IMPROVING AMBULANCE RESPONSE TIMES:

HIGH IMPACT CHANGES

AND

RESPONSE TIMES ALGORITHMS

FOR NHS AMBULANCE TRUSTS

Gateway reference 8048

April 2007
## DH INFORMATION READER BOX

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### Document Purpose
Best Practice Guidance

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### Title
High impact changes and response time algorithms for NHS ambulance trusts

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PCT CEs, NHS Trust CEs, SHA CEs

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### Description
This document has been produced for ambulance trusts and key stakeholders involved in the commissioning and performance management to act as a guide, and bring together high impact changes and algorithms to bring about a real and sustained improvement in performance and patient care.

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### For Recipient's Use
IMPROVING AMBULANCE RESPONSE TIMES – HIGH IMPACT CHANGES

The improvement philosophy underpinning the concept of High Impact Changes starts from the principle that ambulance service operations need to be designed not just to avoid performance failure, but also to enable continuous improvement across the whole organisation.

Typical components of this type of performance improvement strategy could include:

- Designing the system to continually improve
- Taking a detailed process view of the flow of calls and patients across departmental/organisational boundaries
- Working smarter not harder
- Focusing on bottlenecks in the system
- Managing and reducing causes of variation in performance
- Segmenting patients according to their specific needs
- Implementing measurement systems for improvement that reveal the true performance of the system and the impact of any changes made in real time.

Performance is improved by mapping patients through the system and removing activities that do not add value or create delays and bottlenecks. Processes must be simplified and speeded up. This often involves both process re-design and role re-design and the two have to be considered in parallel.

What does this mean for the ambulance service?

This document has been produced for ambulance trusts and key stakeholders involved in the commissioning and performance management of ambulance services.

It is designed to act as a guide, bringing together a number of high impact changes, both operational and control room based, developed to bring about a real and sustained improvement in performance and patient care.

Some of them stand alone in terms of delivery; others have clear dependencies with each other and require planned implementation through a robust project management process. In developing this document, we have considered the whole call management cycle and have worked to ensure that the changes are complementary and improve the whole system rather than just individual areas.

The document also lists identified areas of good practice within ambulance trusts and highlights a number of Department of Health publications which organisations may find helpful.
## HIGH IMPACT CHANGES

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Ownership of performance by key managers

Rationale
Allows “on the day” management of performance, led by the Director or senior member of staff responsible for performance. Ensures ownership of problems, and rapid implementation of corrective action.

What
- Daily/ weekly briefings, led by the trust performance lead, with key managers, which are decision oriented and based on corrective action required.
- Telephone conference early each day to discuss previous day’s performance and also to plan actions for the current day

How
- Time-limited weekly meetings held with key managers, which are decision oriented and action based.
- Managers held account for non-delivery of agreed actions.
- Live performance information available to key managers throughout the working shift, including weekends.
- Messages generated automatically by the CAD system, at least four times a day to a pager or mobile phone (by SMS).
- Use of the DH ambulance reporting tool (see demand analysis section)

Best practice
South East Coast Ambulance Service have developed a web based performance and activity reporting tool. This enables the ambulance service to drill down to station, PCT, postcode and dispatch level to review performance and activity. This data is imported into the system from the three CAD systems within the Trust and provides a Trust wide picture for Managers and Team Leaders to use.

The tool also reports on the performance of individual call takers and dispatchers. An in-bound patients screen also enables the patient handover time at the hospital to be recorded.

An important report from the tool is one which actively indicates when and where a 999 call has missed meeting the standard.

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Effective Staff Management

Rationale
Effective management of staff resources optimises capacity to achieve a real and sustained improvement in performance.

What
- Sickness levels should be below 5% of operational staff establishment
- Extraction rate\(^1\) to include sickness, leave and training and must be agreed and managed throughout the organisation
- Extraction rate should be based on the relief ratio\(^2\)
- A 35% relief ratio is required to deal with all the mandatory requirements around training, leave etc

How
- Annual leave managed during the Christmas and New Year period
- Extraction rate and management of the quota to be reviewed regularly at the weekly key manager’s performance meeting.
- IWL publications contain helpful case studies and further information. A literature search will reveal case studies and presented papers to cover this topic.
- The references provided at the back of this document will also help.

Best Practice
After a damning report by CHI (now the Healthcare Commission) the Kent sector of the South East Coast Ambulance Service embarked upon a programme of service and performance improvement.

Following the report by CHI a very detailed clinical governance and performance improvement plan was developed by the Executive Team, and this was discussed and agreed by staff-side representatives, prior to being presented to the trust board. For example, some of the measures included, establishing a risk management and clinical governance committee, allocating risk and governance to a Director on the trust board. Reviewing the other directorates in terms of roles and responsibilities and ensuring that the plan was communicated to all staff within the trust. A dedicated and experienced IWL lead was appointed and each directorate carried out internal reviews to ensure that their team had the systems and processes in place to meet the objectives of the clinical governance and performance improvement plan.

Delivery of the plan was also dependent upon Commissioner support as the earlier plans of reconfiguration did mean that new investment in the trust had not been forthcoming. The ambulance trust worked hard with Commissioners and was well supported by the Lead Commissioner for the service and a joint-phased approach was agreed around the investment, performance improvement and delivery of the plan overall.

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1 An extraction rate in ambulance trusts is considered to mean the number of staff each day stood down or absent from operational duties due to authorised absence which will reduce cover.

2 A relief ratio in ambulance trusts is the number of staff who are on permanent shift relief duties, compared to the number of staff who are employed on permanent roster lines.
The first IWL assessment was a marginal pass and the service decided to appoint a dedicated IWL lead. Some new members were appointed to the Executive Team and a staff engagement and IWL strategy was developed. Two years later the service gained IWL Practice Plus Status, and scored very highly in the national staff survey, showing a major improvement.

The extraction rate was managed fairly with staff and additional investment in the service enabled the relief ratio to be improved, with sickness levels also improving.

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Dynamic deployment plans

Rationale
Dynamic deployment is a common term used in ambulance services to describe the practice of moving resources closer to the predicted source of the next call. This can use a variety of locations, as well as ambulance stations having ambulances on standby. Locations are dependent on predicted demand, and may vary over the course of a week/year. Resource mobilisation is quicker from standby positions, and this together with their location may help with response times.

What
• Analysis of historical demand, to predict areas of high demand by time of day, day of week, time of year. Resources allocated on strategic standby to areas of predicted high demand.
• To have the plan integrated into the CAD system and to deploy resources to various standby positions, in accordance with the agreed plan.

How
• Identification of standby points, differentiating between those to be used on a regular basis and occasional temporary standby points, taking into account traffic flows, location of facilities etc
• Ongoing monitoring of compliance with the Plan by control room staff
• Ongoing review of the Plan to reflect variance in demand. Linked to six-monthly roster review
• The Plan should include no more than 20 resources per dispatch desk
• Training implications for control room staff need to be considered.
• Communication with front-line personnel is essential to ensure understanding and buy-in when developing and implementing plans, and to manage any concerns around safety of lone workers
• Use of the DH ambulance reporting tool (see demand analysis section)

Best practice
East of England Ambulance Service – Bedfordshire and Hertfordshire sector use the MIS Alert 2000 CAD system. The deployment plan has been developed by carrying out local demand analysis on the basis of historic data and this work is led by Alison Webb, the data analyst in the Bedfordshire and Hertfordshire sector.

Demand analysis is carried out at least three times a year to review the deployment plan and make any changes that are required. The plan is built into the deployment part of the CAD and automatically activates an ambulance or response vehicle to go to standby position. The Trust has an agreed deployment strategy in place which does not allow for two vehicles to be posted to the same standby position at the same time.

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Development of a front-loaded model

Rationale
Fast-response vehicles and, in some areas community/ co-responder schemes, can often get to the scene faster than traditional ambulances, and can provide assessment and care until back-up arrives.

What
- “Front-loaded model” is an expression used to describe a reduction in the proportion of traditional ambulances in a fleet and an increase in the proportion of fast response vehicles
- Fast-response vehicles with a paramedic or ECP on board may obviate the need for a traditional ambulance, particularly as some cars can transport patients to hospital or other care setting.
- Community/ co-responder schemes are best used in areas where an 8 minute ambulance response more challenging due to the isolation of the area/ low demand levels. Community responder schemes are not a substitute for an ambulance response and dispatch of the two responses should be concurrent.
- Sending a single response rather than two to appropriate Category A calls frees up resources for other calls and helps to optimise performance around A8/ A19 response standards.

How
- Deployment of FRVs needs to be fast, with use of dynamic deployment to gain maximum benefits in terms of performance.
- Modern CAD systems will allow the auto-paging of community/ co-responders when a call is received in the area covered by the scheme.
- Appropriate targeting of community/ co-responder schemes is necessary to ensure that they are not sent to calls that are beyond their competence to deal with.
- Requires workforce re-engineering and effective engagement with unions and staff.
- Additional training for control room staff around a new deployment regime is critical.
- In particular operational staff will require considerable assurance that this working practice is staff and that support from key managers is available to them as and when required.
- Identify appropriate call codes and flag them on CAD
- Consider staffing implications on dispatch desks in the control room, and the need for different ways of working in the control room
- Effective staff side engagement critical
- Links to dynamic deployment plans, and introduction of front-loaded models.

Best practice (1)
Many ambulance services in their plans to deliver call connect are implementing a significant change to the resources deployed to 999 calls. This is known as the “front
“loaded model” and is a term used to describe a planned reduction in the number of front-line double crewed ambulances deployed to a call and a significant increase in the number of single crewed response vehicles, capable of conveying patients.

This model has workforce implications for ambulance services and will take several months to implement successfully. Dispatchers in 999 call centres will also have to be re-trained in the deployment of more single responders and manage in a different way the allocation of calls to a conveying ambulance.

Paul Gates, Assistant Director of Production at the Great Western Ambulance Trust has prepared an operational synopsis of what issues ambulance Trusts may face when they start to implement the front loaded model. Paul is happy to share this paper with other interested parties.

Contact Details –
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Best practice (2)
West Midlands Ambulance Service have introduced a Solo Responder Back up Procedure which has now been agreed with staff and recently introduced. It works by not automatically sending a back up response to a First Contact Practitioner or Paramedic when responding to a Category A call unless specific criteria are met. For example, young children, patients exposed to the elements, seriousness of patient condition, health and safety issues – for staff and/or patient; may all mean that a back up response is dispatched.

This procedure will assist with the introduction of the front loaded model.

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Effective matching of resources to demand

Rationale
This is a basic requirement of achieving performance. Having correct rosters in place, which reflect demand patterns, ensures that there is capacity to provide a rapid response and that efficient use is made of resources.

What
- Varying rosters to reflect seasonal fluctuations in demand
- Mix of different start and finish times, varying shift lengths to meet demand and to manage impact of shift handover periods
- Review rosters twice yearly to check continued appropriateness

How
This change can be complex and time-consuming to implement. Changes need to be owned by staff and therefore early engagement with staff and unions is essential.

Some services have centralised rostering through PROMIS, while other services have encouraged self-rostering through self-managed teams of eleven or twelve staff.

Best practice
In the East Midlands Ambulance Service, the Lincolnshire sector has developed the concept of self-managed teams. Through a team leader with a dedicated team of Technicians and Paramedics, they arrange to cover annual leave, sickness and training from within each team.

The teams work on the basis of annualised hours and Working Time Directive software suggests a number of roster options, which match demand, for the teams to consider.

The self-managed teams concept has been very successful and the Trust are proposing to roll this out to other sectors, which may include the control room.

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Demand analysis

Rationale
Understanding of historical and current demand, and use of data to predict demand and plan capacity underpins an effective high performance regime.

What
Systems and processes in place to be able to identify quickly peaks and troughs in performance and understand the causes of deviation to enable corrective action to be taken.

How
- Agreed minimum dataset, which provides daily critical performance information to key managers. The summary report from the DH ambulance reporting tool (see below) could form the basis for this dataset.
- Data analysis team that has the ability to undertake rapid analysis of performance information and is able to present the findings in operational terms.
- Use of software to provide modelling around demand/ dispersion patterns and distribution.
- Use the DH ambulance reporting tool to understand demand and barriers to improvement
- Quarterly demand capacity planning reviews.
- Bi-annually review demand, performance arrangements and dispersion of activity.
- Prepare separate capacity plans for known peak periods of demand such as summer holidays, winter, bank holidays, Christmas and New Year.
- Involve out of hours services, A&E departments, urgent care networks and PCTs in developing the plans to ensure that the impact upon other services is realised and managed, and to consider alternative care pathways.

Best Practice
The Mersey sector of the North West Ambulance Service has developed a performance dashboard. The dashboard works by importing live data from the CAD system into the dashboard on an hourly basis and provides reports to managers around performance and activity for their operational area. The Trust also believes that the dashboard is helping them to understand much more about the changes that need to take place in the control room to support the introduction of call connect.

On each Monday morning Operational Managers review with staff the performance issues and test with them the effectiveness of any changes that have been made. This information then forms a major part of the sector performance plan which is discussed at the weekly meeting of Area Managers, chaired by the Head of Service. The performance issues are then fed into the Executive Team which meets every Tuesday afternoon.

At the weekly meeting Managers are held to account by the Head of Service for implementing any changes agreed at the last meeting.
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**DH ambulance reporting tool:**

A standard set of core analysis of ambulance trust data has been developed by the Department of Health. The purpose of this core analysis is to provide a structure for operational managers to identify the particular causes of performance problems and therefore focus improvement effort in the places where it will have the most benefit.

Data collected in the template sheet provided can be uploaded into the analysis tool. This will produce a series of graphs and summary information designed to answer questions about the causes of performance problems.

The tool can be accessed at:

Control room awareness and ownership of individual and collective performance

Rationale
Creating awareness of current position and encourages improvement. Enables individual and team performance to be managed.

What
Using new technology to measure the performance of Control Room Supervisors/Managers and call takers and dispatchers.

How
• Category A, B, C, GP urgent and call answering times should be displayed, linked to the CAD for real-time data.
• A separate display should also be available showing incoming 999 calls awaiting dispatch
• A display board showing 999 call pick-up, call waiting, calls lost per shift
• All managers able to access this information electronically
• Be clear about expectations around individual and team performance
• Manage variations in individual performance from norm/ best practice

Best practice
West Midlands Ambulance Service has developed local performance indicators for control room staff. Call pick up information is updated every 15 minutes and this enables the duty supervisor to post performance on a white board every hour, showing the position as at midnight, week to date and year to date.

The four teams of call takers and dispatchers are measured on the activation of resources for Category A8/ A19/ B19/ Urgent and Category C performance. This is also plotted on a chart and forms a part of the performance review process for supervisors, call takers and Dispatchers.

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Reference Material

DH ambulance reporting tool (web-based tool):

Improvement Partnership for Ambulance Services best practice document:
‘Driving Change Good Practice Guidelines for PCTs on Commissioning Arrangements for Emergency Ambulance Services & Non-Emergency Patient Transport Services’

4-hour checklist: Reducing delays for A&E patients (web-based tool), Ambulance Improvement Checklist and Ambulance Trust Self-Assessment Tool:

DH USB memory stick from Strategic Learning Event – Feb 2007:
Call Connect presentation
Copy of key speaker presentations
Call Connect Core Script
Ambulance Response Times Algorithm

IWL toolkit:
The improvement philosophy underpinning the concept of high impact changes starts from the principle that ambulance service operations need to be designed not just to avoid performance failure, but also to enable continuous improvement across the whole organisation.

One of the key high impact changes is effective demand analysis. Performance is improved by mapping patients through the system and removing activities that do not add value or create delays and bottlenecks. Processes must be simplified and speeded up. This often involves both process re-design and role re-design and the two have to be considered in parallel.

The ambulance reporting tool provided by the Department of Health can be used to identify bottlenecks. This algorithm sets out some actions to tackle bottlenecks identified in each stage of the call management cycle. The aim should be to focus on bottlenecks, and to seek to manage reduce variation in performance to acceptable levels. Trusts should seek to establish measurement systems for improvement that reveal the true performance of the system and the impact of any changes made in real time.

In addition, trusts should also set internal targets for improving overall ambulance availability through actively managing down job cycle times.

**Response Time**

- **Call Connect** – The time the telephone call hits the switch.
- **Call Answer** – Time when the telephone call is answered by a competent and trained call taker.
- **Assign Vehicle** – When the call sign of the responding resource is allocated to the CAD.
- **Vehicle Mobile** – When the allocated resource begins responding to the scene of the call.
- **Arrive Scene** – When the allocated resource arrives at the location given.
- **Leave Scene** – When the allocated resource leaves the scene to transport patient to a treatment centre.
- **Arrive Treatment Centre** – When the allocated resource arrives at the treatment centre.
- **Patient Handover** – When the allocated resource has been relieved of patient responsibility.
- **Vehicle Clear** – When the allocated resource is available for further work.
The descriptions contained in the call management cycle have been agreed by Operational Directors from Ambulance Services and have been built into the ambulance reporting tool developed by the Department of Health.

The high impact changes described in this document are a representative sample taken from the other paper, which forms part of this information pack.

The call management cycle times set out below are an average only, and have been used in various pieces of operational research carried out in a range of English ambulance trusts for modelling the performance changes required to achieve response time standards with call connect in place.

**The Traditional Service Model – average best practice times for benchmarking purposes**

These descriptions are taken from the call management cycle above –

1. Call connect to call answer = 5 seconds
2. Call answer to vehicle assigned = 55 seconds
3. Vehicle assigned to vehicle mobile = 30 seconds
4. Call connect to vehicle mobile = 90 seconds

**The Front Loaded Model (FLM) average best practice times**

1. Call connect to call answer = 5 seconds
2. Call answer to vehicle assigned = 35 seconds
3. Vehicle assigned to vehicle mobile = 20 seconds
4. Call connect to vehicle mobile = 60 seconds

**The turnaround times at a healthcare facility**

The time between the arrival of an ambulance transporting emergency or urgent patients to a healthcare facility (vehicle arrival) and the vehicle becoming available again to respond to 999 calls (vehicle clear) should be on average 15 minutes. This is known as the turnaround time.

The clock for measuring waiting times in A&E departments should start 15 minutes after vehicle arrival, whether or not the ambulance crew has handed over that patient to the care of the A&E department.

**On scene times**

On the basis of performance modelling work carried out in the majority if ambulance trusts in England, it has been found that the best practice on-scene times for First Response Vehicles (FRVs) and ambulances under both models are as follows:

- Traditional model – 15-20 minutes (FRVs and ambulances)
- Front loaded model – 30 minutes (FRVs)
15 minutes (Ambulances)

**Performance Improvement using some High Impact Changes**

| Call connect to call answer |
The use of technology

Display live performance data in the control room

Introduce Enhanced Information Service for Emergency Calls (EISEC) and Automatic Location Service for Emergency Calls (ALSEC)

Introduce Automatic Call Distribution (ACD) telephony

Display direct from the telephone switch 999 call pick-up times etc

People and processes

Carry out a review of demand to ensure that resources are matching the demand profile and distribution of calls received. This review should also apply to both control room staff and operations

Review call taking processes within the control room to ensure that calls are answered within the target time

Agree key performance targets for call takers, dispatchers and supervisors in the control room

Monitor and review performance of individual teams within the control room on a monthly basis

Separate call handling functionality and separate supervisor call handling

More flexible working with other administrative staff working in the control room – to take 999 calls during unexpected peak periods

Call answer to vehicle assigned
Delays in assigning a vehicle from call answer

**Benchmark 55 seconds**

### The use of technology
- Check CAD systems for speed and functionality and ensure that mapping software is up-to-date
- Ensure that the GPS tracking is working correctly and provides consistent updates to the CAD system
- Have an interface in place which loads up the location of the call directly into the satellite navigation system from the MDT on the vehicle
- Check time sources on CAD systems, MDTs, mobile data routers to ensure time synchronisation.
- Ensure staff are trained to make full use of CAD functionality

### People and processes
- Carry out regularly demand analysis reviews to ensure that resources in the control room and operations matches the current demand pattern.
- From the demand analysis review, ensure the dynamic deployment plan (which should be CAD based) is updated to reflect any changes to the dispersion and distribution of activity.
- Have an agreed extraction rate policy in place and maintain staffing levels in accordance with this policy.
- Feed back daily to the control room supervisor any unplanned / unauthorised drops in shift cover at the start or during the shift
- Analyse data showing calls that fall outside of the 8/19 minute window and determine the cause of delays associated with assigning a vehicle to the incident.
- To understand performance bottlenecks use the ambulance reporting tool to gain information on delays in assigning vehicles to calls
- Continue to dispatch to urgent calls when vehicles available and divert onto higher priority calls if necessary

**Vehicle assigned to vehicle mobile**
Delays in vehicle becoming mobile

**Benchmark 30 seconds**

### The use of technology

- Ambulance trusts should consider the implementation of auto-dispatch procedures for community and co-responders, FRVs and ambulances.
- Eliminate the use of telephone activation at station level and activate via mobile data radio systems.
- Check time sources on CAD systems, MDTs, mobile data routers to ensure time synchronisation.
- Monitor and review mobile data transfer failures.
- Introduce an alarm in the CAD system to notify dispatchers of delays in vehicles becoming mobile above 15 seconds.

### People and processes

- Have an exception reporting process in place for all delays above 30 seconds and forward those with operational implications should be forwarded to a local sector manager for investigation and follow-up action.
- Control supervisor to be notified by dispatcher of any mobilisation delays, which exceed the target time.
- When a frequent pattern of mobilisation delays occur, these should be investigated to determine route cause which may include technological failures, difficulties accessing or leaving stations or response posts or individual performance.
- Review working practice on station so that vehicles are immediately ready to mobilise e.g. phone near or en route to the exit.
- To understand performance bottlenecks ambulance services are encouraged to utilise the ambulance reporting tool, which will provide further information around delays in assigning a vehicle to a call.
Delays in arriving on scene  
**Target 75% within 8 minutes**

### The use of technology
- Optimum use being made of CAD systems, mapping software, deployment plans and GPRS tracking
- Live performance information, perhaps through a dashboard, circulated to all key managers from a control centre electronically with regular updates throughout the day
- To introduce the use of EISEC and ALSEC and modern telephony including ACD in control rooms to speed up the call taking and dispatch process

### People and processes
- Carry out regular demand analysis reviews to ensure that resources in the control room and operations matches the current demand pattern.
- Frequent meetings held between trust performance leads and key managers involved in performance delivery. These meetings should be action orientated and based upon information received through the performance dashboard
- Excellent staff involvement and communication around the design of rosters, demand analysis and any required workforce re-engineering.
- To understand performance bottlenecks ambulance services are encouraged to utilise the ambulance reporting tool, which will provide further information around delays in assigning a vehicle to a call.
- Continue to dispatch to urgent calls when vehicles available and divert onto higher priority calls if necessary

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**On scene delays**
On scene delays
Benchmark average for FRVs
30 minutes and ambulances
15 minutes

The use of technology
Consider the use of new technology
to automatically stop the CAD clock
when the resource arrives on scene
Install a CAD alarm to notify
dispatchers when the on scene
times have exceeded 15 minutes

People and processes
Develop rapid handover and stand
down arrangements between FRVs
and double-crewed ambulances at
the scene of the incident.
Activate an operational officer to any
incident where it is anticipated that
the on scene time will exceed 20
minutes
Identify on the CAD record when it is
known that the incident will have a
longer on scene time than 15 minutes
and consider deploying an
operational manager to manage the
incident

Turnaround times
Delays in hospital turnaround

**Benchmark average – 15 minutes**

### The use of technology

- Install inbound patient CAD screen to accurately record patient handover times
- Install auto reporting to automatically time stamp the CAD record when the vehicle arrives at the healthcare facility

### People and processes

- Staff to notify the control room of any delays over locally agreed threshold
- Operational managers to be deployed to the healthcare facility based on set thresholds e.g. total number of minutes at hospital (which could be 1 ambulance at hospital for 120 minutes, or 10 ambulances at hospital for 12 minutes each)
- Ensure regular liaison between the ambulance and acute trust around A&E delays