapid Response Vehicles [RRVs]) will be allocated to RED calls, and Amber calls ('See & Treat');

- A dedicated patient transport service will be provided by Urgent Care Service (UCS) for low acuity GREEN patients who are assessed by HCPs as requiring admission to hospital.
- Clinical Telephone Assessment ("hear & treat") for other low acuity GREEN calls

Figure II:3: Step 3 Indicators

AQI11	Number of RED category incidents resulting in an emergency response
	Number of RED category incidents with first response arriving on scene within 8 minutes
	Percentage of RED category incidents with first response arriving on scene within 8 minutes, 65% of the time
	RED Category - Median Response
	RED Category - 65th Percentile
	RED Category - 95th Percentile
AQI12	Number of AMBER category incidents resulting in an emergency response
	AMBER Category - Median Response
	AMBER Category - 65th Percentile
	AMBER Category - 95th Percentile
AQI13	Number of GREEN category incidents resulting in a response
	GREEN Category - Median Response
	GREEN Category - 65th Percentile
	GREEN Category - 95th Percentile
AQI14	Number of responded Incidents that received at least 1 resource allocation (excluding incidents where multiple dispatches are appropriate)
	Percentage of Incidents where 1 Vehicle Allocated
	Percentage of Incidents where 2 Vehicles Allocated
	Percentage of Incidents where 3 Vehicles Allocated
	Percentage of Incidents where 4 or More Vehicles Allocated
AQI15	Number of Community First Responders (CFRs) attendances at scene
	RED
	AMBER
	GREEN
	Number of Community First Responders (CFRs) attendances at scene where first response arriving on scene
	Percentage of Community First Responder (CFR) attendances at scene where they were the first response arriving at scene

Step 4: Give me treatment

This step focuses on the development and delivery of a range of clinical care services able to offer a variety of treatment options. The selection of the most appropriate treatment will be supported by decision support tools (e.g., Paramedic Pathfinder for "see & treat"; the Manchester Triage System and the Clinical Assessment System for "hear & treat"). Treatment options will include the use of Alternative Care Pathways or ACPs (set out in a Directory of Services) allowing patients to be referred to primary and community care. WAST will develop a Clinical Hub to coordinate the delivery of care to patients ("sign-posting" for clinical advice, managing referrals to alternative care pathways, and arranging non-emergency transportation, i.e., managing any element of WAST's services that is not time critical).

FigureII:4: Step 4 Indicators

AQI16 i	Percentage of patients with attempted resuscitation following cardiac arrest, documented as having a return of spontaneous circulation (ROSC) at hospital door
	Number of patients with attempted resuscitation following cardiac arrest, documented as having a return of spontaneous circulation (ROSC) at hospital door
	Total Number of patients with attempted resuscitation following cardiac arrest
AQI16 ii	Percentage of suspected stroke patients who are documented as receiving appropriate stroke care bundle
	Number of suspected stroke patients who are documented as receiving appropriate stroke care bundle
	Total Number of suspected stroke patients
AQI16 iii	Percentage of older patients with suspected hip fracture who are documented as receiving appropriate care bundle [including analgesia]
	Number of older patients with suspected hip fracture who are documented as receiving appropriate care bundle
	Total Number of older patients with suspected hip fracture
	Percentage of older patients with suspected hip fracture who are documented as receiving analgesia
	Number of older patients with suspected hip fracture who are documented as receiving analgesia
	Total Number of older patients with suspected hip fracture
AQI16 iv	Percentage of ST segment elevation myocardial infarction (STEMI) patients who are documented as receiving appropriate STEMI care bundle
	Number ST segment elevation myocardial infarction (STEMI) patients who are documented as receiving appropriate STEMI care bundle
	Total Number of ST segment elevation myocardial infarction (STEMI) patients
AQI16 v	Percentage of suspected sepsis patients who have had a documented NEWS score
	Number of suspected sepsis patients who have had a documented NEWS score
	Total Number of suspected sepsis patients
AQI16 vi	Percentage of patients with a suspected febrile convulsion aged 5 years and under who are documented as receiving the appropriate care bundle
	Number of patients with a suspected febrile convulsion aged 5 years and under who are documented as receiving the appropriate care bundle
	Total Number of patients with a suspected febrile convulsion aged 5 years and under
AQI16 vii	Percentage of hypoglycaemic patients who are documented as receiving the appropriate care bundle
	Number of hypoglycaemic patients who are documented as receiving the appropriate care bundle
	Total Number of hypoglycaemic patients

AQI17	Number of Incidents that resulted in non conveyance to hospital
	Treated At Scene
	Referred To Alternate Provider

AQI18	Number of Incidents where RRV Ideal as per clinical response model
	Number of Incidents where RRV sent as ideal response
	Percentage of Incidents where RRV sent as ideal response
	Number of Incidents where EA Ideal as per clinical response model
	Number of Incidents where EA sent as ideal response
	Percentage of Incidents where EA sent as ideal response
	Number of HCP (card 35) calls where UCS ideal as per clinical response model
	Number of HCP (card 35) calls where UCS sent as ideal response
	Percentage of HCP calls where UCS sent as ideal response

Step 5: Take me to hospital

Patients who require ongoing care and treatment will be transported to hospital or to alternative care settings (e.g., Minor Injury Unit or a primary/community care facility). The clinical acuity of the patient will dictate the level of transport. For critical care patients or patients requiring ongoing treatment, EAs will be utilised. All other patients will be

transported by a combination of Urgent Care Services (UCS) and non-emergency patient transport services (NEPTS).

Figure II:5: Step 5 Indicators

AQI19 i	Number of 999 Patients conveyed to Hospital
	Total Number of Incidents where an Ambulance Resource Attended Scene
	Percentage of patients conveyed to hospital following a face to face assessment
AQI19 ii	Total number of patients conveyed to hospital by type
	Tier 1 Major A&E Units
	Tier 2 (Minor A&E Units) - Minor Injuries Unit or Local Accident Centre
	Tier 3 (Major Acute) - Medical Admissions Unit
	Other (all other units such as Maternity or Mental Health Units)
AQI20 i	Number and Percentage of notification to handover within 15 minutes of arrival at hospital
	Number of Notification to Handover within 15 minutes
	Total Number of Handovers
AQI20 ii	Number and Percentage of notification to handover within 15 minutes of arrival at hospital by hospital type.
	TIER 1 (Major A&E Units) - Percentage of Notification to handover within 15 minutes
	TIER 1 (Major A&E Units) - Notification to handover within 15 minutes
	TIER 1 (Major A&E Units) - Total Number of Handovers
	TIER 2 (Minor A&E Units) - Percentage of Notification to handover within 15 minutes
	TIER 2 (Minor A&E Units) - Notification to handover within 15 minutes
	TIER 2 (Minor A&E Units) - Total Number of Handovers
	TIER 3 (Major Acute) - Percentage of Notification to handover within 15 minutes
	TIER 3 (Major Acute) - Notification to handover within 15 minutes
	TIER 3 (Major Acute) - Total Number of Handovers
	Other - Percentage of Notification to handover within 15 minutes
	Other - Notification to handover within 15 minutes
	Other - Total Number of Handovers
AQI21	Number of lost hours following notification to handover over 15 minutes
	Tier 1 Major A&E Units
	Tier 2 (Minor A&E Units) - Minor Injuries Unit or Local Accident Centre
	Tier 3 (Major Acute) - Medical Admissions Unit
	Other (all other units such as Maternity or Mental Health Units)
AQI22 i	Number and Percentage of handover to clear within 15 minutes of transfer of patient care to hospital staff
	Number of Handover to Clear within 15 minutes
	Total Number of Handovers
AQI22 ii	Number and Percentage of handover to clear within 15 minutes of transfer of patient care to hospital staff by hospital type
	TIER 1 (Major A&E Units) - Percentage of Handover to Clear within 15 minutes
	TIER 1 (Major A&E Units) - Number of Handover to Clear within 15 minutes
	TIER 1 (Major A&E Units) - Total Number of Handovers
	TIER 2 (Minor A&E Units) - Percentage of Handover to Clear within 15 minutes
	TIER 2 (Minor A&E Units) - Number of Handover to Clear within 15 minutes
	TIER 2 (Minor A&E Units) - Total Number of Handovers
	TIER 3 (Major Acute) - Percentage of Handover to Clear within 15 minutes
	TIER 3 (Major Acute) - Number of Handover to Clear within 15 minutes

	TIER 3 (Major Acute) - Total Number of Handovers
	Other - Percentage of Handover to Clear within 15 minutes
	Other - Number of Handover to Clear within 15 minutes
	Other - Total Number of Handovers
AQI23	Conveyance to hospital outside of Local Health Board area
	Percentage of Overall Conveyance to hospital outside of Local Health Board area
AQI24	Number of lost hours following handover to clear over 15 minutes
	Tier 1 Major A&E Units
	Tier 2 (Minor A&E Units) - Minor Injuries Unit or Local Accident Centre
	Tier 3 (Major Acute) - Medical Admissions Unit
	Other (all other units such as Maternity or Mental Health Units)

APPENDIX III STAKEHOLDER CONSULTEES

This appendix sets out the key stakeholders consulted over the course of this evaluation. In addition, local/frontline interviews were conducted with GP cluster leads, WAST clinical team leaders, and paramedics, who spoke on condition of anonymity.

Staff consulted at development stage

Consultee	Role
Jonathan Whelan*	Assistant Medical Director
Andy Perris*	Interim Assistant Director of CCC
Gregg Lloyd*	Head of Clinical Operations
Aled Brown	Interim Head of Emergency Care, Welsh Government
Brendan Lloyd*	Executive Lead (Director of Medical and Clinical Services)
Grayham Mclean*	Unscheduled Care Lead
Richard Lee	Interim Director of Operations (Prior to taking up the post as Assistant Commissioner Richard was overall Clinical Lead for developing the model)
Nicki Maher	Head of Health Informatics
Michelle Mabbs	Senior Business Intelligence Analyst

Note: * denotes staff who were also consulted in the evaluation stage.

Full evaluation consultees: Executives

Name	Role
Tracy Myhill	Chief Executive Officer
Brendan Lloyd	Executive Lead (Director of Medical and Clinical Services)

Full evaluation consultees: Clinical Modernisation Leads by Step

Name	Role
Wendy Herbert	Step 1: Assistant Director of Quality & Nursing, Director of Quality and Nursing
Andy Perris	Step 2: Interim Assistant Director of CCC
Grayham Mclean	Step 3: Unscheduled Lead
Andrew Jenkins	Step 4,5: Deputy Director, Medical and Clinical Services

Full evaluation consultees: Clinical Input / Quality Assurance

Name	Role
Gregg Lloyd	Head of Clinical Operations
Chris Sims	Head of Operations – Resilience and Specialist Operations
Jonathan Whelan	Assistant Medical Director

Full evaluation consultees: Training & Implementation

Name	Role
Karen Lockyear	Head of Learning and Development, Workforce & OD
Vince Baglole	Clinical Service Improvement / Support Officer

Full evaluation consultees: Operational Leads

Name	Role
Rachael Edwards	Head of Operations - Clinical Contact Centres
Stephanie Kneath	Interim Clinical Operations Manager
Robin Petterson	Clinical Support Officer Cardiff and Vale

Full evaluation consultees: all others, including EASC members (chair, chief commissioner, board chief executives)

Name	Role
Siobhan McClelland	Chair, EASC
Stephen Harrhy	Chief Ambulance Services Commissioner
Adam Cairns	CEO Cardiff and Vale Health Board /Lead CEO Unscheduled Care
Alison Williams	CEO Cwm Taf Health Board / Vice-Chair EASC
Julian Baker	Director of National Collaborative Commissioning
Joe Teape	Chief Operating Officer Hywel Dda
Nick Wood	Chief Operating Officer Aneurin Bevan
Christopher D.V. Jones	Chair Cwm Taf Health Board/ Lead Chair Unscheduled Care
Grant Robinson	Clinical Lead Unscheduled Care Welsh Government
Phillip Stylianides	Picker Institute
Nigel Lee	Director of Secondary Care BCU
Morag Olsen	Chief Operating Officer BCU
Abigail Harris	Director of Planning Cardiff and Vale
Kevin Davies	Non Executive Director, WAST Board

Topic Guide

The introduction and topic guide for the interviews were very simple. All consultees were sent an email explaining the purpose of the evaluation and consultation and a list of discussion topics as follows:

- Overview - broad successes and any failures of implementation of the new model
- The revised call assessment procedure – is it working as intended?
- Improvements in on-scene decision-making;
- Outputs: early findings from the AQIs and how they are used;
- Emerging evidence on improved care outcomes, patient satisfaction, experience;
- Resourcing (staff + vehicles), staff satisfaction;
- Fit with the wider healthcare system;
- The development of the Clinical Commissioning Framework and how this has affected your work;
- Lessons learned from year 1; avenues for enquiry for the evaluation to discover areas of best practice.

Each email was customised to make it clear that not all topics would be appropriate for all interviewees and that we were particularly interested in their particular areas of expertise related to their role. They were also asked to think particularly about the last point – this evaluation is intended to be formative in part and any lessons learned which could be applied to the model going forward, or other WAST or NHS Wales initiatives, would be helpful.