Cohort profile: The Myocardial Ischaemia National Audit Project (MINAP)

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Abstract

Aims

The Myocardial Ischaemia National Audit Project (MINAP) collects data from admissions in England, Wales and Northern Ireland with type 1 myocardial infarction. The project aims to improve clinical care through the audit process and to provide powerful high-resolution data for research.

Methods and Results

MINAP collects data spanning 130 data fields covering the course of patient care, from the moment the patient calls for professional help through to hospital discharge and rehabilitation.

Data are entered by clinicians and clerical staff within hospitals, and pseudonymised records are uploaded centrally to the National Institute for Cardiovascular Outcomes Research (NICOR), hosted by Barts Health NHS Trust, London, UK. 206 hospitals submit over 92,000 new cases to MINAP annually. Approximately 1.5 million patient records are currently held in the database.

Patient demographics, medical history, clinical assessment, investigations, treatments, drug therapy prior to admission, during hospital stay and at discharge are collected. Data completeness of three key data fields (age, admission blood pressure, and heart rate) is over 91%. Vital status following hospital discharge is obtained via linkage to data from the United Kingdom Office for National Statistics.

An annual report is compiled using these data, with individual hospital summary data included. Datasets are available to researchers by application to NICOR.

Conclusion

MINAP is the largest single-healthcare-system heart attack registry, and includes data from hospitalisations with type 1 myocardial infarction in England, Wales and Northern Ireland. It includes high-resolution data across the patient pathway, and is a powerful tool for quality improvement and research.

Introduction

There were more than 11 million new cases of cardiovascular disease within European Society of Cardiology (ESC) member countries in 2015; a prevalence of over 83 million.[1]

Cardiovascular disease registries have been established to collect observational data about such patients. Often, databases were devised for clinical audit – whereby the performance of participating units or clinicians could be compared against explicit agreed standards of care. This served a *quality assurance* function. However, *quality improvement* initiatives are also facilitated, through what we have previously described as a 'Janus-like' capability[2] – the use of registries to look both *backwards*, in order to identify variations or deficiencies in important elements of care, and *forwards*, to describe the effects of targeted interventions. Data collected in registries also have an important role in quantifying disease burden to assist service planning, the implementation of new therapies, and the planning of research.[2] Registries have been used in the development of prognostic models,[2] as a source of observational data for hypothesis formulation, and, more recently, as a relatively inexpensive method of performing randomised controlled trials – offering opportunities for recruitment, randomisation and follow-up, and providing valuable real-world context.[3]

The Myocardial Ischaemia National Audit Project (MINAP) is one of six domains of cardiovascular care that, together, comprise the National Cardiac Audit Programme (NCAP) within the National Institute for Cardiovascular Outcomes Research (NICOR). MINAP receives data for hospital admissions in England, Wales and Northern Ireland with type 1 myocardial infarction (T1 MI).[4] The project aims to

4

examine and improve clinical care, and so outcomes, of patients with acute coronary syndromes through the audit process, and to provide powerful high-resolution data for research.[5-12] It is the largest single-healthcare-system heart attack registry in the world, originally established to support a national framework for coronary heart disease,[13, 14] and has been collecting data since 2000. A similar example is the Swedish Web-system for Enhancement and Development of Evidence-based care in Heart disease Evaluated According to Recommended Therapies (SWEDEHEART), which was launched in December 2009 following the merger of three existing registries.[6, 15]

Aim and Objectives

The primary aim of MINAP is to examine and improve service delivery for, and outcomes of, patients admitted to hospital with an acute coronary syndrome. This requires the collection, cleaning, and analysis of relevant data. The results of these analyses are made available to participating hospitals, ambulance services and regional cardiac networks in a format that allows comparisons with others and with a national average, as well as benchmarking of performance against national standards or targets. This promotes and facilitates quality improvement initiatives. An annual report is released to the public. Additionally, the dataset is a resource for research which has evaluated the performance of hospitals according to the ESC Acute Cardiovascular Care Association quality indicators,[9] compared care provision between men and women,[10] and quantified temporal trends and geographical variations in T1 MI clinical care and outcomes.[11, 12]

5

Quality of care interventions

Setting

Presently, MINAP holds over 1.5 million records. In 2017/18 102,056 new records were submitted, of which 92,233 were confirmed T1 MI.[16, 17] Data are submitted by 13 ambulance services and 206 hospitals in England, Wales and Northern Ireland, figure 1.[16] The costs of local data entry, including staff time for data collection and electronic data entry, are borne by the participating hospitals. Central funding for the audit activities of MINAP, including its data storage, cleaning, analyses and reporting, originate from National Health Service (NHS) England and GIG Cymru/NHS Wales, and are channelled to NICOR through a commissioned NCAP by the Health Quality Improvement Partnership (HQIP).[18] Researchers pay for the costs of data extracts.

Population and consent

Participating hospitals are required to enter data for all patients admitted with T1 MI. Data have been continuously submitted from NHS hospitals to MINAP since October 2000.[19] NICOR conforms to legislation within the Data Protection Act for the collection and use of patient-identifiable data. MINAP has approval to hold patient identifiable information without patient consent under section 251 of the NHS Act 2006.

Patient identification

Each patients' unique NHS number is pseudonymised and stored within the database. Other patient identifiers, such as local hospital number, date of birth and residential postcode, are encrypted before transmission to the central database.

6

Start points

MINAP includes patients with T1 MI.[4] This includes myocardial infarction due to plaque erosion or rupture, fissure or dissection. Whilst it is possible to upload information about patients with a final diagnosis of unstable angina, the majority of cases submitted to MINAP have evidence of myocardial injury, either with or without ST-segment elevation (STEMI and NSTEMI).

Baseline and follow-up data

Data are collected within 130 fields that cover the entire patient pathway from the time the patient calls for professional help to the point of discharge, figure 2. Patient demographics, medical history and clinical assessment, investigations, treatments, drug therapy prior to admission, during hospital stay and at discharge are all included.[20] The various data fields are reviewed to ensure that they remain up-to-date and reflect contemporary practice. Redundant fields are archived, and continuity of data are maintained where possible.[21]

Data capture and storage

Data are collected at each hospital site by clinicians and clinical audit staff. Ambulance data are abstracted from documentation completed by paramedic staff and entered onto MINAP by hospital personnel. Historically, cases were either uploaded on a case-by-case basis via a 'web portal', or entered into a PC-based package (Lotus Notes) – manually, or automatically in batches via third party software that acts in local clinical information systems.[16] However, MINAP has recently adopted the Swedish IT platform, QReg5, for data entry and curation that will enable more sophisticated and timely management of the data for quality

improvement and research. A data dictionary is available, containing explanatory detail for each field. Data are securely uploaded to NICOR, where they are stored and managed.

Data quality

There is evidence that reporting of T1 MI within MINAP may be incomplete.[8] Yet, in the most recent MINAP annual report the overall *case ascertainment* rate, comparing MINAP submissions with official National Health Service (NHS) administrative hospital coding data, was 101.7%.[17] There is variation in case ascertainment between hospitals, in that 11 units (5.3%) had rates above 150% (suggesting greater MINAP submissions than coded discharges) and 11 (5.3%) units had rates below 50% (suggesting suboptimal case ascertainment). The authors of the most recent report point out that this reflects a comparison based upon a fairly restrictive, albeit recommended, set of International Classification of Diseases (ICD) codes.[17] Were some participating hospitals to be using a broader range of ICD codes to identify cases of AMI, as seems likely, a lower case ascertainment rate would be reported.

Data submissions should meet the minimum standard for *data completeness*. This is defined as at least 95% completion of 48 specified data fields for STEMI, and 43 fields for NSTEMI.[22] The MINAP data application used by hospital staff contains error-checking mechanisms designed to minimise common errors. In 2015/16, data completeness of three key data fields (age, admission blood pressure, and heart rate) was 91.5%.[23] Completeness of a variety of other data fields is monitored and made available to participating centres.
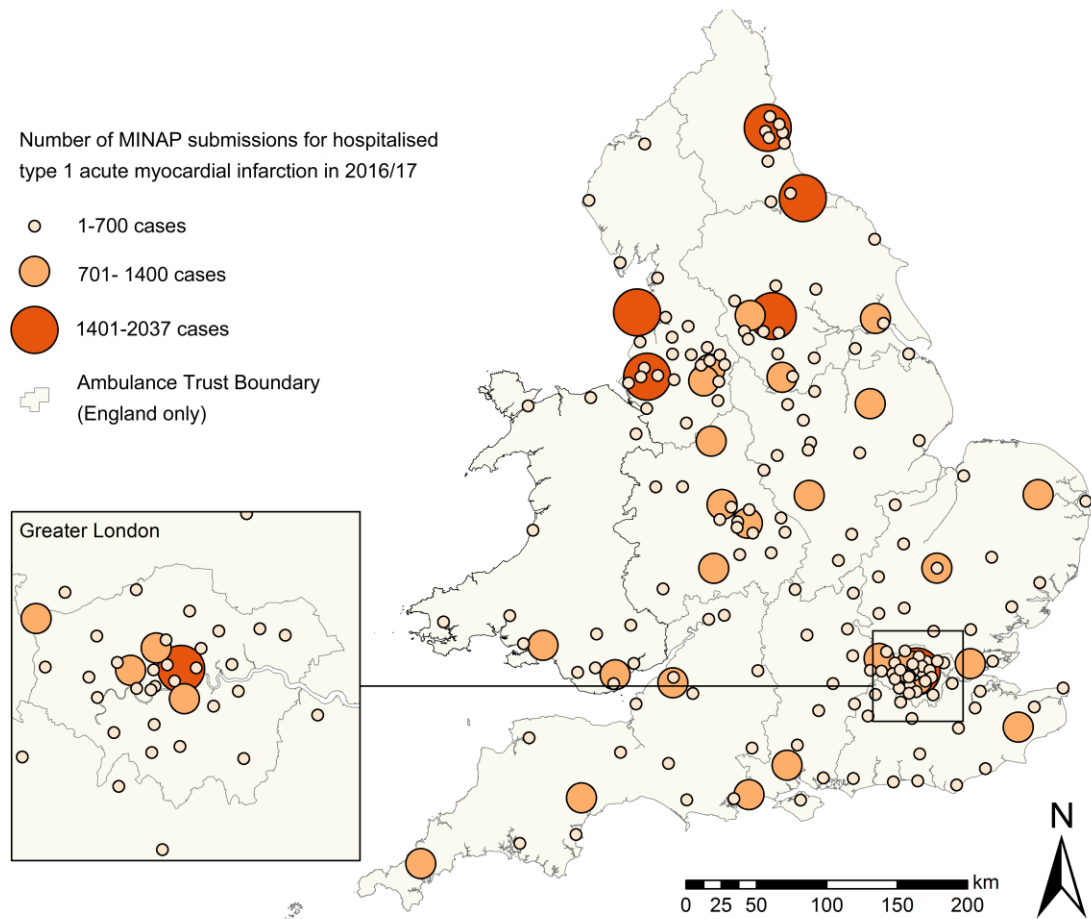
8

Endpoints and linkages to other data

All-cause mortality is available, as data are linked to the United Kingdom Office for National Statistics using individual patient NHS numbers to obtain regular mortality updates. Linkage between other databases held within NICOR is possible. Data are available for research and audit by application to NICOR, https://www.ucl.ac.uk/nicor/access. Applications are reviewed by a NICOR Research Group and subsequently, if approved, by the Data Access Request Group at the Healthcare Quality Improvement Partnership.

Conclusion

MINAP is the largest single-healthcare-system heart attack registry, and includes data from hospitalisations with MI in England, Wales and Northern Ireland. It holds high-resolution data across the patient pathway, with robust linked mortality data from the United Kingdom Office for National Statistics. It is a powerful tool for quality improvement within the NHS and in producing high impact research.

Figures

Figure 1: Geoplot of hospitals and the number of patients with type 1 myocardial infarction submitted to MINAP (England and Wales only)
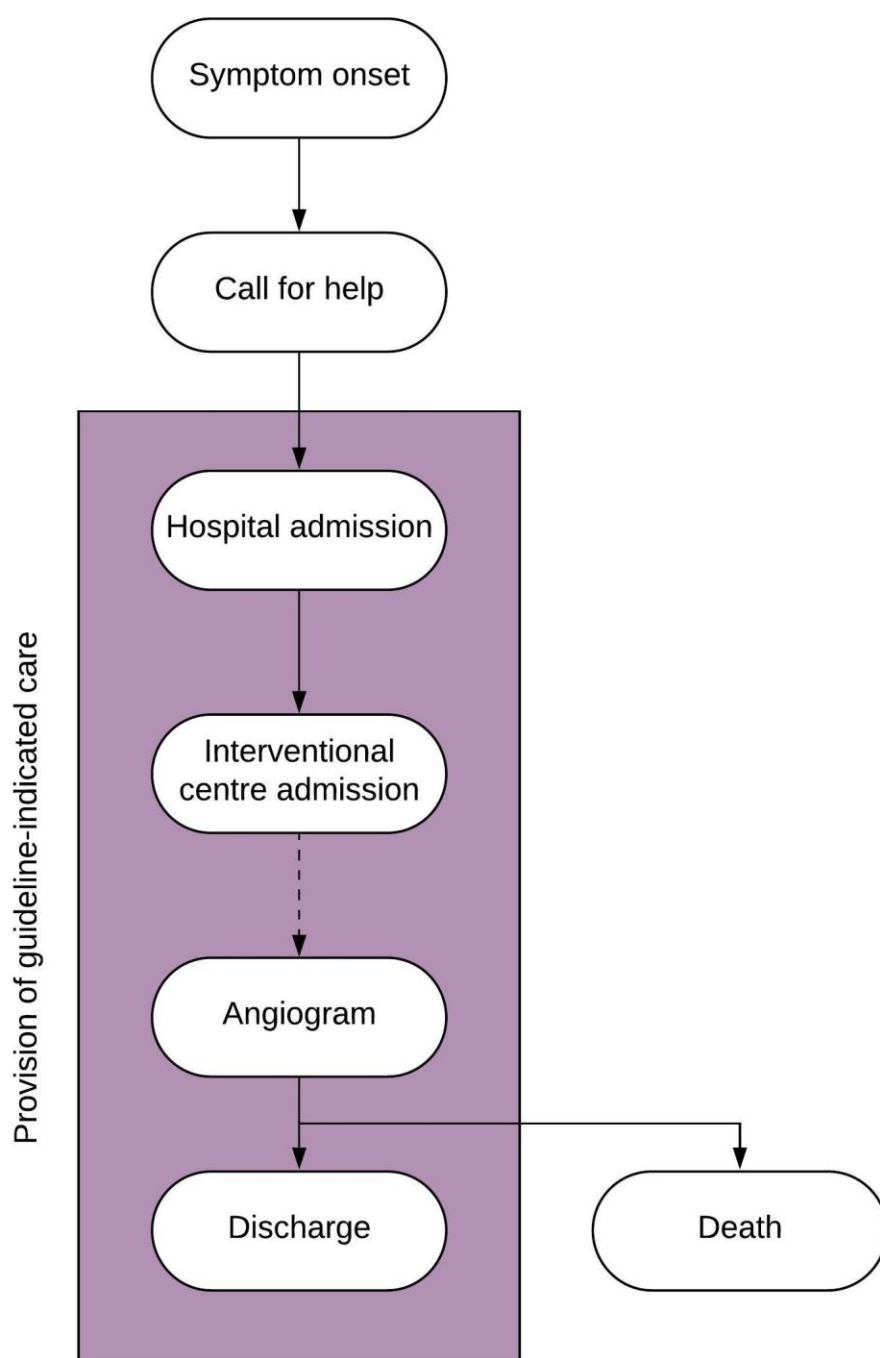
Figure 2: Data are collected at each stage of the patient journey, from symptom onset to discharge.

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Conflicts of interest

C Weston is Clinical Lead for MINAP. A Timmis, T Quinn, A Keys and CP Gale are members of the MINAP Domain Expert Group. CP Gale is a member of the NICOR Research Group.

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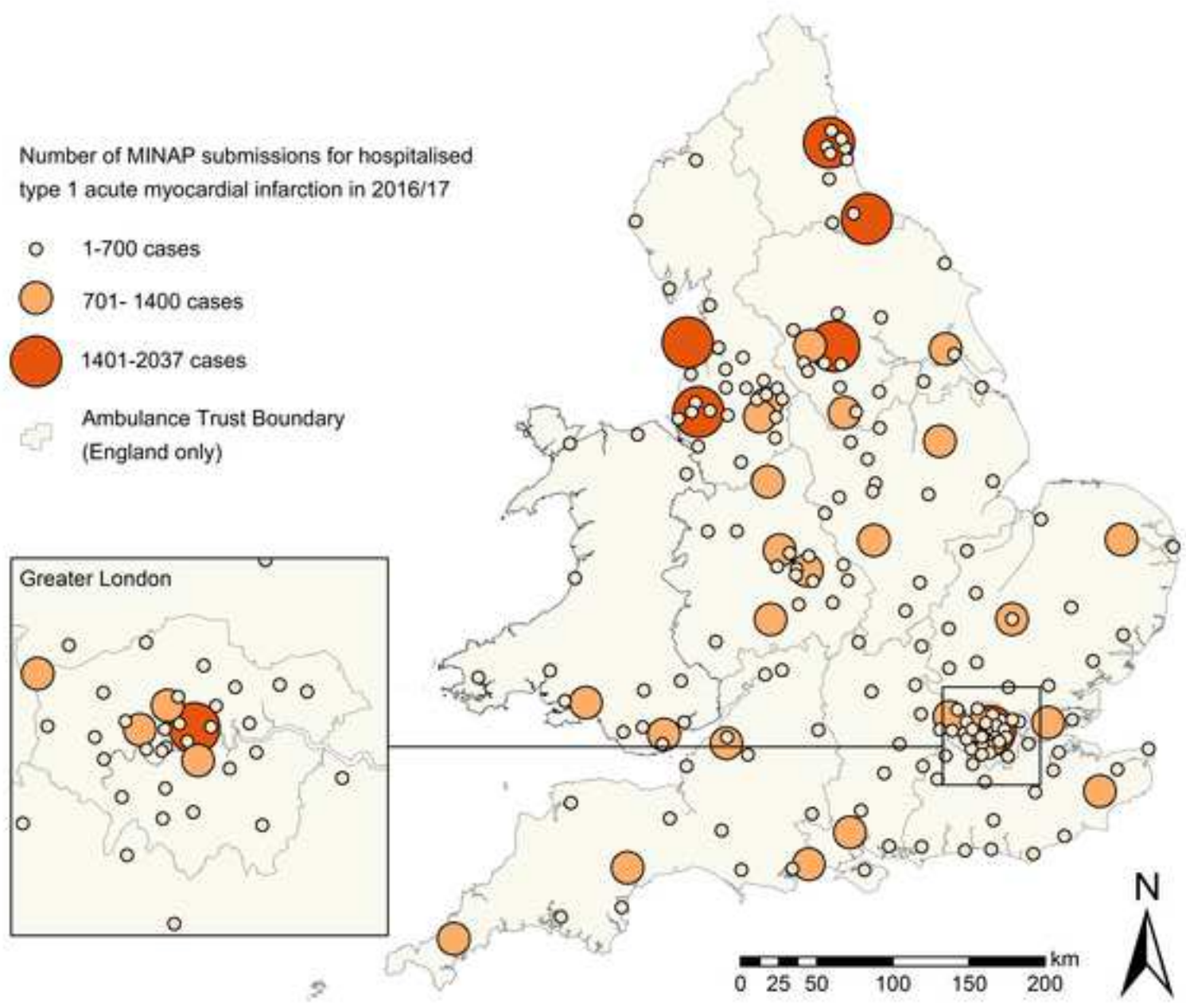
14

Figure 1

Number of MINAP submissions for hospitalised
type 1 acute myocardial infarction in 2016/17

○   1-700 cases

○   701- 1400 cases

●   1401-2037 cases

▢   Ambulance Trust Boundary
(England only)

Greater London

N

km
0 25 50   100   150   200

Figure 2