**Ambulance Quality Indicators: Clinical Outcomes specification**

# Section 1   Introduction

This document provides data suppliers with the specifications for the Clinical Outcome (AmbCO) data items in the NHS England Ambulance Quality Indicators (AQI).

It will assist all stakeholders in the analysis and interpretation of the AQI data, and provide assurance on data quality and reliability.

It is available from the NHS England AQI website landing page, www.england.nhs.uk/statistics/statistical-work-areas/ambulance-quality-indicators, and the NHS Digital data collection page https://digital.nhs.uk/data-and-information/data-collections-and-data-sets/data-collections/ambco.

## 1.1   Contents

## 1.2   Document history

| | |
|---|---|
| 20180830 | Cardiac arrest count and post-ROSC bundle introduced. Definitions for Stroke and STEMI timeliness taken from "20180412 STEMI and stroke timeliness specification.pdf". Definitions for Stroke bundle, STEMI bundle, and Cardiac arrest ROSC and survival, taken from "AQI Guidance v1.31.docx", with new data item codes introduced. |
| 20181102 | Sepsis section 5 added |
| 20190613 | R5b: Exception for oxygen in post-ROSC care bundle does not require patient awake. M4b: Exception for aspirin in STEMI care bundle added: advice from doctor. K1 items: stroke times from call to hospital arrival have in practice started from call start, rather than response time clock start. Guidance amended to reflect this. K2 items: Patients with time from hospital arrival to CT Scan exceeding 1000 minutes now excluded. Time series has been revised back to August 2017. K2 and K3 item clarifications: Exclude final diagnosis of TIA; stroke must be pre-hospital. P items: Exceptions to hospital pre-alert added. Neutropenic sepsis to be included, starting with June 2019 data. |
| 20191213 | K1n no longer counts suspected strokes assessed by ambulance services; it counts confirmed strokes according to SSNAP, that are matched to ambulance service records. K1 times, and therefore now all AmbCO time data, are supplied as a count of minutes. |

## 1.3   Future editions

Suggestions for amendments to this document may be made via the contact details at the AQI website landing page:

www.england.nhs.uk/statistics/statistical-work-areas/ambulance-quality-indicators

## 1.4   Data supply process

The eleven NHS ambulance services in England supply some data items directly to NHS England, as specified in the definitions in this document. Starting with data for February 2018, ambulance services complete a standard spreadsheet proforma prepared by the Data Collections Team at NHS Digital. It is available from the AmbCO collection in https://collectionportal.sdcs.digital.nhs.uk, the NHS Digital Strategic Data Collection Service (SDCS). It has formulas that prevent it from being accepted if, for example, one of the numerators is larger than the corresponding denominator.

Ambulance services then upload the proforma to SDCS. NHS England downloads the data through the Secure Electronic File Transfer (SEFT) portal at https://www.seftprod.hscic.gov.uk.

The other data items in this document are supplied to NHS England from the other sources specified in this document. Many of the items are derived from data supplied by ambulance services to these other sources.

NHS England may ask data suppliers about unusual numbers to check for quality, before publishing the AQI.

The timetable for supply and publication is at the AQI website landing page.

NHS England publish all time data as hours:minutes (for example, 1:37). From April 2019 data, all times should be supplied as a count of minutes (for example, 97 minutes), which can include decimal places.

# Section 2   Cardiac arrest data

Delivery of early access, early Cardio-pulmonary Resuscitation (CPR), early defibrillation and early Advanced Life Support (ALS) is vital to reduce the proportion of patients who die from out of hospital cardiac arrest.

Work is ongoing during 2019 to try and measure time to defibrillation, and counts of successful resuscitations before arrival of the ambulance service.

## 2.1   Data supply

Ambulance services supply monthly incident-level data to the Out of Hospital Cardiac Arrest Outcomes (OHCAO) registry at Warwick Medical School. From April 2018 data, they have expanded this supply, so that Warwick Medical School can calculate and supply the data items in Section 2 in a single file to NHS England. Ambulance services also supply the count R0n to NHS England via OHCAO.

## 2.2   Cardiac arrest count (R0n)

### R0n

Count of all cardiac arrest patients receiving an organised Emergency Medical Services (EMS) response; whether resuscitation attempted, continued, terminated, or not attempted.

Exclude successful resuscitation before arrival of EMS.

## 2.3   ROSC (R1n, R1r, R2n, R2r)

Recording of return of spontaneous circulation (ROSC) on arrival at hospital indicates the outcome of the pre-hospital response and intervention.

### R1n

The number of patients who had resuscitation (Advanced or Basic Life Support) commenced / continued by ambulance service following an out-of-hospital cardiac arrest.

Code changed from SQU03_3_1_2 in 2018.

### R1r

Of patients in R1n, the number who had ROSC on arrival at hospital.

Code changed from SQU03_3_1_1 in 2018.

### R2n

Utstein: The number of patients who had resuscitation (Advanced or Basic Life Support) commenced / continued by ambulance service following an out-of-hospital cardiac arrest of presumed cardiac origin, where the arrest was bystander witnessed and the initial rhythm was Ventricular Fibrillation (VF) or Ventricular Tachycardia (VT).

Code changed from SQU03_3_2_2 in 2018.

### R2r

Of patients in R2n, the number who had ROSC on arrival at hospital.

Code changed from SQU03_3_2_1 in 2018.

## 2.4   Survival to discharge (R3n, R3d, R4n, R4d)

### R3n

The number of patients who had resuscitation (Advanced or Basic Life Support) commenced / continued by ambulance service following an out-of-hospital cardiac arrest.

Exclude patients for whom survival outcome is not known.

Code changed from SQU03_7_1_2 in 2018.

### R3s

Of patients in R3n, the number discharged from hospital alive.

Code changed from SQU03_7_1_1 in 2018.

### R4n

Utstein: The number of patients who had resuscitation (Advanced or Basic Life Support) commenced / continued by ambulance service following an out-of-hospital cardiac arrest of presumed cardiac origin, where the arrest was bystander witnessed and the initial rhythm was VF or VT.

Exclude patients for whom survival outcome is not known.

Code changed from SQU03_7_2_2 in 2018.

### R4s

Of patients in R4n, the number discharged from hospital alive.

Code changed from SQU03_7_2_1 in 2018.

For some patients, survival outcome may not be available to ambulance services when they supply data to NHS England. If so, R3n may be fewer than R1n, and R4n may be fewer than R2n.

## 2.5   Post-ROSC care bundle (R5n, R5b)

First produced for April 2018. NHS England collect and publish R5n and R5b data for January, April, July, and October.

### R5n

The number of patients who had resuscitation (Advanced or Basic Life Support) commenced / continued by ambulance service following an out-of-hospital cardiac arrest, and had ROSC on scene.

Exclude Traumatic Cardiac Arrest, patients successfully resuscitated before the arrival of ambulance staff, ROSC achieved en-route or upon arrival at hospital, and patients aged less than 18 years.

### R5b

Of patients in R5n, the number who received the post-ROSC care bundle.

If, for any component, no exceptions apply, and the component is not delivered, then the care bundle is not delivered, and the case should be included only in R5n.

If each component is either met or has a valid exception, the care bundle is delivered, and the case should be included in R5b and R5n.

Equipment failure, or presence only of non-registered staff on-scene, are not acceptable exceptions for any of these post-ROSC care bundle components.

If time of ROSC lost is unknown, it should be assumed that ROSC <10 minutes.

| Component of post-ROSC care bundle | Exceptions | Comment |
|---|---|---|
| 12 lead ECG taken post-ROSC | • Patient refusal<br>• Patient re-arrested with ROSC < 10 minutes in duration | If patient in arrest on arrival, should assume 12 lead ECG is post-ROSC |
| Blood glucose recorded post-ROSC | • Patient refusal<br>• Patient re-arrested with ROSC < 10 minutes in duration<br>• Blood glucose measured prior to ROSC and within normal range | If blood glucose pre-ROSC is below normal range then a subsequent blood glucose is required |
| End-tidal $CO_2$ reading / waveform recorded post-ROSC / continuously | • Patient refusal<br>• Patient re-arrested with ROSC < 10 minutes in duration<br>• Not required: no advanced airway in situ | |
| Oxygen administered post-ROSC / continuously | • Patient refusal<br>• Patient re-arrested with ROSC < 10 minutes in duration<br>• Not required: oxygen saturations were 94-98% (88-92% if chronic obstructive pulmonary disease) | |
| Systolic blood pressure reading recorded post-ROSC or, if unobtainable, presence of radial pulse documented | • Patient refusal<br>• Patient re-arrested with ROSC < 10 minutes in duration | |
| Administration started of a 250ml bolus of saline fluids post-ROSC | • Patient refusal<br>• Patient re-arrested with ROSC < 10 minutes in duration<br>• Not required: systolic blood pressure > 90 or presence of radial pulse where blood pressure is unobtainable, evidence of significant heart failure or hypervolemia clearly documented<br>• All attempts to gain intravenous and intraosseous vascular access are unsuccessful | A flush of 10ml is not considered as fluids administered. |

# Section 3   STEMI data

### 3.1   STEMI time to PPCI (M1n, M3n, M3m, M390)

Data for items M1n, M3n, M3m, and M390 are compiled and sent by ambulance services and acute NHS trusts to the Myocardial Ischaemia National Audit Project (MINAP) at the National Institute for Cardiovascular Outcomes Research (NICOR), who then send a combined file to NHS England.

M1n, M3n, M3m, and M390 superseded STEMI indicators SQU03_5_2_1 and SQU03_5_2_2, which NHS England last collected for October 2017.

MINAP data should exclude patients:

- less than 20 years of age or with age not recorded;
- where the call time, hospital arrival time or angiography time are not available or not realistic (time periods less than zero or more than 1000 minutes);
- already in hospital, repatriated after coronary intervention, self-presenters, inter-hospital transfers, and any other or unknown admission methods;
- with cardiac arrest before arrival at hospital.

#### M1n

The number of patients in the Myocardial Ischaemia National Audit Project (MINAP) directly admitted after transportation by an ambulance service in England, with a hospital admission date in the month in question, and an initial diagnosis of "definite Myocardial Infarction (MI)".

#### M3n

The number of patients in M1n who have primary percutaneous coronary intervention (PPCI).

#### M3m

For patients in M3n, the mean average time from call for help (999 call connect time) until catheter insertion for angiography.

#### M390

For patients in M3n, the 90th centile time from call for help (999 call connect time) until catheter insertion for angiography.

### 3.2   STEMI care bundle (M4n, M4b)

Items M4n and M4b are supplied by ambulance services to NHS England via SDCS.

From 2018 NHS England will only collect and publish M4n and M4b data for January, April, July, and October.

**M4n**

The number of patients with a pre-hospital diagnosis of suspected ST elevation myocardial infarction confirmed on ECG.

Code changed from SQU03_5_3_2 in 2018.

**M4b**

Of patients in M4n, the number who received the STEMI care bundle.

Code changed from SQU03_5_3_1 in 2018.

If, for any component, no exceptions apply and the component is not delivered, then the bundle is not delivered, and the case should be included only in M4n.

If each component is either met or has a valid exception, the bundle is delivered, and the case should be included in M4b and M4n.

| Component of STEMI care bundle | Exceptions |
|---|---|
| Aspirin given | • Patient refusal<br>• Contraindication to drug<br>• Cautions if clear reasons provided<br>• Doctor (for example GP or cardiologist) advised not to provide aspirin (General Medical Council number provided) |
| Glyceryl trinitrate (GTN) given | • Patient refusal<br>• Contraindication to drug<br>• No chest pain |
| Two pain scores recorded | • Patient refusal<br>• Patient unable<br>• Patient unconscious |
| Appropriate analgesia given – options available are Morphine, Entonox and Paracetamol | • Patient refusal<br>• Patient not in pain<br>• Contraindication to drug(s)<br>• Cautions if clear reasons provided |

# Section 4   Stroke data

Stroke records are supplied by ambulance services and acute trusts to the Sentinel Stroke National Audit Programme (SSNAP), who then send aggregated data to NHS England.

## 4.1   Stroke diagnostic bundle (K4n, K4b)

After January 2018 data, NHS England will only collect and publish K4n and K4b for February, May, August, and November.

### K4n

> The number of FAST positive or suspected stroke patients assessed face to face by the ambulance service. This refers to patients with a new onset / presentation of suspected stroke symptoms. Include patients with previous stroke or transient ischaemic attack (TIA) who have a new onset of symptoms.
>
> Code changed from SQU03_6_2_2 in 2018.

FAST-positive patients and suspected stroke are both included in K4n and K1n, because acute trusts can record equivalent clinical episodes under either of these categories. Patients can be excluded if they are found to have had a TIA and their symptoms resolve whilst with the ambulance crew.

The FAST assessment helps assess whether someone has suffered a stroke:

- **F**acial weakness: can the person smile? Has their mouth or eye drooped?
- **A**rm weakness: can the person raise both arms?
- **S**peech problems: can the person speak clearly and understand what you say?
- **T**ime to call 999 for an ambulance if you spot any one of these signs.

### K4b

> Of patients in K4n, the number who received the stroke diagnostic bundle.
>
> Code changed from SQU03_6_2_1 in 2018.

If, for any component, no exceptions apply and the component is not delivered, then the bundle is not delivered, and the case should be included only in K4n.

If each component is either met or has a valid exception, the bundle is delivered, and the case should be included in K4b and K4n.

| Component of stroke diagnostic bundle | Exceptions |
|---|---|
| Findings from a FAST assessment recorded | - Patient refusal<br>- Patient unable |
| Blood glucose recorded | - Patient refusal |
| Systolic and diastolic blood pressure recorded | - Patient refusal |

### 4.2 Stroke: time to hospital arrival (K1 items)

The K1, K2, and K3 data items superseded data items SQU03_6_1_1 and SQU03_6_1_2, which NHS England last collected for October 2017.

#### K1n

From April 2019 data onwards, K1n is the number of patients, transported by an ambulance service, and notified to SSNAP by acute trusts as having had a confirmed stroke. Acute trusts must have supplied sufficient information to SSNAP for the ambulance service to locate the patient in their records and supply the call time.

Up until March 2019, K1n was the number of FAST positive or suspected stroke patients assessed face to face by the ambulance service, including patients with a previous stroke or TIA who had a new onset of symptoms.

#### K1m

For patients in K1n, the mean average time from call connect to hospital arrival.

#### K150

For patients in K1n, the median time from call connect to hospital arrival.

#### K190

For patients in K1n, the 90th centile time from call connect to hospital arrival.

For K1 items, hospital arrival time is that supplied by the ambulance service to SSNAP.

### 4.3 Stroke: time to CT scan (K2 items)

#### K2n

Number of stroke patients in SSNAP, transported by an ambulance service, with a hospital admission date in the month in question, where the stroke is recorded by SSNAP as having occurred before hospital arrival, who had a Computerised Tomography (CT) scan. Exclude patients with a final diagnosis of TIA.

#### K2m

For patients in K2n, the mean average time from hospital arrival to CT scan.

#### K250

For patients in K2n, the median time from hospital arrival to CT scan.

#### K290

For patients in K2n, the 90th centile time from hospital arrival to CT scan.

For K2 items, incidents with more than 1000 minutes from hospital arrival to CT scan are excluded.

For K2 and K3 items, hospital arrival time is currently as recorded by the hospital. However, a date will be agreed when this will change to the time recorded by the ambulance service. Testing is ongoing during 2019 for ambulance services to supply their time of arrival to SSNAP.

### 4.4 Stroke: time to thrombolysis (K3 items)

**K3n**

Number of stroke patients in SSNAP, transported by an ambulance service, with a hospital admission date in the month in question, where the stroke is recorded by SSNAP as having occurred before hospital arrival, who had thrombolysis. Exclude patients with a final diagnosis of TIA.

**K3m**

For patients in K3n, the mean average time from hospital arrival to thrombolysis.

**K350**

For patients in K3n, the median time from hospital arrival to thrombolysis.

**K390**

For patients in K3n, the 90th centile time from hospital arrival to thrombolysis.

# Section 5   Sepsis data (P1n, P1b)

First produced for June 2018 data. NHS England will collect and publish P1n and P1b data for March, June, September, and December.

If, for any component, no exceptions apply and the component is not delivered, then the bundle is not delivered, and the case should be included only in P1n.

If each component is either met or has a valid exception, the bundle is delivered, and the case should be included in P1b and P1n.

### P1n

Adult patients with a pre-hospital impression of suspected sepsis and a National Early Warning score (NEWS2) of 7 or above.

Exclude pregnant patients, and patients aged less than 16 years.

Patients with neutropenic sepsis were excluded up to March 2019 data, and included from June 2019 data onwards.

### P1b

Of patients in P1n, the number who received the sepsis care bundle.

| Component of sepsis care bundle | Exceptions |
|---|---|
| Observations assessed: (level of consciousness, blood pressure, oxygen saturation and respiratory rate) | • Patient refusal (blood pressure and oxygen saturation only)<br>• Unable to record measurement due to condition of patient |
| Hospital pre-alert recorded | • Patient refused conveyance / not-conveyed due to pre-existing care plan<br>• Pre-alert attempted but not accepted by receiving facility |
| Oxygen administered | • Patient refusal<br>• Not clinically indicated (clear reasons must be provided) |
| Administration of IV fluids | • Patient refusal<br>• Unable to gain IV access<br>• Not clinically indicated (clear reasons must be provided) |

# Section 6   Abbreviations, glossary / data dictionary

| | |
|---|---|
| NEAS, NWAS, YAS, | North East, North West, Yorkshire, |
| EMAS, WMAS, EEAST, | East Midlands, West Midlands, East of England, |
| LAS, SECAmb, SCAS, | London, South East Coast, South Central |
| SWAS, IOW | South Western, Isle of Wight Ambulance Services |
| Angiography | Injection, through a catheter, of a contrast dye into blood vessels, followed by an x-ray to examine the blood vessels. Depending upon the results of this examination, it may be followed by angioplasty. |
| Angioplasty | Insertion and inflation of a balloon inside a blood vessel to allow blood to flow. Sometimes followed by insertion of a stent. |
| AQI | Ambulance Quality Indicators |
| Centile | A 90th centile time to clinical intervention of, for example, 156 minutes, means that 9 out of 10 incidents had that clinical intervention within 156 minutes. |
| $CO_2$ | Carbon Dioxide |
| CPR | Cardio-pulmonary resuscitation |
| CT scan | Computerised Tomography scan |
| ECG | Electrocardiogram |
| FAST | Face Arm Speech Test for stroke |
| GTN | Glyceryl trinitrate |
| IV | Intravenous |
| Mean | The average: the sum of all values divided by the count of values |
| Median | A median time to clinical intervention of, for example, 93 minutes, means that half the incidents had that clinical intervention within 93 minutes. The median is identical to the 50th centile. |
| MINAP | Myocardial Ischaemia National Audit Project |
| MPDS | Medical Priority Dispatch System |
| Myocardial Infarction | Damage to heart from reduced blood supply |
| Myocardial Ischaemia | Reduced blood supply to heart |
| NASCQG | National Ambulance Service Clinical Quality Group |
| NEWS | National Early Warning Scheme |
| NICOR | National Institute for Cardiovascular Outcomes Research |
| OHCAO | Out of Hospital Cardiac Arrest Outcome programme |
| PPCI | Primary Percutaneous Coronary Intervention (a form of angioplasty) |
| Reperfusion | Restoration of blood flow, for example with angioplasty |
| ROSC | Return of Spontaneous Circulation |
| SDCS | Strategic Data Collection Service at NHS Digital |
| $SpO_2$ | Pulse oximeter oxygen saturation |
| SSNAP | Sentinel Stroke National Audit Programme |
| STEMI | ST-section Elevation Myocardial Infarction, a type of heart attack |
| TIA | Transient Ischaemic Attack |
| Utstein | A standardised system for the uniform reporting of cardiac arrest data, originally defined by health professionals at Utstein Abbey in Norway |
| VF | Ventricular Fibrillation: when the heart quivers instead of pumping, due to disorganised electrical activity in the ventricles |
| VT | Ventricular Tachycardia: A type of regular and fast heart rate that arises from improper electrical activity in the ventricles of the heart |