Knife crime prediction model

Predicting the most likely locations and total number of knife crimes over a four-week period.

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Key details

Stage of practice	Untested
Purpose	Prevention
Topic	Knife and gun crime Digital, data and analytics Intelligence
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Region	West Midlands
Partners	Police
Stage of implementation	The practice is implemented.
Start date	April 2024
Scale of initiative	Local

Key details

Target group	Children and young people

Aim

This knife crime prediction model aims to provide:

- information on the likelihood of knife crime by under 25-year-olds through spatial predictions
- predictions about youth knife crime to be considered alongside intelligence reports and patterns of past crimes to inform patrolling decisions

Intended outcome

The intended outcome of the initiative is to see a reduction in knife related violence within the West Midlands through a more effective approach to patrol decisions.

Description

Prediction is a spatio-temporal knife crime forecasting model built by the data analytics lab at West Midlands Police (WMP). The model was developed with an input from with the project guardian team who utilised their expertise on knife crime. Project guardian is WMP's response to serious youth violence (aimed at under 25-year-olds) and knife crime. The initiative has received funding from the Home Office's Grip serious violence policing programme since 2021.

Grip aims to deter violence through visible patrol activity in hot spots, whilst adopting strategic problem-oriented policing to address the root causes of violence within those locations. Overseen by a detective chief inspector, Project Guardian is split into three areas:

- A dedicated taskforce are deployed into high crime areas, adopting several different techniques to reduce offending, bring offenders to justice and improve public confidence. This is staffed by one inspector, five sergeants and 36 police constables.
- An analytical and intelligence capacity that underpins and supports both the taskforce and the hot spot policing response. Their work includes scanning and analysis for the scanning, analysis, response and assessment (SARA) plans, completing season threat documents, daily scanning for

actionable intelligence, reviewing each offence where a knife is used to cause injury, highlighting opportunities for investigation and safeguarding, and reviewing and disseminating information around Habitual Knife Carriers. This team is made up of an intelligence manager (inspector), a higher analyst, five intelligence analysts (who have had additional training in problem solving), two researchers and a business support officer.

- A hot spot policing model with scheduled patrols and significant problem-orientated policing to stubborn crime hot spots in local policing areas. Scheduled patrols are completed by police constables from local policing areas, informed by the analytical and intelligence department conducting the scanning and analysis elements of SARA.

Prediction was built with R software and utilises data on past amounts and locations of relevant knife crime and crime more generally, extracted from Connect (WMP's crime system). Using this model, a dashboard, displaying forecasts and past crimes, was developed and designed in conjunction with the project guardian team. Project guardian then utilise forecasts alongside intelligence reports to inform deployment plans for each of the local policing units within WMP which outline the patrolling activity. Only those within project guardian have access to the dashboard.

Overall impact

The results of the forecasting model are assessed by the force following each production run (accuracy, and sensitivity). This includes looking at the costs of patrolling areas based on false positives. Therefore, the performance of the model is partly assessed by an organisational value approach, assessing the model's value for money invested, compared to a hot spot approach.

The model is on average 38% more accurate than a 'traditional' hot-spot approach. This means that WMP is saving resource costs through using this approach compared to using a more traditional hotspot approach. Other approaches are also used at the same time, such as problem orientated policing.

The use of the outputs, in terms of contribution to decision making, within project guardian has been assessed and presented to WMP's (lab specific) Ethics Committee prior to final adoption. No changes to the modelling approach resulted from the Ethics Committee process.

Learning

A key learning point is tailoring the outputs of the underlying model that produces forecasts to the requirements of the team that will use those outputs to the best ways they can use them. This principally relates to how the results, in this case a dashboard, are designed and the delivery of training in using and interpreting the outputs.

More generally, the ability of WMP to tap into its own data science capability means there is the ability to tailor the presentation of the modelling and the results to force requirements and undertake on-going accuracy and efficacy tests.

Best available evidence

Currently, the Crime Reduction Toolkit does not include any best-available evidence on predictive tools for identifying knife crime hot spots. However, it does include the best-available evidence on hot spots policing.

See Knife Crime: a problem solving guide for practical and evidence-informed advice on how to reduce local knife crime.

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