

Ethics Committee Briefing Note

Project Reference: WMP DAL Predicting Mental Health Incidents

Source of analytical question / hypotheses to be examined:

This project has been requested by Inspector Scott McGarrigle who manages the Mental Health Triage Teams.

As this project is at the proposal stage and is presented to the committee 'in principle' in order that any immediate concerns can be raised, the finer details of the methodology will not be determined until after the exploratory data analysis (EDA) phase. Once the analyses have been completed the projects will be presented to the Committee again so that findings and methodology can be examined in more detail.

Purpose of data analysis

The purpose of this project is to analyse existing mental health data stored by West Midlands Police (WMP) to make predictions and to investigate correlations between mental health and crime/anti-social behaviour (ASB).

The intention is to provide a baseline understanding of the volume and nature of the demand placed on WMP resources as a result of mental health related incidents, as held within WMP data systems.

At this stage, the Committee is being asked to offer advice on a project making predictions using only WMP data. The resulting analyses will not identify individuals.

However, responding to mental health incidents is a multi-agency responsibility¹ and it is well-documented² that the inappropriate use of police resources are not in the best interest of a person with mental ill health, when they most urgently need mental healthcare and support services. Therefore, the ambition is that this will provide a starting point for a longer term project to utilise relevant partner data sets to understand the wider demand placed on all services responding to mental health incidents, once appropriate data sharing protocols have been agreed.

Such partnership work is in response to the recommendations made by Her Majesty's Inspectorate (HMICFRS) in its 2018 report, '*Policing and Mental Health: Picking up the Pieces*'³ and to support the strategic intentions of West Midlands Police (WMP) in responding to mental health incidents.⁴

Context

All police responses to people with mental ill health are governed by legal frameworks including the United Nations Convention on the Rights of Persons with Disability and the European Convention on

¹ HMG '*Mental Health Crisis Care Concordat*' (2014) https://www.crisiscareconcordat.org.uk/wp-content/uploads/2014/04/36353_Mental_Health_Crisis_accessible.pdf

² College of Policing (CoP) Authorised Professional Practice (APP) <https://www.app.college.police.uk/app-content/mental-health/introduction-and-strategic-considerations/#strategic-oversight-and-management>

³ HMICFRS (2017) *Policing and Mental Health; Picking up the Pieces*

<https://www.justiceinspectors.gov.uk/hmicfrs/publications/policing-and-mental-health-picking-up-the-pieces/>

⁴ WMP Force Strategy on Policing and Mental Health (2020)

Human Rights (ECHR), given effect in domestic law in the Human Rights Act 1998. Our responses to individuals experiencing mental ill health are governed by the Mental Health Act 1983 (MHA) and the Mental Capacity Act 2005 (MCA).

The nationally agreed definition⁵ for a police mental health related incident is:

Any police incident thought to relate to someone's mental health where their vulnerability is at the centre of the incident or where the police have had to do something additionally or differently because of it.

In these circumstances police may be acting in a criminal justice or health care capacity or both.

The strategic intention⁶ of WMP in relation to mental health contexts is to:

- Ensure the safety, dignity and rights of the public are placed at forefront of all WMP decisions on policing and mental health.
- Ensure collaborative mental health partnerships operate effectively.
- Ensure WMP fulfils its responsibilities to protect life as well as under the mental health and capacity law.
- Ensure WMP operates effectively to relevant mental health professional practice.
- Ensure WMP is not operating beyond its legal authority.
- Ensure WMP officers are not operating beyond professional competence.

This policy takes account of the 2018 HMICFRS report, '*Policing and Mental Health: Picking up the Pieces*'⁷ which raised:

'significant concerns about whether the police should be involved in responding to mental health problems to the degree that they are... The fact that people are calling the police to access health care is untenable, and the evidence ... shows that the demand for police to respond to mental health-related calls is increasing'.

The report also highlighted that '***police forces have an inadequate picture of the extent and nature of the demand they face from people with mental health problems'***.

In the West Midlands policing area, a partnership response to mental health incidents has operated since 2014 with the creation of the Mental Health Triage system. This is funded and resourced by NHS Clinical Commissioning Groups (CCG), West Midlands Ambulance Service (WMAS) and WMP. Multi-agency Triage Teams provide help to those suffering mental health crises and consist of a WMP officer, a paramedic and a psychiatric nurse. (In Coventry the provision is a single officer and a psychiatric nurse in a police response vehicle on early and late shifts).

⁵ CoP APP <https://www.app.college.police.uk/app-content/mental-health/introduction-and-strategic-considerations/>

⁶ WMP Force Strategy on Policing and Mental Health (2020)

⁷ HMICFRS (2017) Policing and Mental Health; Picking up the Pieces
<https://www.justiceinspectorates.gov.uk/hmicfrs/publications/policing-and-mental-health-picking-up-the-pieces/>

The remit of Triage is to:

- Ensure safe, dignified care and identify patients who need detention under the Mental Health Act
- Reduce demand on police and ambulance services
- Prevent unnecessary admissions into A&E departments
- Prevent any unnecessary use of the police S.136 power
- Reduce the use of police stations as a place of safety for S.136 detainees

S.136 refers to Section 136 of the MHA which gives police the power to detain someone in need of immediate care, by taking them to a place of safety where medical staff can assess them.

Each quarter⁸, the Triage teams conduct around 400 – 450 face to face mental health assessments by the psychiatric nurse and provide telephone advice to ambulance crews on around 600 – 675 occasions. Whilst the use of S.136 remains high, the intervention of Triage teams is shown to prevent the unnecessary use of this power. Between June and September 2019, S.136 was utilised 306 times, whilst Triage advice prevented its use on a further 193 occasions. On average, officers remain with people who have been detained under S.136 for 6.5 hours, illustrating that the demand on ‘officer time’ presents a significant challenge for WMP. A large proportion of those being assisted by Triage are ‘open to services’ in that they are already being treated by local mental health trusts in a community setting. In Quarter 2 of 2019, 24% of clients who engaged with the Triage Team in the Black Country and 60% in Birmingham/Solihull were open to services. This suggests that many people are undergoing cycles of mental health crisis despite receiving some form of treatment and clinical engagement.

In addition to incidents attended or supported by the Triage teams, there is also wider demand placed on all frontline officers to respond to⁹:

- Requests to complete ‘safe and well checks’ on mental health patients on behalf of Community Mental Health Teams.
- Missing persons from mental health units or those who have failed to attend appointments with GPs / Community Mental Health Teams.
- Execution of Mental Health Act warrants, whereby police assist the local authority and NHS in conducting Mental Health Act Assessments in raised risk environments.
- Requests to assist partner agencies in detaining people under the Mental Capacity Act 2005.
- Non-availability of beds in mental health settings, particularly specialist settings.
- In 2019, ‘mental health’ was cited as a contributory factor in a third of incidents where officers are recorded as deploying ‘Use of Force’¹⁰, usually to protect themselves, the public or the person they were dealing with.

⁸ Mental Health Update to OPCC SPCB Dec 2019 (item 8b) <https://www.westmidlands-pcc.gov.uk/strategic-policing-crime-board/agendas-minutes-reports/>

⁹ Mental Health Update to OPCC SPCB Dec 2019 (item 8b) <https://www.westmidlands-pcc.gov.uk/strategic-policing-crime-board/agendas-minutes-reports/>

In addition, demand for police attendance at mental health related incidents increases towards in the late afternoon and weekends, as other services who do not offer a 24/7 service close. This is when other types of demand for police attendance also increases.¹¹

Recording of mental health incidents within WMP systems is known to be poor. Around 1-2% of all incidents are identified as mental health related either using a flag or final closure code. However, dip sampling of records and officer experience suggests the true proportion is far greater and in reality we do not know how many mental health related incidents we respond to each day which means we are unable to take a strategic, proactive approach to the problem.

Using analyses previously unavailable with such volumes of data, the Data Analytics Lab (DAL) will identify incidents which are in fact mental health related but where this information has not been directly entered into a specific data field. Examples might include use of the term 's.136' or the name of a mental health facility being referred to in the free text body of the log. This will enable WMP to better understand the proportion of incidents which relate to mental health for the first time.

Intended activity resulting from the project

The intended output of the project is to provide predictions a month in advance of the likely volume, locations and time of mental health incidents. This will enable decision makers to allocate resources such as the Triage Team and other front line officers with greater precision.

The project will also investigate any relationships between mental health incidents and crime; for example where alcohol is involved, or where a crime is identified as domestic abuse. This will be a starting point for understanding the wider societal factors contributing to mental health demand for policing.

In addition, the results of this project will be shared with relevant health agencies as part of the ongoing partnership approach to offer a better service to vulnerable people with mental health issues at times of crisis.

In the longer term, the ambition is that further analyses of partner data will inform strategic decision making across the wider partnership. The richer picture that partner data would offer includes an understanding of the proportion of people already 'open to services' and the outcomes of any referrals. Future analysis of this additional data would assist with strategic planning for the multi-agency response to mental health. **The current project would however only use WMP data.**

Data to be used:

The units of analysis will be incidents (Oasis / ControlWorks) requiring police attendance within the WMP area. Additional data which holds information about mental health related demand will also

¹⁰ 2019: 10,470 occasions when Use of Force was deployed; mental health cited as a factor in 3,520 cases.

¹¹ Mental Health Update to OPCC SPCB Dec 2019 (item 8b) <https://www.westmidlands-pcc.gov.uk/strategic-policing-crime-board/agendas-minutes-reports/> and HMICFRS (2017) Policing and Mental Health; Picking up the Pieces <https://www.justiceinspectors.gov.uk/hmicfrs/publications/policing-and-mental-health-picking-up-the-pieces/>

be investigated including Crimes, Intelligence and Compact (missing persons data).

Data relating to individuals will be the basis of this analysis. However, this will be aggregated and no individual will be identifiable from the analysis.

The output will be predictions of likely numbers and locations of demand resulting in temporal patterns and geographic hotspots.

Level of analysis:

- Individual
 - Individuals aggregated?
 - Yes
 - No
- Specific Area:
 - Output Areas
 - Super Output Areas - Lower
 - Super Output Areas - Mid
 - Wards
 - Districts
 - Other
- West Midlands
- Other

Reliability of data:

An extensive exploratory data analysis (EDA) phase will be undertaken to examine the extent of any data quality issues, including processes to identify the presences of any bias, to ensure that no bias is built into the model.

Discussions with subject matter experts (SMEs) will be undertaken both to capture any extraneous requirements and to sense check the analyses.

Sample or entirety: Entirety

If sample: N/A

Method of sampling: N/A

Method of choosing sample size: N/A

Sample size: N/A

Type of analysis:

- Exploratory
- Explanatory
- Predictive
- Optimisation

Proposed methodology:

It is apparent that there are patterns to mental health related incidents both over time and over space. Therefore it is envisaged that a spatio-temporal model would likely provide the best means of prediction, potentially also with a separate univariate time series model. For the purposes of spatial prediction, it is also envisaged that the WMP area would be broken into wards in order to cater for analyses and predictions over areas that are distinct and small enough to allow operational activities to be planned.

Additional investigation of the data will ascertain whether there are any correlations between mental health demand and certain types of crime such as those related to alcohol use or domestic abuse.

Will the project eventually be automated:

- Yes
- No

Means of evaluation:

The accuracy of the model would be assessed during its build phase through comparison to a test dataset. Following this beta testing of the model would be undertaken in order to assess its accuracy over a period of time on new data.

ALGO-CARE considerations:

Advisory:

If applicable, are the outputs from the algorithm to be used in an advisory capacity?

The predictions would be used to assess levels of risk and potential levels of harm and threat. This would feed into resource allocation decisions for front line officers and the Triage Teams.

Does a human officer retain decision-making discretion?

The predictions would be for informational purposes only to feed into decisions that would ultimately be made by officers following operational protocols.

Lawful:

What is the policing purpose justifying the use of the algorithm (means and ends)?

Being able to predict where and when mental health incidents are most likely to occur, so as to plan policing resources supports both the delivery of HMICFRS 2018 recommendations and of WMP's mental health strategy by quantifying the volume and nature of demand caused by mental health incidents. Similarly, WMP's Improvement Plan for 2020/21 includes the objective to '*Continue to improve our response to those in need, improving our response to emergency incidents and those involving vulnerable people*'.

Is the potential interference with the privacy of individuals necessary and proportionate for

legitimate policing purposes?

Whilst data regarding individuals will be processed, this would be used to produce aggregated data. The basic unit of analysis would be incidents and their location. Therefore there would essentially be no interference with the privacy of individuals.

In what way will the tool improve the current system and is this demonstrable?

To date it has not been possible to quantify the proportion of incident demand which relates to mental health. The tools traditionally available to analysts (excel) are insufficient to manage the volume of data held within command and control incidents. The processing power and expertise in the DAL will enable a more sophisticated analysis of WMP incident data in order to make predictions about where and when mental health incidents are more likely to occur in the future.

Are the data processed by the algorithm lawfully obtained, processed and retained, according to a genuine necessity with a rational connection to a policing aim?

The data are from WMP systems and collected to enable normal day-to-day operations.

Is the operation of the tool compliant with national guidance?

The analyses proposed would accord with the DCMS Data Ethics Framework 2018.¹²

Granularity:

Does the algorithm make suggestions at a sufficient level of detail given its purpose and the nature of the data processed?

Given the overall aim of predicting the number and locations of mental health incidents, using incident data aggregated over time and to spatial units would enable better decision making within WMP.

Are data categorised to avoid broad-brush grouping and results and therefore issues of potential bias?

Using aggregated counts would best suit the aims of the project, but would not involve any other form of categorisation (given that incidents would be the unit of analysis). For example, there would be no categorisation of individuals' protected characteristics. Any output would identify an incident as mental health related, rather than any individual.

Do the potential benefits outweigh any data quality uncertainties or gaps?

The project will include an extensive EDA element and this should highlight areas of heightened uncertainty in the data or where particular gaps exist. Should any such issues be identified, these would be addressed as a part of the project. Given the benefits of responding to mental health incidents in a timely manner and with the most appropriate resource, it is not expected that any

¹² <https://www.gov.uk/government/publications/data-ethics-framework/data-ethics-framework>

data quality issues would be of such a magnitude as to warrant not undertaking the project.

Is the provenance and quality of the data sufficiently sound?

The data have been gathered during the day-to-day response work of WMP and do enable analyses of the type envisioned for this project.

If applicable, how often are the data to be refreshed?

Currently envisaged as circa every four weeks.

If the tool takes a precautionary approach in setting trade-offs, what are the justifications for the approach taken?

If a predictive model can be built, its accuracy would be tested on separate data which had not been used in building and training the predictions. This can be done using historic data – where we know what happened and would tell us if the model would have predicted the number and location of events or not. If the model is not deemed to be accurate enough, then the project would not be pursued. Ultimately any model developed would aim to maximise accuracy (most likely measured using RMSE, etc.) as possible. This approach would mean that we could best allocate WMP resources whilst ensuring a minimisation of false positives.

Ownership:

Who owns the algorithm and the data analysed?

WMP would own the algorithm and owns the data.

Does WMP need rights to access, use and amend the source code and data?

No

Are there any contractual or other restrictions which might limit accountability or evaluation?

No

How is the operation of the algorithm kept secure?

The data and the analyses are contained wholly within the WMP Hadoop system and the security measures employed therein.

Challenge:

What are the post-implementation oversight and audit mechanisms, e.g. to identify any bias?

Checks will be made as to the accuracy of the model on an on-going basis (overall accuracy, etc.) as well as any consistent patterns that may represent biases.

If the algorithm is to inform criminal justice disposals, how are individuals notified of its use?

Not applicable.

Accuracy:

Does the specification of the algorithm match the policing aim and decision policy?

The model would aim to produce information to aid decision making within WMP to support the Force's strategic aim of improving our response to those in need, to emergency incidents and those involving vulnerable people.

Can the accuracy of the algorithm be validated periodically?

The productionisation of any model resulting from the project would include checking its accuracy on an on-going basis.

Can the percentage of false positives / negatives be justified?

Not yet known, however any model developed would aim to maximise accuracy.

How was the method chosen as opposed to other available methods?

Currently the broad (and potential) approach has been identified due to the nature of the business question and the data available.

What are the (potential) consequences of inaccurate forecasts?

The main issues arising from inaccurate forecasts would be (a) potential for actions for WMP that may not be necessary (including in particular locations) and (b) WMP resources being allocated ineffectively.

Does this represent an acceptable risk?

Any model arising from this project would seek to balance the advantages against the risks arising from inaccurate predictions partly via balancing the model's accuracy and partly through assessing the types of decisions for which any such model would be effective and any actions that would arise from these decisions. This would be subject to periodic review.

How are the results checked for accuracy and how is historic accuracy fed back into the algorithm for the future?

For any model that was productionised, it's accuracy would be assessed on an on-going basis via measuring its accuracy (RMSE, etc. and identified locations) as well as producing histograms of counts / estimated probabilities so that any degradation of the model could be tracked and the model rebuilt if necessary.

How would inaccurate or out-of-date data affect the result?

This is partly dependent on the nature of any model should one be capable of being built. Generally inaccurate or out-of-date data could detrimentally impact on the model's performance (in terms of accuracy) and lead to inefficient decision making and resource deployment.

Responsible:

Would the operation of the algorithm be considered fair?

During the development of any model, the presence of any biases in the underlying data or for predictions to produce biases would be fully examined and mitigated if the potential was present.

Is the use of the algorithm transparent (taking account of the context of its use), accountable and placed under review?

The details of any model arising from this project would be provided and, as mentioned above, when productionised there would be on-going checks as to model performance.

Would it be considered to be used in the public interest and to be ethical?

Enabling us to improve our response to vulnerable people suffering from a mental health crisis is likely to be seen as a positive use of our data and technical expertise.

There may be potential for this project to be seen as another instance of hotspot prediction that will be disadvantageous to various communities. This project would aim to use robust analyses and methods such that any such concerns could be mitigated. Once productionised, the accuracy of the models would be kept track of in order to ensure that the model(s) do not degrade.

There are a number of existing mechanisms for reporting back to our communities in order to enable them to scrutinise our decision making. These include the OPCC Strategic Policing and Crime Board (SPCB); Independent Advisory Groups (IAGs) on each geographical area and scrutiny panels for Stop and Search and Use of Force. These existing arrangements could be considered as the channel for communicating the output of this project.

In addition, work is ongoing to create an IAG for users of mental health services in order to examine the Triage patient journey and seek views on how services could be improved.¹³ If successful, this would be an ideal forum to assess the public interest and ethical use of the output of this project.

Explainable:

Is information available about the algorithm / decision-making rules and the impact of each feature?

Such information would be produced for any model arising from this project.

¹³ Mental Health Update to OPCC SPCB Dec 2019 (item 8b) <https://www.westmidlands-pcc.gov.uk/strategic-policing-crime-board/agendas-minutes-reports/>

Glossary

WMP / Law Enforcement Terminology	
ASB	Anti-social behaviour
CCG	NHS Clinical Commissioning Groups
COP	College of Policing
DA	Domestic Abuse
DAL	Data Analytics Lab
EHCR	European Convention on Human Rights
HMICFRS	Her Majesty's Inspectorate of Constabulary, Fire and Rescue Services
IAG	Independent Advisory Group
MCA	Mental Capacity Act 2005
MHA	Mental Health Act 1983
OPCC	Office of the Police and Crime Commissioner
PCC	Police and Crime Commissioner
SME	Subject Matter Expert
SPCB	Strategic Policing and Crime Board
WMAS	West Midlands Ambulance Service
WMP	West Midlands Police
Data Science Terminology	
ALGO-CARE	All projects have used the ALGO-CARE to consider ethical implications: Advisory, Lawful, Granularity, Ownership, Challenge, Accuracy, Responsible, Explainable
AUC – ROC Curve	AUC stands for 'area under the curve' of a ROC (Receiver Operating Characteristics) curve. Essentially, ROC is a probability curve and the AUC tells us how good the model is at distinguishing between different groups within the data. This is a statistical test for the accuracy of the model that has been built.
DCMS	Department for Digital, Culture, Media and Sport – developed the Data Science Ethical Framework.
EDA	Exploratory Data Analysis

Productionise	To 'productionise' means that once we are satisfied that the model works well, we would automate the process of providing predictions on a regular basis.
Spatio-temporal model	Spatio-temporal models use patterns evident over space as well as patterns evident through time – “everything is related to everything else, but near things are more related than distant things” (Tobler’s first law of geography). This is often true in time as well as over space.
Sensitivity	Refers to the ability of the model to identify the ‘true positives’ as a rate. It measures the proportion of actual positives that are correctly identified as such. The greater the sensitivity of a model, the less the specificity will be.
Specificity	Refers to the ability of the model to identify the ‘true negatives’ as a rate. It measures the proportion of actual negatives that are correctly identified as such. The greater the specificity of a model, the less the sensitivity will be.
Univariate time series model	A time series that consists of single data points recorded sequentially over equal time increments.