NHS

South East Clinical Senate
Kent, Surrey and Sussex
Hampshire, Thames Valley

South East
Clinical
senate

# Access and provision of primary Percutaneous Coronary Intervention (pPCI) in Kent and Medway

**DATE 11.05.21**

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## Background

A discussion was held with the SE Clinical Senates' Councils, South East Coast Ambulance service (SECAmb), specialised commissioning and the recently established cardiac network representatives about the inequalities in patient care in ST-elevation Myocardial Infarction (STEMI) across the part of the region that South East Coast Ambulance service cover in response to issues/concerns raised by SECAmb with respect to the primary Percutaneous Coronary Intervention pPCI pathway.

It has been noted that there are different approaches across the patch in the use of Patient Group Directives (PGDs) and a reluctance of some hospitals to accept patients straight into their cardiac catheterisation labs.

SECAmb had also noted some issues around capacity, particularly at William Harvey Hospital in Kent, who are receiving many more patients than the service was commissioned for.

Previously strategic cardiac networks would have provided an appropriate platform to discuss these issues, but it was reported that these had fallen away over recent years and SECAmb were unsure of who to bring the issues too.

Slides and paper, Clinical Audit Report: STEMI, (attached as Appendix A) were presented by Claire Hall, Clinical Pathways Lead SECAmb and Fionna Moore Medical Director, SECAmb.

Chris Tibbs, Medical Director Specialised Commissioning NHS EI SE and the newly appointed clinical lead to the re-established SE Region Cardiac Network Yaver Bashir; Consultant Cardiologist Clinical Director Cardiology, Cardiac & Thoracic Surgery Oxford University Hospitals NHS Foundation Trust and SE regional lead joined the meeting.

## Main issues:

A number of issues were presented to the Joint Councils':

- Primary PCI pathway has been in place for 11 years.
- There was a cardiac network until a few years ago.
- Now no overarching body for system governance.
- Changes in demand and capacity now quite pronounced.
- Call for help – hospital increasing nationally.
- HSIB report (2021) querying if thrombolysis should be reconsidered for some long call - door cases.
- The majority of SECAmb cases go to either William Harvey Hospital in Kent (for Kent patients) or Sussex University hospital for Sussex patients, there are a variety of hospitals within Surrey that accept Surrey residents.
- Due to Kent only having one pPCI centre, the call to door time is significantly higher than for patients in Surrey.
- The fundamental question is: what is the right geographical spread of pPCI centres?

- Some North Kent patients may benefit from going to Kings, as this would present a shorter call to door time, but not currently commissioned.

## Questions to Senate

- Intervention protocol decisions.
- Out of Hospital cardiac arrest service provision consistency across the region, e.g. shock resistant VF, criteria for acceptance, ICU pressures etc.
- HSIB recommendation to consider thrombolysis.
- Overview of whole system (e.g. unwarranted variation, increasing call to door times, increasing demand on some centres causing delay to treatments).
- Unwarranted variation in governance.
- General network system clinical and operational governance.

## Conclusions

- There is evidence of an inconsistent service with some variation.
- More data evidencing this variation is required.
- Some areas of high deprivation are poorly served.
- Additional detail on what is acceptable variation, taking account of the transport infrastructure across Kent and Medway.
- Some areas are underperforming with regards to standards.
- Other specialised networks have a very good systems governance in place, for example the Trauma network, Cardiac care is an outlier.
- There appear to be two key groupings of the issues raised: Those that can be resolved by more uniform and consistent ways of working, and those that require additional investment. The former can hopefully be resolved with the reformed cardiac network, the latter will need to be addressed by commissioners.
- Looking at disparity of services between London and K&M it is 'hard to explain' current configuration. But this is a complex issue requiring more detailed evidenced debate.
- Acknowledged the 'gravitational' pull of London in terms of staffing and facilities but to allow the whole Kent & Medway population equity of access (including remote and rural populations) commissioning pathways need reviewing.
- At the scene Thrombolysis not the solution for capacity issues.
- Network preference would be to work on capacity issues rather than have patient's cross tertiary pathways or change the commissioning pathways.
- Cardiac network must be sighted on the whole of the pathway not just pPCI.

## Unwarranted variation

- In terms of cardiovascular disease, people in the most and least deprived areas are affected differently, and this is reflected in the inequalities across the network.
- It is an important contributor and the cardiac network should be looking at the overall CVD pathway.
- PH can provide data on the inequalities associated with deprivation and rurality and are a logical resource to routinely hand out this data.
- Underuse of treatments such that cost-effective interventions are not being provided.
- End to end pathway must be considered.
- Inequity of care (a subset of underuse) such that parts of the population are not accessing treatment, possibly because of their social background.

# Next steps

- General agreement from the joint Councils' re the overarching value and utility of the discussion.
- Discussion has provided a partial overview of priority areas of focus for the SE Cardiac Network as it is established. Whilst the focus of the discussion has been in Kent Surrey and Sussex and Kent and Medway specifically, many of the issues raised are relevant to the Region as a whole.
- Councils to consider how best to keep appraised of progress and specifically the potential to reflect issues highlighted into the forthcoming review of Cardiology services in East Sussex.
- Explore future opportunities for the Cardiac Network to update and present progress at a future Joint Councils' meeting.
- SECAmb and South Central Ambulance Service (SCAS) to update each on progress at the next joint South East Clinical Senates' Council meeting 16 September 2021.

Appendix A

# STEMI - Clinical Audit Report

## May 2021

# Contents

# Executive Summary

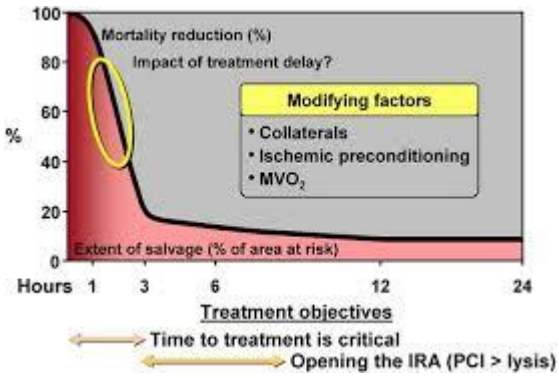
Attendance, treatment and conveyance of patients with ST elevation myocardial infarction (STEMI) remains a significant and important part of SECAmb's activity. Identification of possible STEMI and swift conveyance to a primary Percutaneous Coronary Intervention (pPCI) centre are the 2 most important elements of care for these patients, and can significantly reduce mortality and morbidity. Other elements, such as administration of certain medications, can support treatment and comfort, but only if administered in a manner which does not cause delay. SECAmb has been underperforming with regard to some aspects of the STEMI 'care bundle' for some years. This audit explores performance of the entire SECAmb STEMI journey against national and local standards to identify focussed recommendations for quality improvement initiatives.

SECAmb is performing very well against some standards, such as identification of possible STEMI during 999 or 111 call, dispatch of an appropriate vehicle, administration of some medications in a timely and appropriate manner and assessment of pain with accompanying features. Others are less well met, such as administration of analgesia, time to first ECG, unnecessary calls for back-up and overall time on scene. These are aspects which may be amenable to quality improvement methodology after feedback from staff to identify possible underlying causes. Some standards are more systemically influenced, such as category 2 performance, delays possibly due to pPCI centre decision-making and time-consuming personal protective equipment (PPE) for Covid protection. Increasing ambulance response and 'at scene' times for STEMI are reflected nationally, and the subject of a recent Healthcare Safety Investigation Branch Report (HSIB 2021) querying whether thrombolysis should be considered for some STEMI patients where there will be a long delay to pPCI. These questions require systemic solutions, and the current extablishment of a cardiac network in the south east should support streamlined collaborative solutions. Finally, some standards may now need review at national level due to changing evidence. Ensuring compliance against these standards needs further discussion and decision-making within SECAmb.

This audit identifies some excellent care, alongside some care which could be improved. It is hoped that all aspects will be fed back to staff, explored and learned from for the benefits of this patient group.

## Background

ST elevation myocardial infarction is a life-threatening acute condition where blood supply to myocardial tissue is blocked, starving the heart of oxygen and nutrients. This sequence of events can result in dangerous cardiac arrhythmias, permanent damage to heart muscle causing chronic heart failure, or death. Most blockages are caused by a blood clot brought about by a ruptured atherosclerotic plaque. Evidence shows that the first 3 hours after the infarct begins are time critical in terms of saving the maximum amount of ischaemic myocardium through unblocking the artery. After this time, benefits of treatment are minimal as most damage has already been done.




Average time that patients wait in the UK before calling 999 or 111 for chest pain is about 2 hours (Wechkunanukul, Grantham and Clark, 2017), so a substantial amount of the time critical 'first 3 hours' can already be lost before the patient seeks help.

There was a reduction in absolute numbers seeking help for STEMI after the first lock-down in March 2020, reaching a nadir in April. Numbers were returning to their normal averages by the timeframe of this audit (July – September, 2020), but were not completely back to pre-Covid levels (University of Leeds, 2021). The time-frame for this audit was chosen as the worst of the first wave of Covid had passed, and patient and crew behaviour was returning to some level of pre-Covid normality. However, PPE was still required, necessitating longer on scene and 'job cycle' times, and some pPCI centres were experiencing Covid related challenges in workforce and also changed their logistics, which may have affected time to accept patients on the pPCI pathway. Some standards were more likely than others to be affected by Covid – where appropriate, extra time against some standards has been allowed in this audit.

The pre-hospital pathway for patients suspected of having a STEMI is governed by standards from the following:

- **Joint Royal Colleges Ambulance Liaison Committee (JRCALC) Guidelines** sets out detailed care guidelines for acute coronary syndromes which are aligned to NICE and the European Society of Cardiology.
- **Ambulance Quality Indicators (AQIs)** set out the following national audit standards:

  1) Ambulance System Indicators: the Ambulance Response Programme (NHSE, 2017) classes the usual symptoms described by STEMI patients as an 'emergency' (eg, chest pain, shortness of breath). An emergency is defined as: 'Potentially serious conditions that may require rapid assessment and urgent on-scene intervention and/or urgent transport' (NHSE). This will 'trigger' a category 2 response.

     Targets for a category 2 call are:
     a) Average response target: 18 minutes,
     b) 90th centile response target 40 minutes

  2) Clinical Outcomes Indicators (NHSE) sets out what care the patient should get once the clinician is on scene – known as the 'STEMI care bundle'. This consists of:
     a) Appropriate analgesia
     b) Two pain scores

c) Glyceryl trinitrate (GTN) (unless contraindicated or refused)
d) Aspirin (unless contraindicated or refused)

3) **National Ambulance Service Clinical Quality Group (NASCQG)** sets out specific details about how the AQIs should be audited. Of note:
   a) Paracetamol is only acceptable if morphine sulphate and Entonox are contraindicated or refused.
   b) If a hospital doctor advises against any aspect of the care bundle when accepting the patient for pPCI, this can be included as an exception if documented.
   c) An initial pain score of 0 or documentaon that the patient is pain free can be audited as compliant with 2 pain scores.

4) **SECAmb's 'STEMI and pPCI flow-chart'** (appendix 1) which is based on JRCALC guidelines, but also includes specific Trust-based guidance such as the administration of the P2Y12 inhibitor, ticagrelor.

## Aim & Objectives

### Audit aim

This audit aims to examine whether STEMI care within SECAmb is compliant with relevant standards with a view to developing focussed and specific quality improvement initiatives.

### Audit Objectives

Objectives are:

- To audit SECAmb STEMI performance against all relevant standards
- To highlight any unwarranted variance of care between patients with STEMI in the SECAmb area.
- To highlight correlations between various aspects of the audit as the basis of further exploration.
- To recommend avenues for quality improvement for STEMI care within SECAmb.
- To highlight good audit compliance where it exists.

## Methodology

### Design

This is a retrospective clinical audit of all geographical areas of the Trust during a 3 month period, where a patient was accepted and conveyed from the community with a suspected STEMI to a pPCI centre.

## Samples

## Inclusion criteria

**Two samples of incidents were identified after a search of the Trust's Doc-Works Patient Clinical Record Database, based on the following criteria:**

**Sample A (larger sample for increased reliability for some criteria):**

- **Dated between 1st July 2020 and 30th September 2020.**
- **Crew condition code of A02 (Acute ST segment elevation myocardial infarction)**
- **Conveyed to a pPCI centre**

The sample size was 319 incidents

**Sample B (smaller sample to allow for more detailed analysis given time and resource constraints)**

- **Dated between 1st August 2020 and 31st August 2020.**
- **Crew condition code of A02 (Acute ST segment elevation myocardial infarction)**
- **Conveyed to a pPCI centre**

The sample size was 96 incidents

## Exclusion criteria

- Coding errors
- Cases where care was handed over to HEMS at any point
- End of Life Care
- Interhospital transfers
- Cases where the patient had a cardiac arrest before reaching hospital.

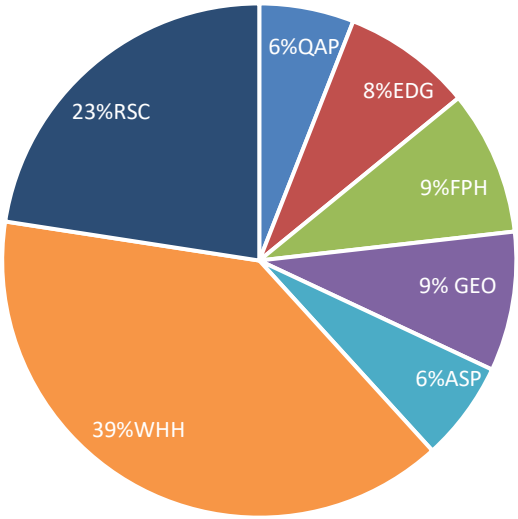
## Data collection and analysis

The data was analysed by SECAmb's Clinical Pathways Lead using a Microsoft Excel spreadsheet and populated from the Doc-Works database of patient clinical records. 319 incidents (sample A) were reviewed by assessing the patient clinical record for the incidents against standards of timeliness. A sub-set of 96 cases (sample B) was analysed in more detail against a further set of clinical standards. It was hoped to be able to look at the data at Operating Unit (OU) level, but the data was not reliable in this regard without substantial cleaning, so this aspect was abandoned.

## Demographic and other Information (samples A and B)

- **First call was to 111 in 13% of cases**
- **Mean time from chest pain start to call for help (999 or 111) was 241 minutes (4 hours)**
- **Mean patient age was 66 years old, with the youngest cohort in E Sussex and the oldest in W Sussex (3 year range)**
- **Females accounted for 31%, males 69% (none were described as non-binary)**
- **69% of callers included chest pain as a symptom, 5% described upper back pain, 26% described miscellaneous symptoms such as shortness of breath, vomiting, etc**

**Patients were conveyed to the pPCI hospitals as follows:**




Key and sample sizes

WHH (William Harvey) n=125

RSC (Royal Sussex County) n=72

FPH (Frimley Park Hospital) n=29

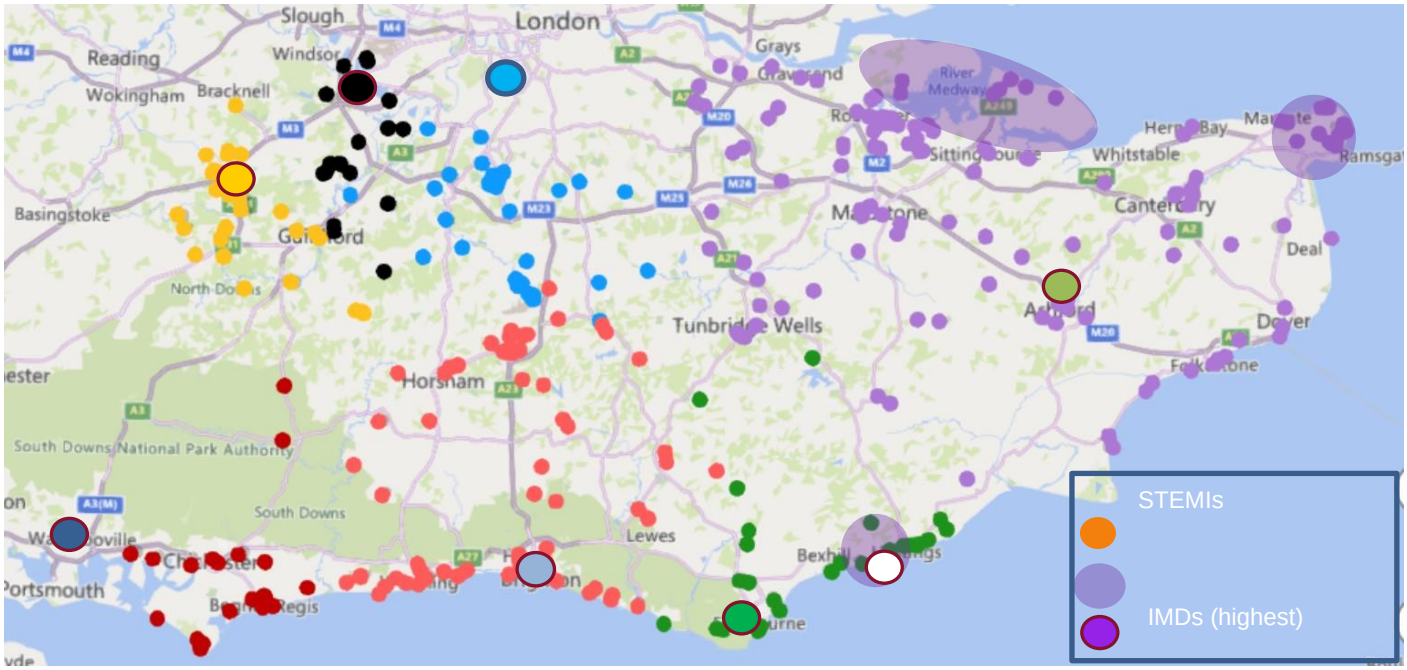
GEO (St George's) n=28

EDG (Eastbourne District G) n=26

QAP (Queen Alex, Portsmouth) n=20

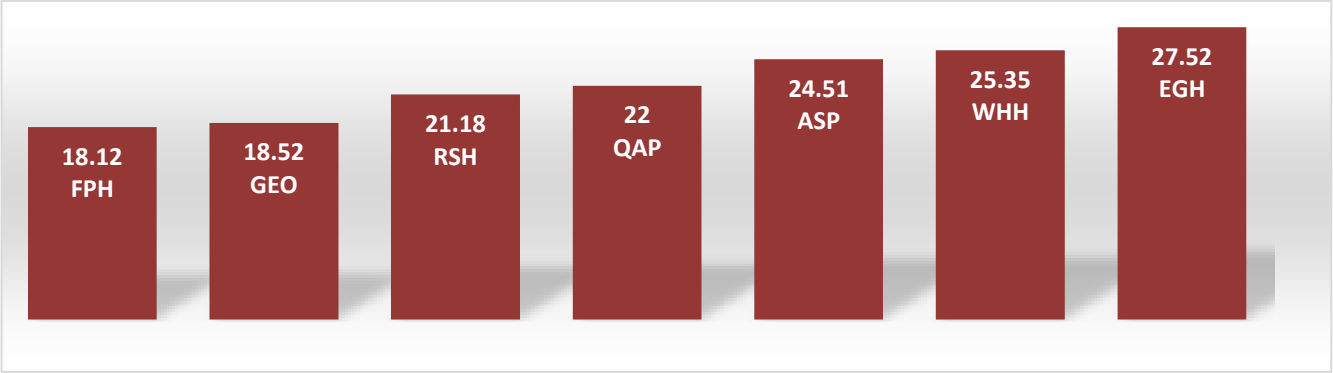
ASP (Ashford St Peter's): n=19

**Spread of confirmed STEMIs (July 2020 – September 2020, sample A: n=319)**



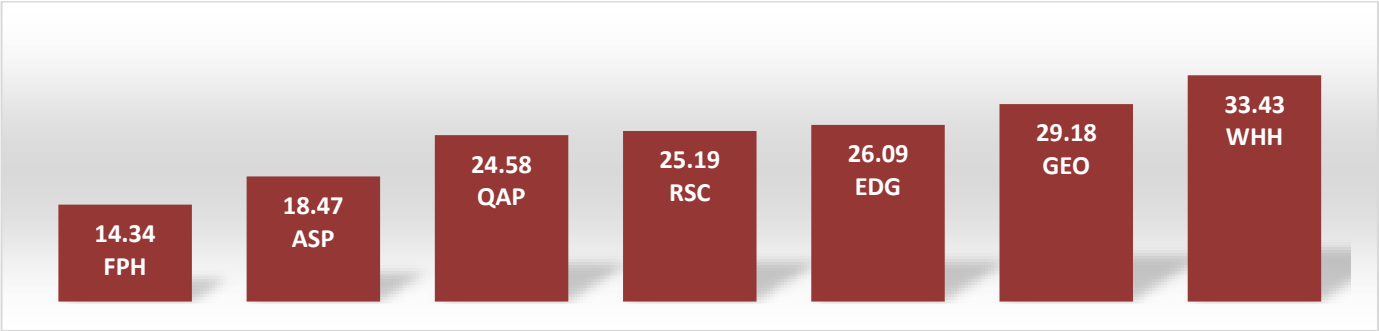

QAP RSC EGH WHH GEO ASP FPH The Conquest)

**Sample A (n=319) mean call for help to on scene times in minutes (overall mean = 23')**

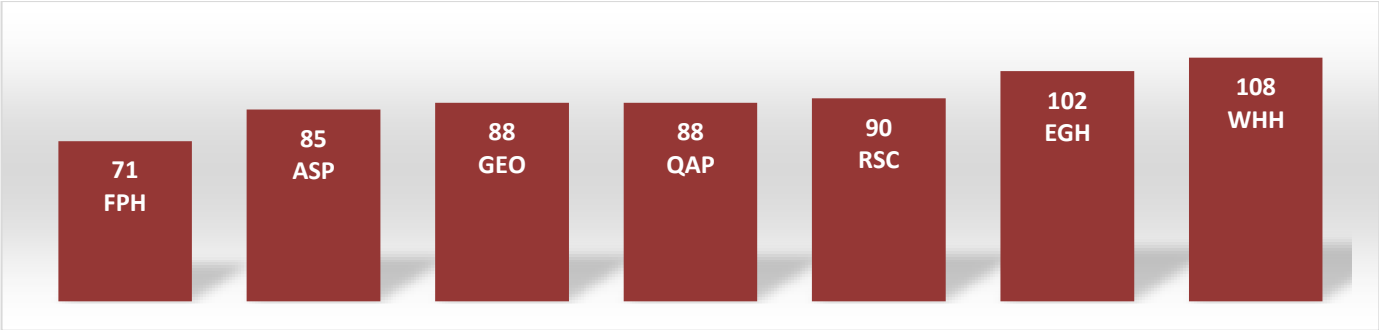



## Sample A (n=319) mean on scene times in minutes (overall mean = 42')

**Sample A (n=319) mean leave scene – at hospital in minutes (mean overall = 25')**




**Sample A (n=319) mean call for help – at hospital times in minutes (overall mean = 90)**

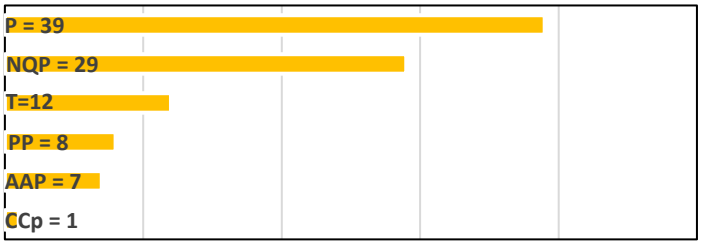



## Other findings of interest – SECAmb attendance (sample B: n=96)

**First vehicle on scene; Double Crewed Ambulance (DCA) or Single Response Vehicle (SRV)**

- **DCA = 89**
- **SRV = 7**
- **(DCA = 93%)**

**Highest grade of first attending clinician**




**P = paramedic**

**NQP = newly qualified paramedic**

**T = technician**

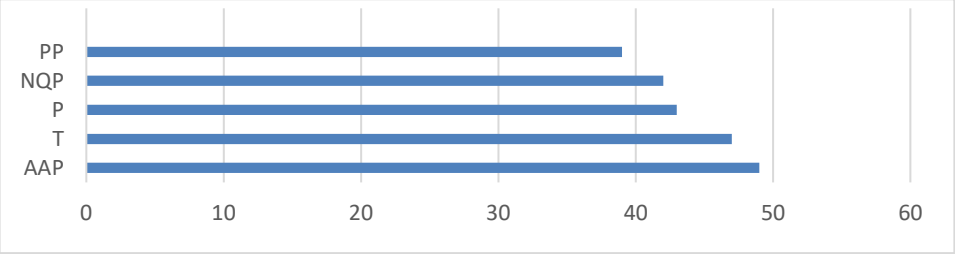
**PP = paramedic practitioner**

**AAP – Associate Ambulance Practitioner**

**CCP = Critical Care Paramedic**

**Registered Clinician first on scene = 77/96 (80%)**

**Relationship between time on scene and grade of first DCA clinician (sample B: n= 90 (CCP removed as only 1 sample)**




**Average time on scene private ambulance providers: 42 mins (sample A: n= 11, all non-registered)**

**Number of times that DCA crews waited on scene for back-up (sample B: n=19)**

*(Valid reason for back-up request; unable to convey patient due to lowered GCS, peri-arrest, other valid documented reason on a case by case basis. Invalid reasons; to administer ticagrelor, to administer morphine, to cannulate. If back-up needed for pain relief or anti-emetic, then a request to rendez-vous should be made)*

- **Non-registered: 7/19 (no valid documented reason for any). PAP = 1**
- **Registered: 1/19 (bradycardic episode, lowered GCS)**
- **Grade of back-up requested: 6/7 Grade 2; 1/7 Grade 1**

## Audit Standards

| | Standard | Target % | Exception | Reference |
|---|---|---|---|---|
| *1* | *Patients receive at least a category 2 Response* | *100* | *Symptoms not fulfilling category 2 as per Ambulance Response Programme* | Ambulance Response Programme criteria (NHSE) |
| *2* | *12 lead ECG is completed within 15 minutes of arrival of FMC (JRCALC states maximum delay of 10 minutes – extra 5 minutes allowed for donning PPE and entering residence)* | *100* | *Documented reason for delay such as vomiting, unable to find exact patient location after arrival.* | JRCALC+ Acute Coronary Sydrome Guidelines; Covid STEMI and pPCI flow-chart. |
| *3* | *Minimum time on scene* ***Interpreted as ≤ 40 mins.*** *JRCALC states:* | *100* | • *Documented reason for delay in managing <C> ABCDE problems.*<br>• *Difficult extrication* | JRCALC+ Acute Coronary Sydrome Guidelines; Covid |

| | | | | |
|---|---|---|---|---|
| | • *start correcting <C>ABCDE problems*<br>• *undertake a time critical transfer*<br>• *continue management en route*<br>• *Make every effort to reduce delay to hospital* | | • *Other valid documented reason (case by case basis)* | STEMI and pPCI flow-chart. |
| *4* | *Administer aspirin as soon as possible (including where self-administered by patient).* ***Interpreted as first or second medication administered by ePCR time.*** | *100* | • *Refused or contraindicated*<br>• *Unable to swallow* | JRCALC+ Acute Coronary Sydrome Guidelines; Covid STEMI and pPCI flow-chart.<br><br>STEMI AQIs |
| *5* | *Administer P2Y12 inhibitor (Ticagrelor)* | *100* | • *Refused or contraindicated*<br>• *Non-registered crew on scene* | JRCALC+ Acute Coronary Sydrome Guidelines; Covid STEMI and pPCI flow-chart.<br><br>SECAmb PGD for Tigagrelor |
| *6* | *Adminster GTN* | *100* | • *Refused or contraindicted* | JRCALC+ Acute Coronary Sydrome Guidelines; Covid STEMI and pPCI flow-chart.<br><br>STEMI AQI |
| *7* | *Patients will have a full set of observations recorded (respiratory rate, pulse, blood pressure, blood glucose, SpO2 levels)* | *100%* | • *Patient refuses*<br>• *Valid reason for inability to assess.* | JRCALC+ Acute Coronary Sydrome Guidelines |
| *8* | *Patients' pain will be described using pain assessment tool such as SOCRATES* | *100* | • *Patient refuses*<br>• *Unable to assess* | JRCALC+ Acute Coronary Sydrome Guidelines |
| *9* | *Patients will have 2 pain scores recorded* | *100* | • *Patient refuses*<br>• *Unable to assess* | STEMI AQIs |

| | | | | |
|---|---|---|---|---|
| *10* | *Accompanying features recorded (eg sweating, pale, cold to touch, clammy, nausea, breathlessness, vomiting, feeling of impending doom)* | *100* | *None present* | JRCALC+ Acute Coronary Sydrome Guidelines |
| *11* | *IV access if clinically indicated (immediate risk of shock (ref BP), IV medication given, maximum 2 attempts)* | *100* | *Patient refusal, unable to cannulate (2 attempts)* | JRCALC+ Acute Coronary Sydrome Guidelines |
| *12* | *Appropriate analgesia should be given* | *100* | *Patient refusal, contraindicated* | *NASCQG* |
| *13* | *Morphine Sulphate should be administered for pain scores of 4 or more* | *100* | *Patient refusal, unable to cannulate, non-registered clinician on scene* | *SECAmb STEMI flow-chart* |
| *14* | *Paracetamol should not be given unless Entonox or Morphone refused or contraindicated* | *100* | *None* | *NASCQC* |

## Results

**Standard 1**: **Patients receive a category 2 response (sample B: n= 96)**

**Exceptions**: **Symptoms not fulfilling category 2 as per Ambulance Response Programme.**

**Excluded:** **1 case was an exception as patient presented to 999 as 'lethargic'**

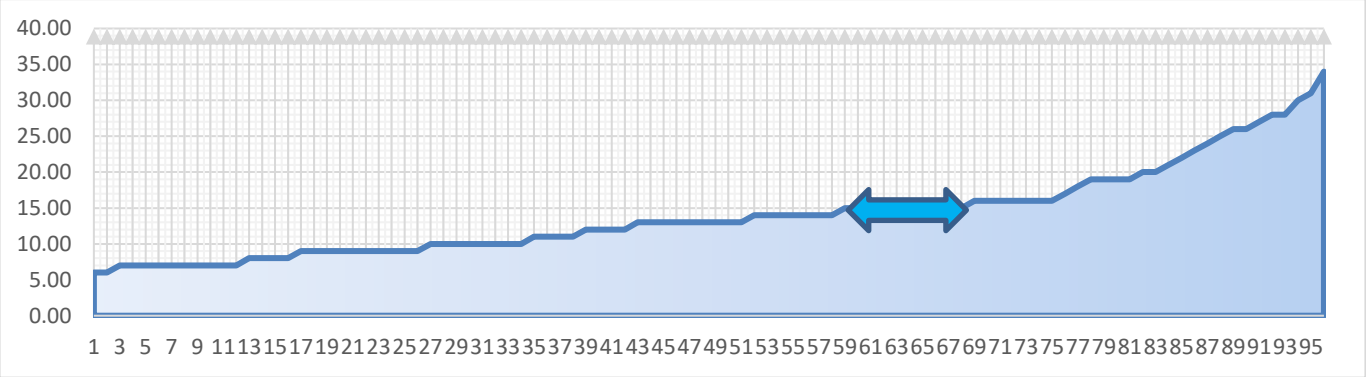
**Sample used:** **n=95**

**Complliance:** **95/95 = 100%**

**Non-compliance**: **0**

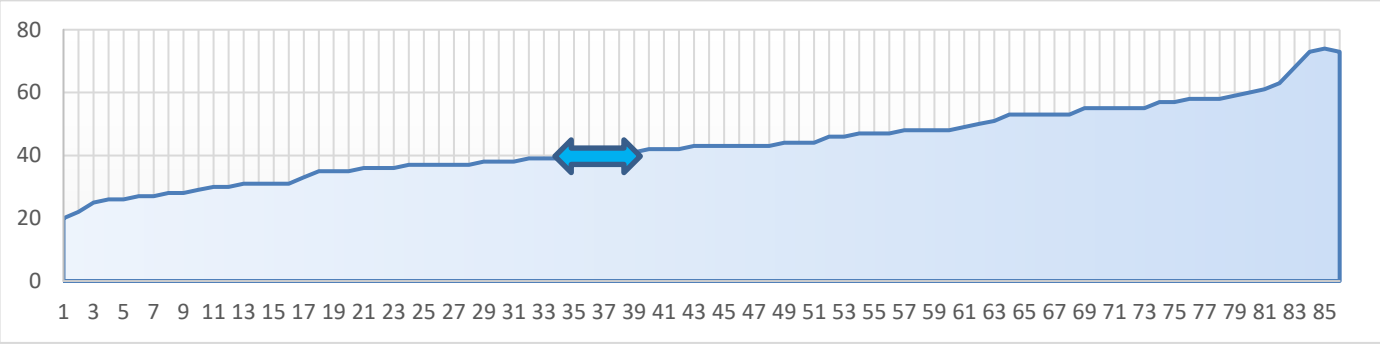
This was an excellent audit result which highlights the accuracy of NHS Pathways for STEMI cases, and call-takers' response to this patient group.

**Standard 2:** **12 lead ECG is completed within 15 minutes of vehicle arrival at scene (sample B: n=94)**
**Exceptions:** **Documented reason for delay such as vomiting, unable to find exact patient location after arrival, ECG not photographed and time of ECG not documented.**
**Excluded:** **4/96 were exceptions.**
**Sample used:** **n=92**
**Compliance:** **69/92 (75%)**
**Non-compliance** **23/92 (25%)**




There were some excellent results for this criteria, with 12 crews performing the first ECG within 7 minutes of arrival. However, in 15 cases there was a delay of over 20 minutes before the first ECG, and in 3 cases, over 30 minutes. There was a correlation between grade of staff and time to first ECG, with registered staff performing first ECGs sooner than non-registered.

**Standard 3: Minimise time on scene (≤ 40 mins where DCA is first on scene) (sample B: n= 90)**
**Exceptions: Difficult extrication, other legitimate documented reason.**
**Excluded: 3/90 were exceptions**
**Sample used: n=87**
**Compliance: 38/87 (44%)**
**Non-compliance: (56%)**




There was only 44% compliance with this standard. Of interest is that longer on-scene times were associated with longer distances to pPCI centres (longest on-scene = William Harvey and Eastbourne; shortest on-scene = Frimley Park). Medicines administrations were also audited as to whether they happened before or after leaving scene. Most medications were given before leaving scene, with 'top-up' morphine or ondansetron most likely to be given en route.

Reasons for long on-scene times are unknown, but may be connected to the following:

- Decision-times from pPCI centres
- Administration of the STEMI care bundle (eg, difficulties cannulating). It is not known how much is done on the ambulance, and how much in the patient's home.
- Lack of experience and knowledge of time-criticality in some staff groups (for example, PPs had the least time on scene, AAPs the longest).

A known factor is waiting on scene for back-up unnecessarily, and when requesting backup, requesting a G2.

**Standard 4: Administer aspirin as soon as possible (defined as first or 2nd medication administered)**
**Exceptions:Refused, contraindicated or self-administered before arrival of crew.**
**Excluded: 7/96 were exceptions**
**Sample used: B; n=89**
**Compliance against timeliness standard: 80/89 (90%)**
**Non-compliance: 9/89 (10%)**
**Compliance with administration of aspirin at any time on scene 88/89 (99%)**

**Standard 5:** **Administer Ticagrelor**
**Exceptions:** **Refused, contraindicated or non-registered crew on scene.**
**Excluded:** **16/96 were exceptions**
**Sample used**: **B; n=80**
**Compliance:** **79/80 (99%)**
**Non-compliance** **1/80 (1%)**

**Standard 6:** **Adminster GTN n=76**
**Exceptions:** **Refused or contraindicated.**
**Excluded:** **16 were exceptions**
**Sample used:** **B; n= 70**
**Compliance:** **68/70 (97%)**
**Non-compliant:** **2/70 (2%)**

**Standard 7:** **Patients will have a full set of observations recorded (respiratory rate, pulse, blood pressure, blood glucose, O2 SATs). N=96**
**Exceptions:** **Unable or refused**
**Excluded:** **none**
**Sample used:** **B; n=96**
**Compliance**: **91/96 (95%)**
**Non-compliance**: **5/96 (5%)** **(all non-compliant incidents were blood glucose not done)**
There were several cases where a blood glucose measurement was not done, but in general, observations were thorough.

**Standard 8:** **Patients' pain will be described using pain assessment tool such as SOCRATES**
**Exceptions:** **unable, not in pain.**
**Excluded**: **5 were exceptions**
**Sample used**: **B; n= 91**
**Compliance:** **89/91(98%)**
**Non-compliance:** **2/91 (2%)**
In nearly all cases a very comprehensive pain description was recorded.

**Standard 9:** **Patients will have 2 pain scores recorded**
**Exceptions:** **Patient refused, unable to record, no pain**
**Excluded:** **5 were documented as not in pain**
**Sample used:** **B; n=91**
**Compliance: 76/91 (84%)**
**Non-compliance: 15/91 (16%)**
Analgesia in general is poorly performed, and this will be discussed further in sections below.

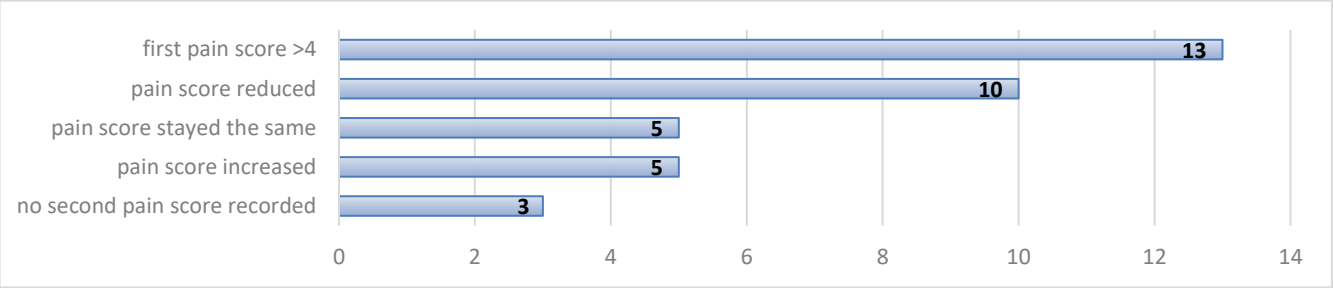
**Standard 10:** **Accompanying features recorded (eg sweating, pale, cold to touch, clammy, nausea, breathlessness, vomiting, feeling of impending doom)**
**Exceptions:** **none**
**Sample used:** **B; n=96**
**Compliance:** **95/96 (99%)**
**Non-compliance:** **1/96 (1%)**
This was an excellent element of care.

**Standard 11**: **IV access if clinically indicated (interpretation = documented, max 2 attempts, necessary due to immediate risk of shock (reference blood pressure), IV medication given)**
**Exceptions:** **no registered clinicians on scene, unable to cannulate**
**Excluded:** **19 cases were exceptions.**
**Sample used:** **B; n=81**
**Compliance:** **64/81 (79%)**
**Non-compliance:** **17/81 (21%). In 6 cases (6/77) cannulation was not documented although IV drugs were given.**

There is no clinical guidance within SECAmb for IV cannulation, and defining 'clinically indicated' is somewhat of a gray area. Paramedics may cannulate if they have an opportunity whilst their crew-mate is readying the vehicle for leaving scene, for example, at no detriment to the patient in terms of delay. There have been anecdotal reports from some crews of challenge on arrival at the cath lab if cannulation has not been routinely performed.

In the majority of cases cannulation was appropriate (IV medication given). In 21% of cases cannulation may have been performed unnecessarily (ie, done without any apparent reason, low or no pain and no IV medications given), or not documented. In one case, 4 attempts were made to cannulate.

**Standard 12: Analgesia should be given:**
**Exceptions: Patient refusal, contraindication**
**Excluded: 6 cases were exceptions.**
**Sample used: B; n=89**
**Compliance: 66/89 (74%)**
**Non-compliance: 23/89 (26%). Of this group:**




It is unknown why analgesia was not offered or given for over a quarter of this sample, although in almost half of the these cases the pain score reduced anyway. One possibility is that GTN administration reduced pain and was sufficient without additional analgesia. GTN can be an effective analgesic even though not classified as such.

**Standard 13: Morphine Sulphate should be administered for pain scores of 4 or more (first pain score)**
**Exceptions: Patient refusal, contraindicated, unable to cannulate, non-registered clinician on scene. 24 cases were excluded.**
**Sample used: B; n=72**
**Compliance: 48/72 (66%)**
**Non-compliance 24/72 (34%).**
Of the 24 non-compliant cases ( n= 24):

- **2/24 received morphine for pain scores of 3.**
- **2/24 received alternative analgesia for pain scores >4.**
- **15/24 (63%) had a reduced second pain scores even without morphine.**
- **1 had the same second pain score**
- **8 had no second pain score recorded**
- **In only one case was over 10mg of MS given (12.5).**

Of the compliant cases (n=48):

- **30/48 (63%) had a reduced second pain score**
- **5/48 had no change**
- **1/48 had an increased pain score**

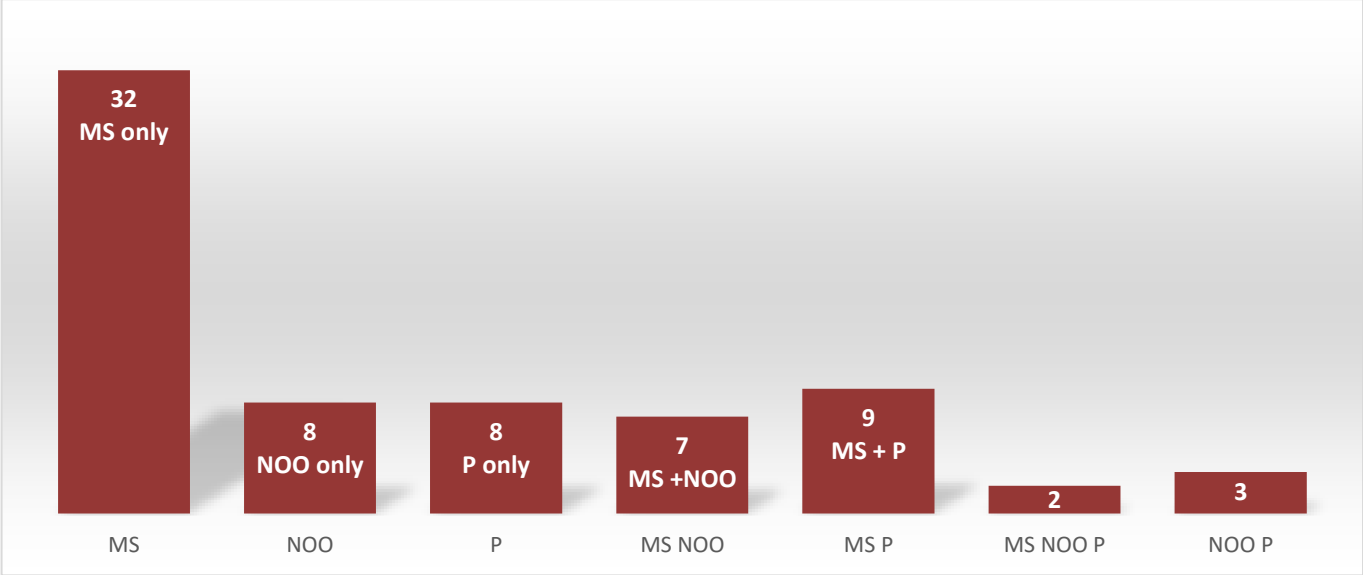
Of note was that second pain scores reduced by at least 1 point in the same proportions of patients (63%) with or without morphine.

**Standard 14: Paracetamol should not be given unless Entonox or Morphine is refused or contraindicated**
**Exceptions: none**
**Sample used: B: n=22 (where Paracetamol was given)**
**Compliance 0/22 (0%)**

**Non-compliance: 22/22 (100%)**
Second pain scores (where recorded) reduced in every case where Paracetamol was given alone, but in nearly all cases GTN was also given, so no correlation can be assumed.

### Other analgesia findings of interest:

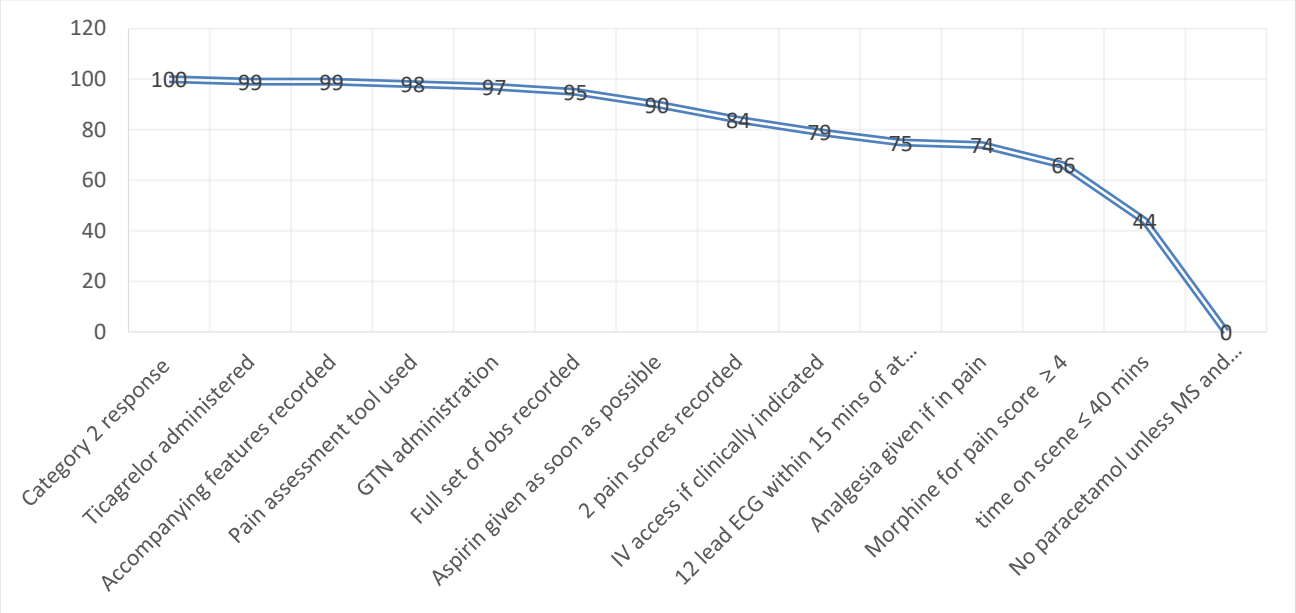
**Analgesia combinations: (sample B: n=69):**




An anti-emetic (ondansetron) was administered: 40/96 cases. There was no correlation with administration of morphine sulphate.

**Analgesia summary:**

## Compliance against all standards




# Discussion

## Demographics

The demographics of the samples was reflective of the findings of the University of Leeds (2021) who have compared STEMI data from 2020 with previous years. They found that hospitalisation for STEMI were younger (66 v 68), more frequently male (69% v 68%) and about twice as likely to use the ambulance service than self-present compared to before Covid (11% v 20%). It is unknown if Covid affected patients' symptom onset time to call for help as we have no previous data in the SECAmb area. However, the mean 4 hours in this audit is twice as long as previous published data for the UK.

## Spread of cases

The spread of cases, times to scene, from scene to hospital and all times combined highlights unwarranted variation between catchment areas for pPCI centres. The fact that there has been no cardiac clinical governance network in the SECAmb area for several years has contributed to a lack of regional oversight to address this. A cardiac network is currently being established.

## Time management

There is ample evidence that time to re-vascularisation is directly related to mortality and morbidity for this category of patient. There are 3 main components to time on scene:

1. Time taken to perform the initial ECG showing ST elevation, which is the 'gateway' (along with clinical history) for initiation of the STEMI pathway.

2. Time management after confirmation of ST elevation. Acceptance discussion by the cath lab may affect this, but this is not routinely documented by SECAmb. Unnecessary cannulation, undertaking aspects of the care bundle on scene instead of en route can all contribute to delay.
3. Waiting for back-up on scene by non-registered clinicians.

## Recommendations

- Exploration as to what influences staff behaviour and decision-making regarding taking an initial ECG, time on scene and requesting back-up
- Documentation of time of ECG transmission, and time of decision-making on the ePCR
- Shared OU level audit data to encourage positive competition. The methodology for this will need to be discussed and clarified as there were some inaccuracies in this data with regard to OU.
- Exploration of whether there can be clinical overview when a crew asks for back-up (eg from the Critical Care Desk, Clinical Support Desk, etc) to explore whether it is really needed. If needed, it should always be a Grade 1 to reflect time-criticality, and where possible a rendez-vous.
- STEMI time-bomb poster (appendix 2) to reinforce the message to reduce delay on scene

## Analgesia

The set of standards for analgesia are very specific in terms of 2 pain scores, and whether morphine, paracetamol or Entonox should be administered and in which circumstances. GTN is not included, although pain reduction is one of its side effects. After a national audit levelling event in 2019 by NASCQG, paracetamol for chest pain was not permitted unless morphine and Entonox were contraindicated or refused. Second pain scores are not always done, so it is not always possible to measure the effects of analgesia, or lack of analgesia. However, many SECAmb clinicians use paracetamol, morphine and or Entonox in various combinations to good effect, as evidenced in this audit. This is also in keeping with JRCALC guidance on pain relief generally, which advises balanced multimodal analgesia (JRCALC, 2020). In many cases, pain scores reduce in spite of no analgesia being administered, or pain scores increase or remain the same when analgesia is administered according to standards. There are several variables which may affect pain scores in addition to analgesia - reassurance, anxiety, GTN administration, fluctuations of flow through the obstructed artery, etc. This makes attribution of pain relief to the administration of analgesia unreliable. With regard to type and combination of analgesia, it is difficult to ensure compliance with standards which clinicians may not experience as justified and where there is no strong evidence of harm from non-compliance. For example, many paramedics have experience of IV paracetamol being effective analgesia. For this reason, a request has been forwarded to JRCALC to reconsider their position on paracetamol for chest pain, and review analgesia for chest pain generally. If this review happens, national audit requirements will change accordingly.

The other aspect of analgesia which SECAmb is not performing well is the requirement to obtain 2 pain scores. It is good practice to understand whether pain is increasing or decreasing, so that analgesia can be offered if necessary. This aspect of the audit standards can be improved without undue extra time on scene, and is very easy to obtain.

## Recommendations

### OU level audit of pain score results for positive competition regarding pain score documentation.

- Discussion about how SECAmb should proceed regarding compliance with analgesia for chest pain generally, and what message should be given to staff.
- Review and amendment of current SECAmb guidance as necessary.

## Action Plan (for discussion)

| | Recommendation | Action | Responsible Person | Sponsor | Evidence | Due Date |
|---|---|---|---|---|---|---|
| 1 | What are the things that need to change? | How will you do to fix the problem? | Who will lead on this work? | The CAQSG will assign a sponsor. | How will you prove that the action is complete? | Must be complete by? |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | |

# References

Healthcare Safety Investigation Board (2021) *Emergency response to heart attack*. Available from: https://www.hsib.org.uk/documents/292/HSIB_Emergency_response_to_heart_attack_Report_V05.pdf

Joint Royal Colleges Ambulance Liaison Committee, *Clinical Practice Guidelines* Class Professional Publishing, Bridgewater [web-based guidelines]

South East Coast Ambulance Service NHS Foundation Trust (2018). Scope of Practice and Clinical Standards Policy [Internal Trust Document]

South East Coast Ambulance (2020) Covid 19 STEMI and pPCI flow-chart. V5. [Internal Trust Document]

University of Leeds (2021) *Data analysis reveals impact of COVID-19 on Healthcare*, Leeds Institute for Data Analytics. Available from: Cardiovascular Research into the COVID-19 virus (leeds.ac.uk)

Wechkunanukul, K., Grantham, H. and Clark, R.A. (2017) Global review of delay time in seeking medical care for chest pain: An integrative literature review. *Australian Critical Care* 30, pp 13-20.

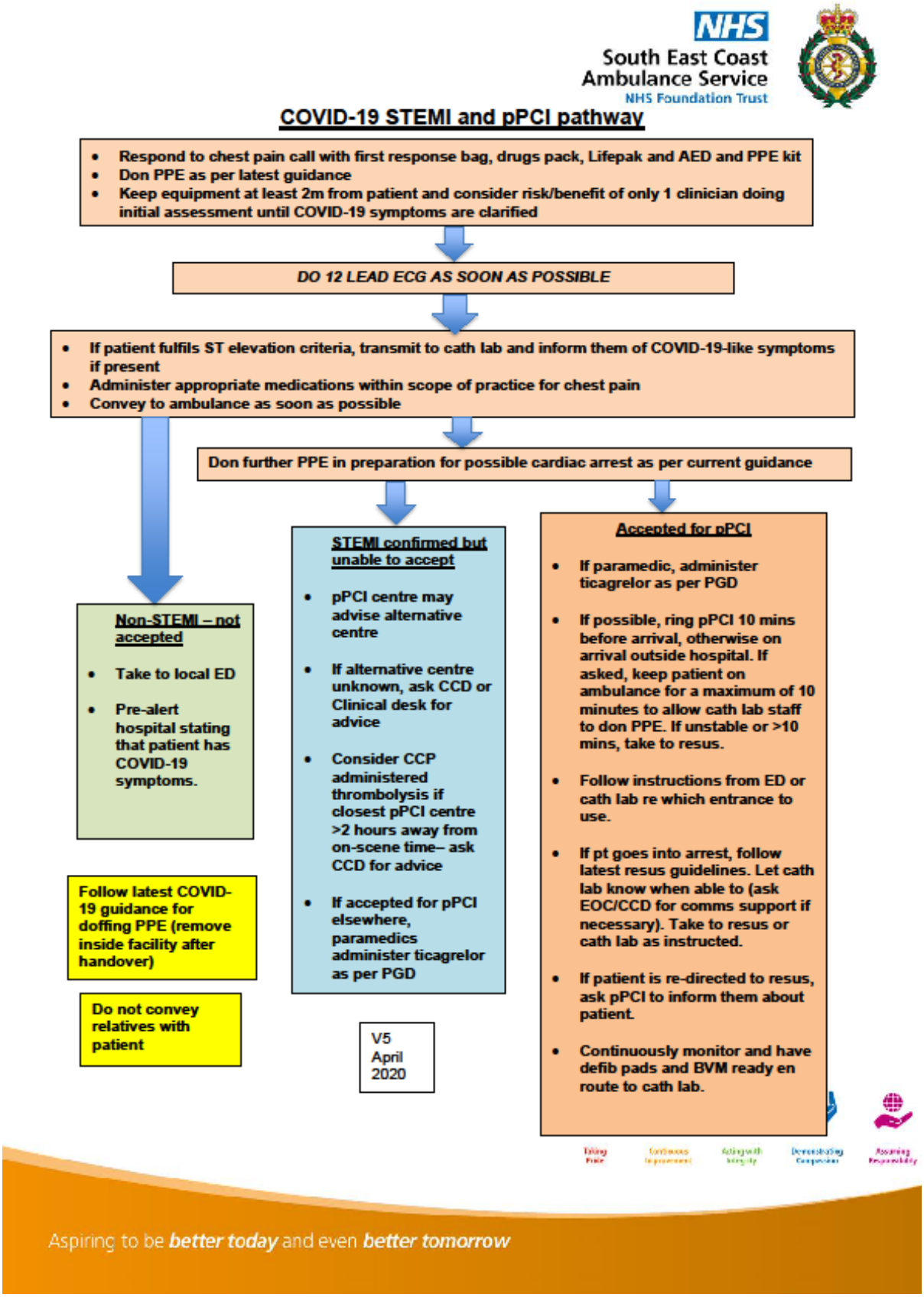
# Glossary

| Term | Acronym | Description |
|---|---|---|
| Associate Ambulance Practitioner | AAP | Non-registered clinicians who can deliver many aspects of care but are not permitted to do some things which paramedics are, such as administer IV medication. |
| Ambulance Quality Indicators | AQI | Standards which Ambulance Trusts are measured by nationally. They are published by NHSE. |
| Clinical Support Desk | CSD | A desk within the control room which is staffed by paramedics where staff on scene can get advice |
| Critcal Care Desk | CCD | A desk within the control room which is staffed by CCPs where staff on scene can get advice on time-critical incidents |
| Critical Care Paramedic | CCP | A specialist paramedic with extra skills and training in critical care |

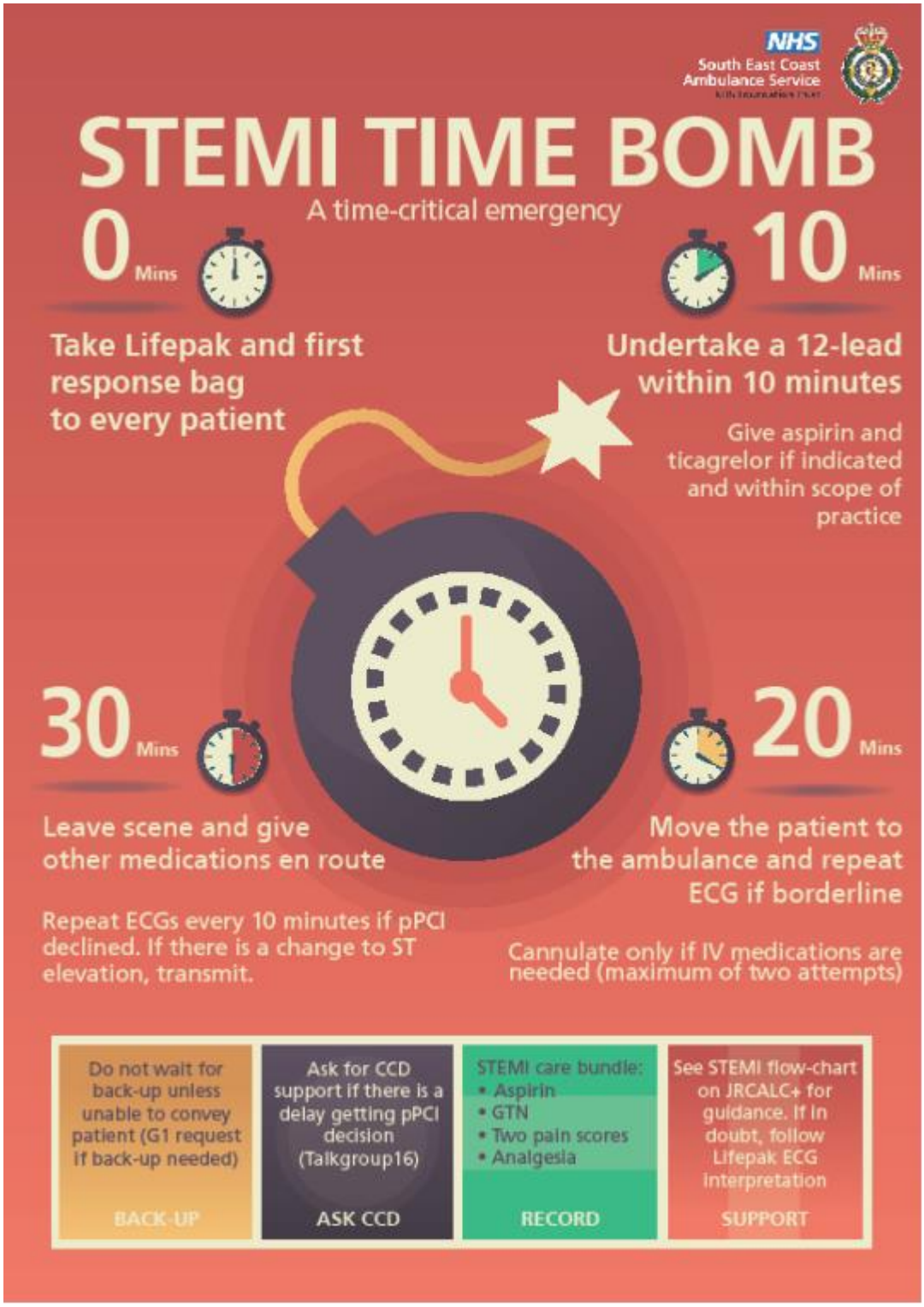
| | | |
|---|---|---|
| Double Crewed Ambulance | DCA | An ambulance capable of conveying a patient |
| Electrocardiograph | ECG | A reading of the electrical activity of the heart |
| Electronic Patient Care Record | ePCR | The electronic version of the Patient Care Record. |
| Entonox | NOO | Another name for nitrous oxide and oxygen |
| Glyceryl trinitrate | GTN | A medication which relaxes vasculature and can relieve pain during a STEMI |
| Helecopter Emergency Medical Service | HEMS | An emergency helicopter service which attends the most seriously ill patients. |
| Intravenous | IV | A means of administering medication via a small tube interted into a vein |
| Joint Royal Colleges Ambulance Liaison Committee | JRCALC | The main reference guidance for all ambulance clinicians in the UK |
| Morphine Sulphate | MS | An opioid analgesia which is recommended for cardiac chest pain |
| National Ambulance Service Clinical Quality Group | NASCQG | The audit body in the UK which sets details of how audit standards should be audited for consistency across all ambulance services. |
| Newly Qualified Paramedic | NQP | A paramedic with less than 1 year's experience since registration |
| Nitrous Oxide | NOO | A type of analgesia also known as Entonox |
| Oxygen Saturation | SpO2 | The measure of how much oxygen red blood cells are carrying. |
| Paramedic Practitioner | PP | A specialist paramedic with extra skills and training in urgent and emergency care |
| Personal Protective Equipment | PPE | Usually comprises gloves, apron and a mask to protect patients and staff against covid and other diseases |
| Primary percutaneous coronary intervention | pPCI | A department in a specialist hospital that can treat STEMI |
| Single Response Vehicle | SRV | A single crewed vehicle used primarily for rapid attendance at an incident. |
| ST elevation myocardial infarction | STEMI | The most serious type of heart attack, identified through specific signs on an electrocardiograph (ECG) |
| Systolic Blood Pressure | SBP | The measure of the pressure of blood on the walls of the arteries during a heartbeat. |

| | | |
|---|---|---|
| Technician | T | Non-registered clinicians who can deliver many aspects of care but are not permitted to do some things which paramedics are, such as administer IV medication. |

# Appendix 1 – STEMI and pPCI pathway flow-chart



# Appendix 2 – STEMI poster



NHS
South East Coast
Ambulance Service
NHS Foundation Trust

# pPCI in the South East Coast Ambulance area

Claire Hall, Clinical Pathways Lead

## Context

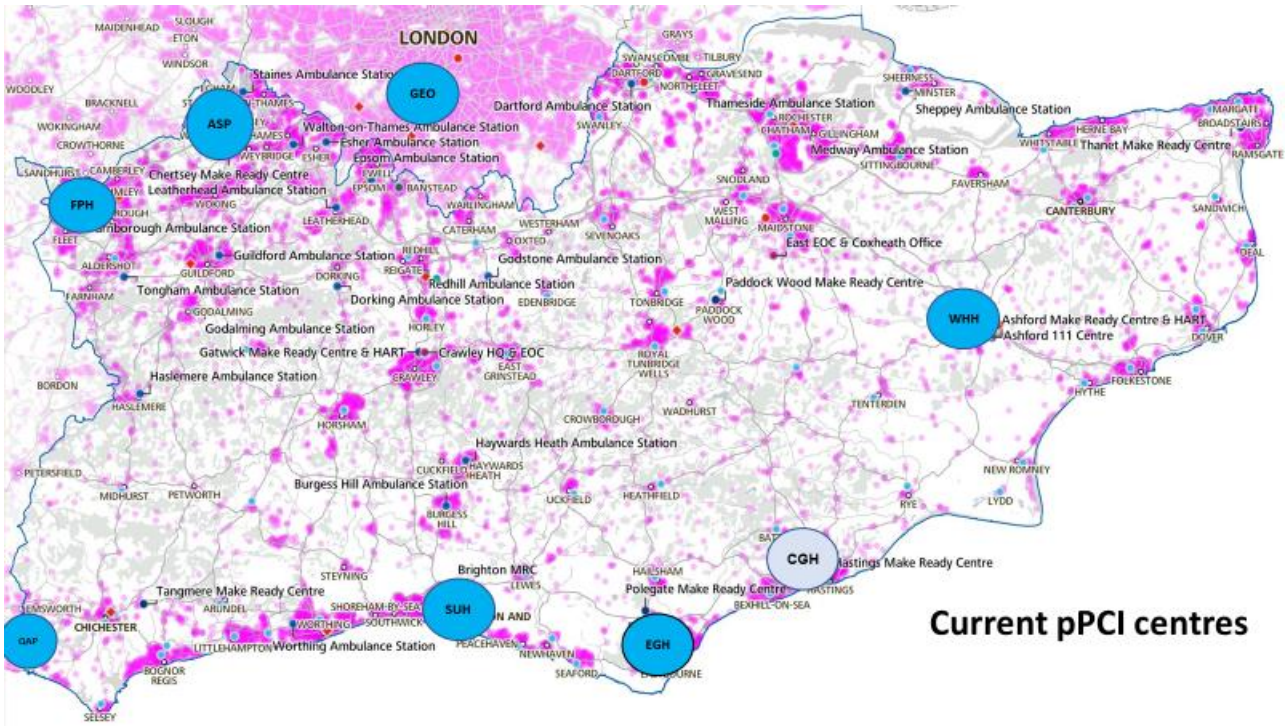
- pPCI pathway has been in place for 11 years in the SE
- There was a cardiac network until a few years ago
- Now no overarching body for system governance
- Changes in demand and capacity now quite pronounced
- Call for help – hospital increasing nationally
- HSIB report (2021) querying if thrombolysis should be re-considered for some long call – door cases

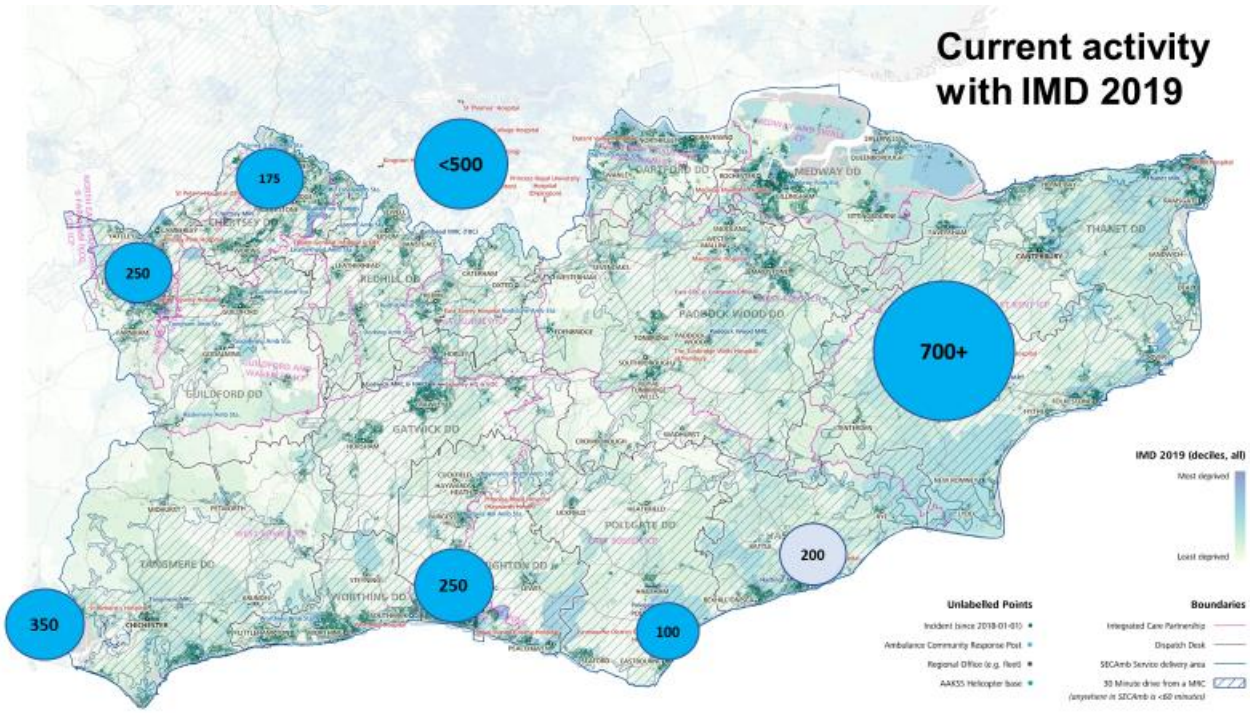
## 2.1 CALL-TO-BALLOON AND CALL-TO-DOOR TIMES ARE WORSENING FOR STEMI

| QI Metric Description/Name | Call-To-Balloon time for STEMI | |
|---|---|---|
| Why is this important? | Shorter Call-To-Balloon times (CTB) are associated with better outcomes | Shorter Door-To-Balloon times (DTB) should be associated with better outcomes following STEMI |
| QI theme | Effectiveness/timeliness | Effectiveness/Timeliness |
| What is the standard to be met? | • a) CTB <120 min<br>• b) CTB <150 min | • a) DTB <60 min<br>• b) DTB <90 min |
| Key references to support the metric | NICE quality standard (QS 68) "Adults w segment-elevation myocardial infarction present within 12 hours of onset of sympt percutaneous coronary intervention (PC coronary reperfusion strategy, as soon as 120 minutes of the time when fibrinolysis given." (Given that pre-hospital fibrinolyti 30mins to start – this leads to a standard | |
| Numerator | a) All with STEMI who underwent primary PCI within [illegible] of call for help<br>b) All with STEMI who underwent primary PCI within 150 min of call for help | a) All with STEMI who underwent primary PCI within 60 min of arrival at PPCI centre<br>b) All with STEMI who underwent primary PCI within 90 min of arrival at PPCI centre |
| Denominator | All with STEMI who underwent primary PCI for whom a CTB can be calculated | All with STEMI who underwent primary PCI for whom a DTB can be calculated |
| Trend | Consistent lengthening of median CTB over last 5 years, leading to fewer patients receiving primary PCI within recommended standard time | No substantial change in DTB over last 5 years |

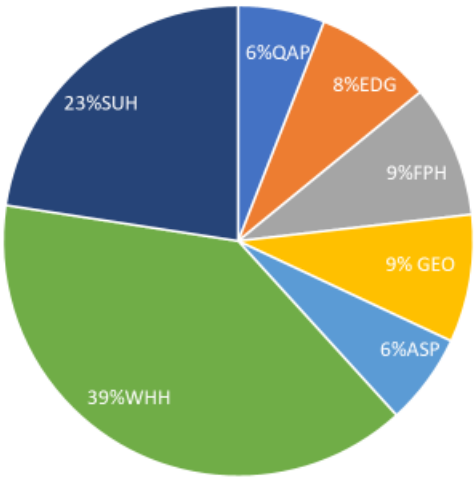
**Recommendations for those not achieving the standards**

**In the management of STEMI, staff in hospitals where Call-To-Balloon time standards are not being met, should work with partner Ambulance Trusts, emergency departments, neighbouring non-interventional hospitals and cardiologists to better understand delays to provision of primary PCI. Individual case reviews may a play a part in quality improvement. Ambulance Trusts should review their local trends and consider methods to improve Call-To-Door times.**






# Current SECAmb activity

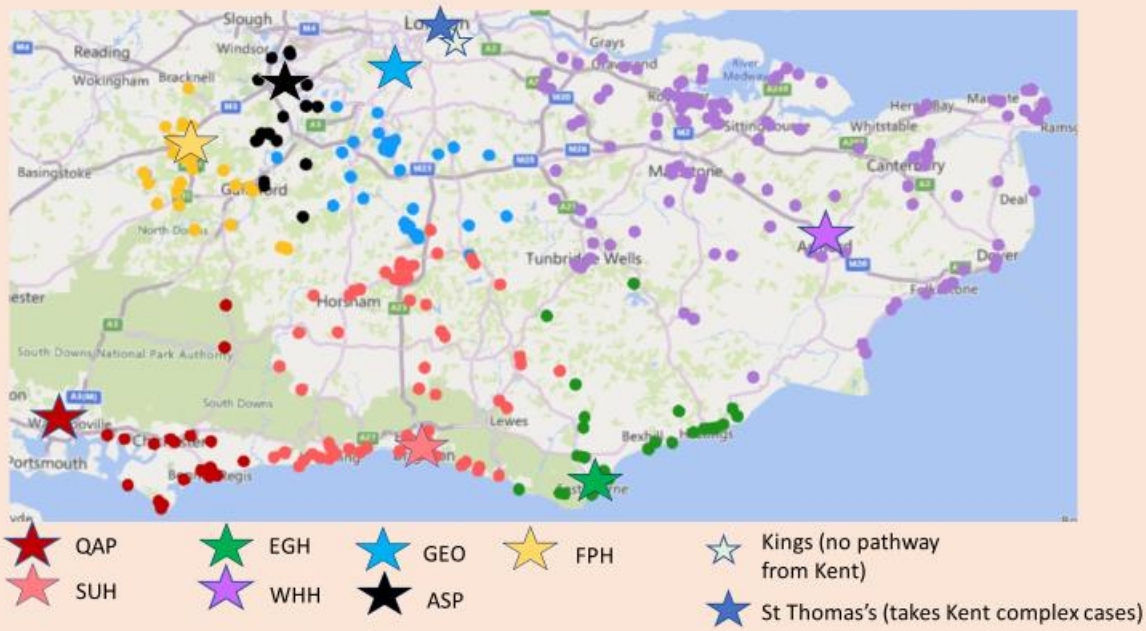



**Key**

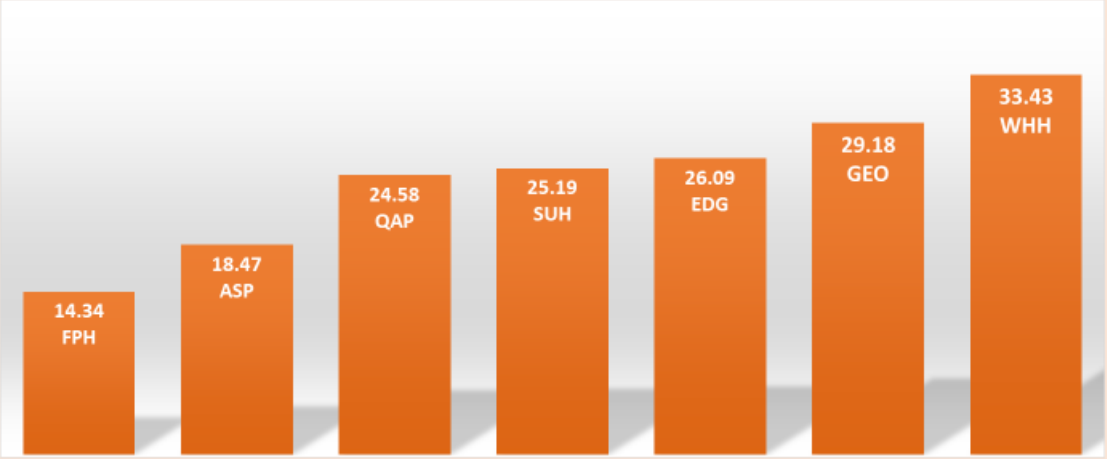
**WHH (William Harvey)**
**RUH (Sussex University Hospital)**
**FPH (Frimley Park Hospital)**
**GEO (St George's)**
**EDG (Eastbourne District G)**
**QAP (Queen Alex, Portsmouth)**
**ASP (Ashford St Peter's)**

**(The Conquest was not accepting at the time: July – September 2020)**

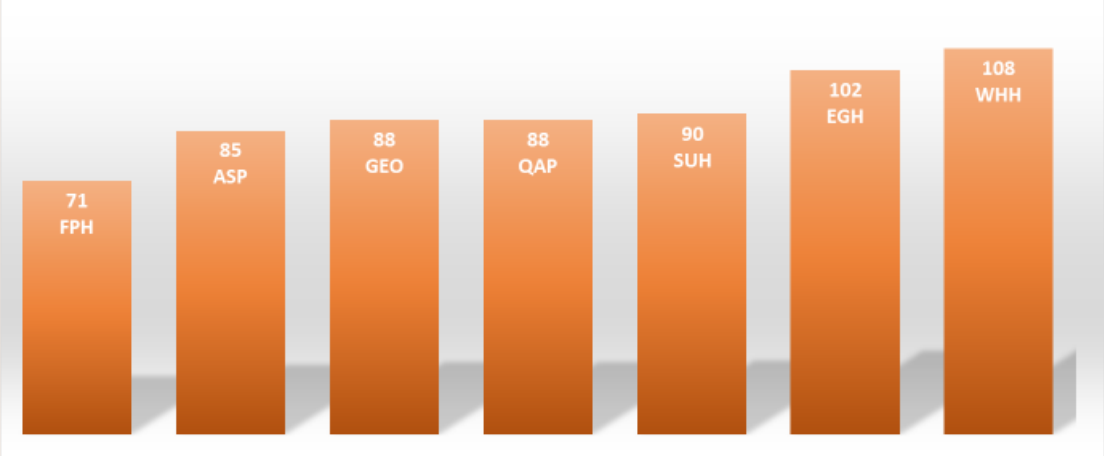
## pPCI by hospital (July – Sept 2020, n=3019)




## Leave scene – hospital door (minutes)

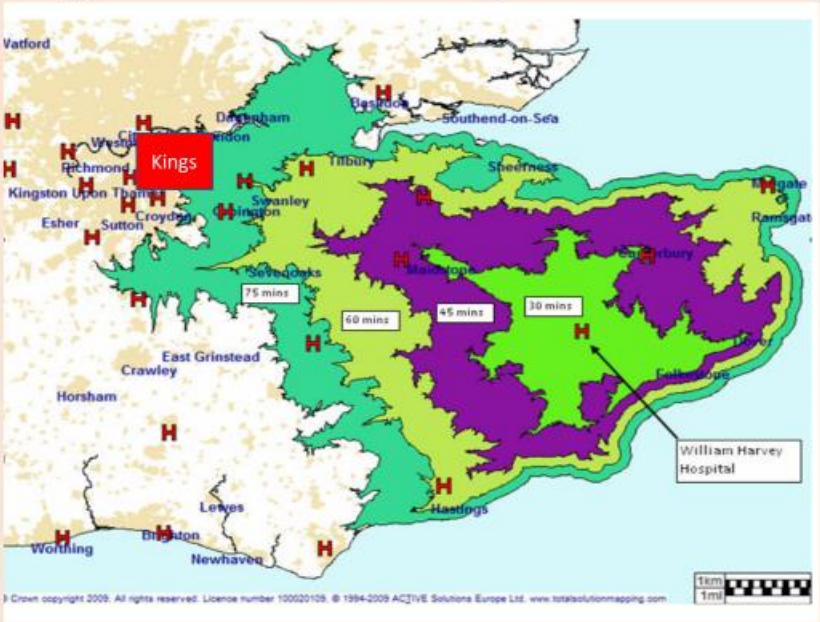


# Call for help – hospital door (minutes)




(MINAP standard – call for help – balloon 150')

# Kings v William Harvey for Dartford patients?




Small isochrone around Dartford may benefit from going to Kings/St Thomas's

(16 miles/~40 minutes -> Kings)
(42 miles/~52 minutes -> WHH)

Current self-presenters to DVH get transferred to Kings now

## For discussion in the SE:

- Intervention protocol decisions (eg which P2Y12 inhibitor?)
- OOHCA provision consistency across the region, eg shock resistant VF, criteria for acceptance, ICU pressures, ECMO
- HSIB recommendation to consider thrombolysis for some cases

- Overview of whole system (eg, unwarranted variation, increasing call – door times, increasing demand on some centres causing delay to treatment)
- Unwarranted variation in governance (compare trauma networks, integrated stroke development networks)
- General network system clinical and operational governance (eg, diverts, declined ECGs)

# In conclusion…

- We have an inconsistent service with unwarranted variation
- (Some areas of high IMD are very poorly served)
- Some areas are underperforming with regards to standards
- Other specialised networks have very good system governance in place (eg, trauma, stroke). Cardiac care is an outlier.