Improving risk management for violence in mental health services: a multimethods approach

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Scientific summary

Violence risk management in mental health services

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Scientific summary

Background

Violence-related morbidity is a key public health problem and is of increasing concern to the public and policy-makers. Mental health services are increasingly involved in public health interventions to reduce violence. However, mental health services have primarily been involved at secondary and tertiary levels of prevention. Risk assessment has become an important role of mental health professionals, but previous research has concentrated largely on the development of risk prediction instruments, which have moderate accuracy levels. The essential link between risk assessment and risk management remains underdeveloped.

Developing preventative interventions, with emphasis on primary prevention, is an international policy priority of the World Health Organization (WHO). More information is needed on violence, its causes and its costs to society at the population level in the UK. The link between risk assessment and risk management must be made in all new risk assessment instruments, and clinical practice must progress by moving from inaccurate assessments based on risk prediction to identification of causal associations between risk factors and violence. New statistical approaches must be developed that facilitate the identification of causal mechanisms to identify the most appropriate targets for clinical intervention.

Objectives

The overall aim of the programme was to improve the quality of clinical risk management of individuals identified as being at high risk of harm to the public.

We had five principal objectives:

1. identification of high-risk subgroups at the population level (including prevalence and burden of care on mental health services) and the implications for clinical risk assessment and management
2. development of 'new-generation' static measures of risk assessment for use with subgroups accessing mental health services: (i) patients with severe mental health illness following first-episode psychosis, (ii) patients discharged from medium secure services (MSSs) and (iii) prisoners released into the community
3. development of dynamic measures of risk assessment that are applicable to clinical intervention in the community
4. integration of the new static and dynamic measures into risk management programmes for use by health-care professionals
5. development of new decision-support tools to guide risk management by clinicians, based on Bayesian networks.

We divided the programme into three overlapping phases:

1. understanding the size of the problem in the general population and the implications for risk assessment
2. understanding the limitations of risk assessment and testing potential solutions
3. developing new statistical models and incorporating these into Bayesian networks.

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Section A: epidemiology of violence in Great Britain

Background

To contextualise clinical assessment and management of risk by mental health professionals we required a comprehensive epidemiological study of the risk of violence in the household population of Great Britain.

Objectives

We investigated associations between self-reported violence and psychiatric morbidity, early maltreatment and victimisation, multiple health-risk behaviours and socioeconomic deprivation. We included studies of health service use by violent individuals and economic evaluation of the impact of violence in the population.

Methods

Available sources of data included the National Household Psychiatric Morbidity Survey (NHPMS) in Great Britain (2000), the Adult Psychiatric Morbidity Survey (APMS) in England (2007) and the second Men's Modern Lifestyle Survey (MMLS) (2011), commissioned for the programme.

Similar measures of violence, demography and psychiatric morbidity were used in the surveys. A joint data set of 15,473 men and women was utilised to investigate correlates of violence, including anxiety disorders, depression, psychosis, antisocial/borderline personality disorders (ASPDs/BPDs), drug and alcohol dependence and cognitive functioning. The APMS (2007) was used to investigate associations with intelligence quotient (IQ), adult attention deficit hyperactivity disorder (ADHD) and autistic spectrum disorder (ASD). The MMLS (2011) ($n = 5400$) was used to investigate early maltreatment and adult victimisation with violence. All associations were estimated by adjusted binary and multinomial logistic regression models, with odds ratios and relative risk ratios as measures of magnitude.

The joint 2000/2007 data set was also used to create typologies of violent indicators based on latent class analysis.

Results

Anxiety disorder, ASPD and drug and alcohol dependence showed independent associations with violence in the population. Depressive disorder and psychosis were unrelated after adjustments. Higher intelligence was protective. Associations with adult ADHD were explained by psychiatric comorbidity. ASD was not associated with violence. Early maltreatment showed strong associations with violence perpetration in adulthood, except sexual abuse. Socioeconomic deprivation was associated with an increased risk of serious violence among young men. There was no clear impact of violence on health-care costs because some costs were increased whereas access to other services was decreased for violent people, resulting in cost reductions.

Conclusions

We confirmed the importance of demographic and socioeconomic correlates with violence that are included in risk assessment instruments. We showed that anxiety and psychotic symptoms have strong effects at the population level, highlighting the importance of further research into their causal associations. Violent individuals both over- and underutilise health services.

Section B: first-episode psychosis follow-up

Background

Current risk assessment instruments have shortcomings, including inaccurate classification of risk levels, and exclude causal factors. Accuracy is essential for those with mental disorder because inaccuracy can increase stigma. Alternatively, it can result in underestimation of risk.

Objectives

Our objectives were to:

1. identify symptoms of mental illness that are causal risk factors in those with psychosis and that are amenable to treatment in forensic and general psychiatric settings
2. develop a static risk instrument for future violence.

Method

A sample of 490 patients presenting with first-episode psychotic illness (1996–2000) were followed up over 10 years utilising a retrospective, case file design. Data were collected in primary and secondary care across England. Symptoms of mental illness were coded using the OPerational CRITeria checklist (OPCRIT) system. Violent outcomes were derived from incidents defined in the MacArthur Community Violence Interview and obtained from medical records and the Police National Computer (PNC). The 10-year follow-up was divided into 20 6-month time windows. Multilevel modelling for repeated measures identified causal risk factors. Moderation and mediation analyses were used to investigate significant sex differences, effects of static on dynamic risk factors and indirect pathways towards violence. Area under the receiver operating characteristic (ROC) curve (AUC) values were utilised to identify the most relevant static risk factors.

Results

The prevalence of violent behaviour was highest in the 6 months following baseline assessment (4.8% in men, 3.2% in women). Among women, 5 out of 28 static factors qualified as relevant risk factors [AUC 0.94, 95% confidence interval (CI) 0.90 to 0.97] and at a cut-off point of 4+ sensitivity was 100%, specificity was 86.1% and the percentage correctly classified was 86.5%. Among men, four static factors were identified as relevant risk factors (AUC 0.68, 95% CI 0.54 to0.83) with 73.3% sensitivity, 60.0% specificity and 60.8% correctly classified. Of 29 symptoms of mental illness, nine were identified as causal dynamic risk factors in women and six were identified as causal dynamic risk factors in men. Few risk factors were shared by both sexes and pathways differed in men and women.

Conclusions

Our findings emphasise the need to differentiate between psychotic men and psychotic women when investigating risk for future violence. Violence risk using static factors is more accurately predicted in women, suggesting that they are a more homogeneous group than violent men. Symptoms of mental illness were more strongly associated with violence risk in women. Pathways differed between sexes. Management and treatment of individuals with psychotic illness should address sex differences.

Section C: the validation of new risk assessment instruments for use with patients discharged from medium secure services

Background

The Medium Security Recidivism Assessment Guide (MSRAG) was developed to predict serious and acquisitive offending among patients discharged from medium secure services. However, the instrument required validation in a new sample of patients.

Objectives

1. To describe characteristics of patients discharged from MSSs and compare violent with non-violent patients.
2. To validate the predictive accuracy of the MSRAG and investigate item-specific predictive accuracy.
3. To investigate the association between dynamic items and concurrent violence.
4. To investigate the moderating effects of dynamic risk items on static risk levels.

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Methods

Of 788 patients discharged from a medium secure pathway from 1 September 2010 to 31 August 2011, 409 were discharged to the community.

We investigated the following risk assessment instruments: MSRAG; Offender Group Reconviction Scale, version 2 (OGRS2); Historical, Clinical, Risk Management-20 (HCR-20); Structured Assessment of Protective Factors for Violence Risk (SAPROF); Positive and Negative Syndrome Scale (PANSS); and Hare Psychopathy Checklist: Screening Version (PCL:SV). Violent outcome at follow-up was assessed using a combination of the MacArthur Community Violence Instrument (MCVI) and the PNC. The main outcomes were binary for any violence and acquisitive and serious offending convictions.

The AUC was used to measure discrimination accuracy and the conventional median split was used to measure classification accuracy. Multilevel logistic regression estimated the association between dynamic items and concurrent violence. We identified moderating effects of dynamic factors.

Results

For 387 patients successfully followed up at 6 and 12 months post discharge, non-violent individuals were older and had been an inpatient for longer before discharge.

Discrimination accuracy (AUC) for violence within 6 months following discharge was highest for the SAPROF total scale, the HCR-20 version 3 (HCR-20^{v3}) total scale and the clinical HCR-20^{v3} scale. The HCR-20^{v3} had the highest sensitivity and the SAPROF external scale had the highest specificity. The HCR-20^{v3} clinical subscale had the highest positive predictive value (PPV) and percentage correctly classified (PCC). Similar results were found for violence within 12 months of discharge.

For acquisitive offending, the MSRAG scales had the highest discrimination accuracy. The OGRS 2 had the highest sensitivity and negative predictive value (NPV) and the SAPROF external scale had highest specificity. For serious offending, the SAPROF external scale had the highest discrimination accuracy, specificity, PPV and PCC. For any criminal convictions, the SAPROF total scale had the highest AUC, specificity and PCC.

Item-specific discrimination and classification accuracy for any violence within 6 and 12 months varied between instruments. There were strong associations between dynamic items and concurrent violence. These differed for subgroups defined by presence/absence of major mental illness and personality disorder. For most dynamic items, there was a trend of increasing risk of violence when dynamic items were present.

Conclusions

We validated the MSRAG but there were few major differences in accuracy for combined measures of violence compared with other actuarial scales.

Dynamic factors showed important moderating effects on the predictive ability of the MSRAG. These should be combined with actuarial measures in future research and adapted for clinical practice.

Section D: development and validation of new instruments for static and dynamic risk assessment

Background

Offender managers use actuarial instruments in the criminal justice system to classify prisoners according to level of risk. These instruments are criticised by those who prefer structured professional judgement but are economical and can be applied automatically using routinely collected data and do not require extensive training.

Objectives

The objectives were to:

1. develop four computerised and four paper–pencil versions of actuarial instruments to predict violent, robbery, drug and acquisitive offences and validate them in a new sample
2. develop a dynamic instrument for violence
3. validate the dynamic instrument in a new sample of prisoners.

Methods

Two data sets were used: the Prisoner Cohort Study (PCS; $n = 1717$) and an anonymised data set from the National Offender Management Service (NOMS; $n = 53{,}800$).

Prisoner Cohort Study participants included men and women serving a prison sentence of ≥ 2 years for a violent or sexual principal offence; who were at least 18 years old; and who had 1 year left of their sentence to serve. The PCS sample was interviewed in two phases: the first-phase interview took place 6–12 months before release; the second-phase interview took place at a mean of 23.0 months after release.

The NOMS data set included randomly selected prisoners released from prison for the first time between 2005 and 2007. Comparative variables with the PCS sample were obtained from the Offender Assessment System (OASys).

The predictive accuracy of the eight new instruments was examined using methods of discrimination and calibration.

Results

Paper–pencil and computerised versions of the four actuarial instruments demonstrated better discrimination than other instruments under study. The results of the external validation showed that they performed as well as existing risk assessment instruments. Dynamic risk factors for violence were identified in 16 domains. The effects were moderated by level of static risk but stratified analyses based on diagnoses showed strong similarities with regard to risk factors across the diagnostic groups. External validation of the instrument showed that most dynamic risk factors in the original sample were also predictive in the validation sample. Moderation effects based on level of static risk were confirmed.

Conclusions

The new actuarial instruments showed good discrimination and moderate predictive accuracy and performed as well as existing instruments. The preliminary version of the Dynamic Risk Instrument for Violence (DRIV) shows considerable promise for use in the criminal justice system with released prisoners. The majority of its items were validated successfully using routinely collected data by probation officers in OASys.

Section E: development of a multistage, multimodel system for risk assessment and management of offending behaviour using Bayesian networks

Background

Sections A–D have shown that it is essential to combine actuarial methods of risk assessment with dynamic factors. The key to improving risk management is a method that identifies and incorporates in the assessment dynamic factors that are causal because they must be targeted in subsequent interventions.

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Objective

The objective was to develop and validate decision support tools for professionals working in criminal justice and forensic mental health settings to guide risk management of violent offenders and patients, based on Bayesian networks.

Methods

Expert knowledge elicitation was used to develop an initial Bayesian network for released prisoners, Decision Support for Violence Management in Prisoners (DSVM-P), which was then learned using a data set of 953 released prisoners. A second network was developed, adapted from the first, for 386 patients discharged from MSSs. The predictive accuracy of both networks was assessed. The tool was demonstrated to a sample of 17 medical and psychology professionals to obtain feedback.

Results

Both networks showed predictive efficacy for violence equal to or exceeding that for all existing risk assessments (DSVM-P AUC 0.79, 95% CI 0.75 to 0.82) and were able to model the effect of interventions with offenders on violence risk, suggesting a role in risk management beyond simple risk assessment. The cross-sample performance of both networks also improved on the next best risk assessment measure; 86% of professionals surveyed believed the network agreed with their assessment of risk of a sample case and 93% believed that it provided clinically useful information.

Conclusions

Early validation of decision support tools using Bayesian networks showed considerable promise. We confirmed a series of risk factors for violence that are currently included in risk assessment instruments and found new factors that could be included in future. However, the important task for future research will be to identify truly causal factors for violence, not merely predictor variables. We have shown that it is possible to identify candidate variables for future studies of causality. We have successfully combined these with static measures of risk. We have developed a new risk management model using Bayesian networks that requires further development into a computerised application to support decision-making by clinicians. This will be used to target causal factors using effective preventative interventions. Further development of the prototype networks into a tool that could be trialled in live settings with offenders should be a future priority.

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