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Protocol: A Quasi-Experimental Effectiveness and Cost-Effectiveness Evaluation of Emergency Department Violence Intervention Programmes in the United Kingdom

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Abstract

Introduction

Hospital-based violence intervention programmes (HVIPs), based in Emergency Departments (EDs) have been proposed as a public health response to violence. These programmes address the underlying reasons why patients are exposed to violence. In addressing any underlying modifiable risks and vulnerabilities HVIPs can reduce patients' exposure to violence and therefore subsequent unplanned attendance into ED.

Methods and Analysis

ED patients are eligible for inclusion in the evaluation if they are normally resident in Wales, United Kingdom (UK), aged 11 years and older. A controlled longitudinal natural experiment will be undertaken. The primary outcome is derived from the Emergency Department Dataset, routinely collected for all EDs in Wales, and is subsequent unplanned ED attendance. Case patients will be matched to control patients attending EDs without an HVIP. Analysis will derive the hazard rate for subsequent unplanned ED attendances using recurrent event analysis. The total monthly count of patients identified as attending because of violence in intervention EDs will be compared to the total count of Welsh control EDs in an interrupted time series analysis to determine whether HVIPS increase violence ascertainment. To determine whether referral, versus no referral, to the HVIP represents value for money, we will undertake a cost-effectiveness analysis from the perspective of the National Health Service.

Ethics and Dissemination

The approval to access and analyse data housed in the Secure Anonymised Information Linkage (SAIL) databank, an ISO 27001 certified and UK Statistics Authority accredited secure data environment, was granted by the SAIL independent Information Governance Review Panel (Ref: 1421). Findings will be presented at local, national, and international conferences and disseminated by peer-review publication.

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1. Strengths and Limitations of this Study

- A whole population, controlled evaluation of a violence prevention team situated in an Emergency Department (ED) that accounts for patient characteristics that might influence outcomes.
- Provides descriptive analyses concerning patient characteristics associated with their willingness to engage in the violence prevention intervention.
- Describes analytic methods for evaluations utilising routine ED data.
- The analysis can only be conducted on patients identified in routine data and linked to the intervention data. Some patients who wish to avoid scrutiny may avoid providing details necessary for linkage.

2. Title

Protocol: A Quasi-Experimental Effectiveness and Cost-Effectiveness Evaluation of Emergency Department Violence Intervention Programmes in the United Kingdom

3. Introduction

Those who experience serious injury due to violence are likely to attend an Emergency Department (ED). EDs are therefore ideal locations for hospital-based violence intervention programmes (HVIPs) [1-3]. HVIPs have recently emerged as a public health response to violent victimisation [3 4], but despite interest in HVIPs there has been no rigorous evaluation of this public health approach to violence in the United Kingdom (UK). Moreover, little is known about the effectiveness of patient discharge planning and referral from ED into organisations able support children involved in violence [5], patients exposed to domestic violence [6 7], and there is a paucity of studies considering referrals for young men involved in violence, the most dominant population in respect of assault-related attendance (ARA) [8]. There are even fewer studies of the effective support available to victims of sexual violence attending ED [9]. Despite uncertainty over effectiveness in a UK context, HVIPs have begun to be implemented. For example, the Scottish Violence Reduction Unit (VRU) has placed Navigators (www.mav.scot/navigator) in EDs, typically youth workers who connect with patients 25 years of age and younger [10].

EDs work with patients attending for many reasons, including those presenting with violence-related injuries. EDs also engage in broader violence reduction initiatives: clinical staff typically receive training in adult and paediatric safeguarding, and many EDs have provisions to identify and refer children, and victims of domestic and sexual violence. However, methods of ascertainment and referral vary considerably and formal relationships with the police and other partners can often lack continuity with multiagency approaches not capturing the entirety of patients' journeys. A public health approach involving the ED would be beneficial in improving overall population health outcomes. It is particularly timely, in 2019 there were 175,764 ARAs at EDs in England and Wales [11] and, despite the pandemic, 119,111 ARAs in 2020 [12]. While knife crime, and therefore serious trauma, has risen by 71% from 2014 to 2018 [13]. Up to 75% of ARAs are unknown to the police [14-16], therefore EDs hold exclusive data on assault characteristics, patient vulnerabilities and modifiable risks, and are therefore well situated to play a significant role in the identification of violence, to investigate the circumstances of violence, and to challenge any underlying vulnerabilities or modifiable risks exposing patients to violence, whether that is through direct support, referral, or discharge planning.

The need for HVIPs is aligned to broader UK Government initiatives, which aim to promote a whole system multi-agency (WSMA) [17] approach to violence. The 1998 Crime and Disorder Act requires the police, local government, and the National Health Service (NHS) to collaborate on joint crime reduction strategies and this includes data sharing to inform targeted responses. Violence reduction is further prioritised by the UK Government in its Serious Violence Strategy [18] and the UK government has allocated funds for the formation of VRUs in England and a Violence Prevention Unit (VPU) in Wales, across 18 Police and Crime Commissioner jurisdictions, with the explicit purpose of promoting the WSMA approach [19]. These initiatives are further aligned with a move towards active population health management, digitally enabled whole-person care and evidence-based treatment pathways outlined in the NHS future plan [20]. Integrated Care Systems in NHS England will be expected to specify violence prevention and reduction standards, which are incorporated into the 2021/22 NHS Standard Contract, and there are expectations that hubs will form Violence Prevention Teams similar to the police VRUs and VPU. Furthermore, a public sector duty on partnerships encouraging the prioritisation of reducing serious violence has received royal assent as a part of the Police, Crime, Sentencing and Courts Bill. This legislation includes a serious violence duty placing a statutory obligation on organisations to collaborate, communicate, and act.

The overarching aim of the work proposed here is a robust effectiveness and cost-effectiveness evaluation of ED-based Violence Prevention Teams (VPTs). VPTs represent a formal collaboration between police and healthcare and embody the WSMA approach. To our knowledge, this is the first formal evaluation of a nurse-led, ED based HVIP in the UK and will address significant gaps in current understanding of their effectiveness and thereby facilitate future aspirations for evidenced-based referral pathways and discharge planning [20 21]. VPTs main function is to identify and support patients attending ED with assault-related injury. To facilitate this, they engage in broader pedagogical roles increasing awareness of these patients' needs, modifiable risks and opportunities to identify and refer across the ED clinical environment.

3.1. Theoretical Framework

The theoretical motivation for a WSMA approach to HVIPs is that there are many modifiable risks and vulnerabilities that, in combination, determine an individual's exposure to violence and subsequently an ARA in an ED. Epidemiologically, these can be usefully described by shared circumstances that in turn signpost opportunities to modify risk or support patients' vulnerability, but responsibility can fall across organisations, including local government, healthcare, and criminal justice. Risks include the consumption of alcohol and other psychoactive substances [22-25]; criminal and/or sexual exploitation and homelessness [3 26]. Violence tends to be more prevalent in younger, socially disadvantaged groups [27-33], with male, socio-economically deprived individuals being more likely to endure violence and experience assault-related injury. These characteristics further extend to personality features [34], including mental health status and learning disability, and neurodevelopmental disorders [35]. This complex interplay of factors that promote exposure to violence, and hence lead to an ARA, highlight the need for a WSMA approach. For example, an environment might become synonymous with violence through a process of homophily [36], whereby individuals with shared pursuits who are at risk of violence gather, for example street drinkers and late night drinking environments. Mitigation might include challenging reasons for frequenting such an environment, including alcohol and substance misuse counselling. Some environments might involve those who use violence to advance their interests, such as acquisitive crime, sexual assault, or sexual exploitation, in which case criminal justice or safeguarding processes to deter violence might be involved, along with support to victims. Chaotic or otherwise disadvantaged households in which domestic violence or harm to children arises might best be approached from a multi-agency process such as the Multi-Agency Risk Assessment Committee (MARAC) and formal investigation (Section 47, Children Act 1989). EDs are primary agencies receiving those who have sustained a

serious injury, including those who are motivated to bypass other agencies or whose assailant is motivated to ensure their victim avoids scrutiny.

Treatment for an ARA in ED aims to address symptoms (e.g., injury) that may not necessarily characterise the underlying reasons for violence (e.g., alcohol dependency), and staff do not always have the resources available to address such modifiable risks and vulnerabilities. However, without addressing them, the risk of repeat unscheduled ED attendance remains, including violence recidivism. For these reasons, services like VPTs that work within a WSMA approach to better understand reasons for ARA are required. Moreover, and for those who are most vulnerable, ED may be the only realistic opportunity for patients to enter a system of care. As such, an ARA is often a sentinel event.

4. Intervention

A process and implementation evaluation that describes both the planned and implemented VPT intervention is available elsewhere [37], and is further described in a Template for Intervention Description and Replication (TIDieR, Appendix 20.1).

4.1. Intervention as Hypothesised

VPTs, which emerged from the VPU violence prevention strategy, were funded by the UK Home Office and Youth Endowment Fund (YEF) with the funding administered by the VPU and the Office of the South Wales Police and Crime Commissioner (PCC). Other HVIPs in the UK are volunteer-based, whereas the VPTs are nurse-led. The original implementation for VPTs were focussed on identifying and supporting ED patients aged 11 to 25 years of age and to formalise the identification of modifiable risks and vulnerabilities, to support and advise patients, and to signpost to other services as appropriate. The VPTs also aimed to raise awareness of the service across ED clinical teams, with the aim of it becoming embedded within usual practice, and to train and upskill the clinical team to enable ascertainment and referral.

4.2. Intervention as Implemented

Since November 2019, a collaborative VPT between the police and NHS has been operational in a South Wales Type I (consultant led with resus) ED in Cardiff (the capital and largest city in Wales) and a second VPT began in an adjacent South Wales Type I ED in Swansea (the second largest city in Wales) in January 2023. The VPTs initially sought to identify patients attending the ED due to violence. This remit was broadened with VPTs subsequently receiving referrals from across the hospital and other community healthcare teams (e.g., MIUs and GPs).

The VPTs work with patients to gain an understanding of any circumstances contributing to their exposure to violence. They refer patients into care pathways (primary, secondary, and tertiary care, or third-sector organisations) to address any vulnerabilities or modifiable risks and can work alongside third sector (non-profit and charitable enterprise) to provide continual case-management. The VPTs also train other staff within the hospital to improve the identification of violence-related injury, to support clinical staff interactions with patients, and to maintain safeguarding procedures. In addition, the EDs at Cardiff and Swansea take part in Information Sharing to Tackle Violence (ISTV), in which anonymous data and intelligence regarding violent incidents are shared with Community Safety Partnerships. These anonymised data enable partner resources to be best used for violence prevention, part of the Cardiff Model for violence prevention [38]. Following implementation, both VPTs expanded the age range of patients to encompass all age groups.

4.3. Usual Care

Under usual practice, clinical ED staff are obliged to undertake safeguarding activities, and provide for those attending due to violence. However, provision varies across EDs. Under usual practice, when people attend ED with an injury suspected to be caused by violence, their injuries are treated and the patient is encouraged to contact the police, or have the ED contact the police on their behalf. In cases of serious injury involving weapon use, the ED is obliged to contact the police irrespective of patient consent. In terms of general safeguarding, all patient-facing clinical staff are expected to have up-to-date safeguarding training, and thus to carry out safeguarding tasks. Patients who are experiencing domestic violence can be referred to an Independent Domestic Violence Advocate (IDVA). Patients attending due to sexual assault can be referred to an Independent Sexual Violence Advisors (ISVA). For the ten control EDs in Wales, two EDs have an IDVA, and two others have access to an IDVA not based in their ED. Furthermore, ED staff can also refer patients into a MARAC, typically cases where the criteria are not met for formal safeguarding but the clinician suspects that something is not right. To facilitate, Multi-agency Referral Forms (MARFs) are filled out for children who require safeguarding and VA1 forms (to support the referral of vulnerable adults) are completed for vulnerable adults who require safeguarding.

There are IDVAs based in the intervention EDs in Cardiff and Swansea. Only Cardiff has an ISVA. Broadly, usual practice focuses on children and victims of domestic violence. The patients eligible for VPT support are therefore those who are not eligible for support from the IDVA or ISVA and are typically over ten years of age. Apart from the IDVAs in control EDs, none have additional resources specifically dedicated to the role of supporting patients attending due to violence, relying mainly on existing clinical staff to support safeguarding within their departments. This may involve naming an existing member of staff as a safeguarding ambassador or having a nurse act as safeguarding lead for the department. Across Welsh EDs, some control EDs have provisions for victims of domestic violence that includes cards with the “Live Fear Free” helpline that they can give to patients experiencing domestic violence and who do not meet the criteria for a MARAC referral. Similarly, none of the control EDs have processes in place to support patients’ referral to outside agencies. If patients disclose that they are struggling with issues, or if staff suspect patients are experiencing an issue, then referrals will made by clinical staff. However, this is not the same as VPT members working with patients to identify modifiable risks and vulnerabilities that contribute to their experience of violence. The VPTs in Cardiff and Swansea are therefore unique.

5. Aims and Objectives

The overarching aim of the Emergency Department Violence Intervention Programme (EDVIPE) evaluation is to determine whether VPTs are effective and cost-effective from the perspective of the NHS.

Objective 1	To assess whether patient involvement with a VPT reduces the likelihood of unscheduled ED re-attendance. We consider case and control patients’ ED unscheduled reattendance for a minimum of 12 months following the initial ARA.
Objective 2	To determine whether the presence of the VPT improves ascertainment of ARAs in ED attendances. We will consider the change in identified ED ARAs across intervention implementation in case and control EDs in Wales.
Objective 3	To derive the costs of the VPT and compare those to the benefits of the intervention and understand whether the VPT represents value for money from an NHS perspective. If an effect is observed, then models will estimate the health impacts, costs and potential savings over a longer time (e.g. 10 years) period and for a national roll-out.

6. Ethics

The approval to access and analyse data housed in the SAIL Databank [39], an ISO 27001 certified and UK Statistics Authority accredited secure data environment, was granted by the SAIL Independent Information Governance Review Panel (IGRP) (Ref: 1421). The IGRP comprises representatives from various organisations and sectors including the British Medical Association, Welsh Government, Public Health Wales, National Research Ethics Service, Digital Health and Care Wales (DHCW), Swansea Bay University Health Board, and members of the public. All routinely collected anonymised data held in SAIL are exempt from consent due to the anonymised nature of the databank (Section 251, Control of Patient Information; 2006 National Health Service Act). At no time will identifiable data be made available to the research team. ED staff will curate data pertaining to patients' exposure to the intervention, which will be passed to DHCW, where it will be anonymised, and a project specific anonymous linkage field (ALF) added, as will a residential anonymous linkage field (RALF). These data will be passed to SAIL for linkage to anonymised VPT clinical data.

Participant consent is not required because all the study outcome data involving patients are anonymised before they are incorporated into the SAIL databank. As the SAIL databank is fully anonymised, it does not fall into the remit of the National Information Governance Board who provide section 251 (formerly section 60) exemption to use identifiable data without consent. Human Ethics and Consent to Participate declarations are not therefore applicable.

7. Patient and Public Involvement

Extensive Patient and Public Involvement and engagement (PPIE) has been and will continue to be undertaken. The rationale is that many patients managed by the VPTs will be vulnerable, with some at the beginning of their journey in the support they receive. The expectations were that these patients would be unlikely to reflect meaningfully on the VPT within the study timeline and therefore alternative opportunities to explore patients' perceptions was required. Furthermore, follow-up qualitative work with young adults in emergency care, the dominant group in ED, requires considerable resourcing and suffers from high levels of attrition [40]. We therefore sought PPIE engagement in order that those with experience of the emergency healthcare system were able to feed into the project, co-produce methods, provide their interpretation of the results and assist with interpretation and dissemination. Groups include survivors of domestic violence, carers, those who have experienced alcohol and drug dependence, homelessness, sexual exploitation, and mental health issues. One PPIE co-investigator was appointed to lead on monitoring equality and diversity, with a second, and experienced, PPIE co-investigator supporting inexperienced PPIE members. PPIE activity was captured using the short-form Guidance for Reporting Involvement of Patients and the Public (GRIPP) [41].

The PPIE groups include lay members with experience of PPIE work: Service Users for Primary and Emergency Care Research (SUPER; www.primecentre.wales/ppi.php) who provided lay perspectives to the research team when developing, and conducting the research, with subsequent engagement undertaken to strengthen the relevance, quality and dissemination opportunities of the research. Additional PPIE members were recruited. These members had lived experience relevant to the patients who are the subject of the intervention (homelessness and domestic violence). SUPER and the PPIE co-investigators advised on how the research team should engage with those who have lived experience but had not have prior experience of PPIE involvement.

7.1. PPIE Activity

SUPER provided feedback on the original proposal, and then provided advice on how the materials should be developed for the two less experienced PPIE groups. These PPIE groups with lived experience were recruited to give input on the protocol. One group consisted of people with lived experience of homelessness and related conditions, recruited from a charity supporting those who are experiencing homelessness. The second group was comprised of survivors of domestic violence and were recruited through Welsh Women's Aid. The PPIE group members gave feedback on the VPTs and provided their first impressions of the research protocol. The groups also helped to develop a list of potential organisations to disseminate research findings, and discussed methods on how this could be achieved. They explained what may be going on in the lives of people who experience violence, and where people might turn to for support.

7.2. Results

PPIE contributed to the initial development of the research proposal, and the development of the research protocol, in the following ways:

- Initial consultation in planning the funding application.
- The research proposal was reviewed in July 2021, and the input and advice contributed to a successful funding application. The research team also responded to the formative comments when developing the protocol and continue to build on them.
- PPIE work influenced the types of data being included in the study. For example, an issue was raised whether some patients would admit to experiencing violence in ED, and therefore opportunities for the VPTs to improve ascertainment.
- Data on ethnicity from the 2011 and 2021 Census, which will also have some indication of those residing in refugee centres (and nursing homes, hostels, etc.), will be included in the study following recommendations that racial violence and the experiences of asylum seekers should be considered.
- It was further indicated that considering school attendance and exclusions data, free school meals and special educational needs would be valuable, in addition to educational attainment.
- The EDVIPE stakeholder reference group (SRG) now includes representation from primary care, secondary care and the third sector, after working with these sectors was suggested.
- Following feedback, EDVIPE now involves PPIE groups with lived experience of different types of violence.
- Following consultation with PPIE lived experience groups, development and refinement of the protocol and the addition of exploratory work was undertaken to:
- Better understand the pathways patients follow up to their attendance in ED, notably whether General Practitioner (GP) consultations were not acted upon.
- To consider patient ascertainment and therefore eligibility for the intervention in ED, as some victims may not realise that they are victims of violence.
- Whether one or two nurses are sufficient to manage an expected high caseload of patients attending ED due to assault, and whether the lack of 24-hour VPT provision would mean some patients are missed.
- Some patients might choose to avoid the police and therefore be less reluctant to receive support from the police, or police aligned services. We might explore this in any VPT referral data available.
- There were concerns that intervention-related activity might become known to the perpetrator, therefore elevating risk of subsequent harm. We can consider the immediacy of post-intervention re-attendance by patient group.

- That there are unique challenges for those who are disabled, both in terms of ability to engage and the nature of the support required.
- Some patients, notably those with children, may be less willing to engage as they would not want to risk losing their home or children. We can consider engagement by gender and presence of dependent children in the patient's residence.
- The judicial system emphasises the right for both parents to be involved with their children, if any. Involvement of parents in the court system might be associated with a blunted intervention effect.
- That PPIE involvement in future diffusion and dissemination activity would lend credence to the project's communication strategy.

8. Methods and Analysis

8.1. Design and conceptual framework.

A controlled longitudinal whole population (Wales, UK) natural experiment. The intervention in Cardiff began November 2019, and January 2022 in Swansea. Due to earlier changes in EDDS coding, these data are consistent and available from January 2012. Intervention data collection therefore begins in November 2019 and ends in August 2023, allowing a 12-month follow-up of patients until August 2024.

8.1.1. Objective 1 - Effectiveness

We hypothesise that engagement with the VPT will help patients overcome modifiable risks and receive support for vulnerabilities, and that therefore the intervention will reduce the recurrence of unscheduled ED attendance.

Other than those who are most seriously injured, patients will register at ED reception and be triaged, at which point the most appropriate pathway through ED will be determined. At reception patients will be asked about the reason for their attendance, including whether it was due to an assault, data that becomes a part of the Patient Management System (PMS) [42]. Patients may not disclose that the reason for their attendance was assault related. They might be reluctant, the perpetrator may have accompanied them, or they may wish to avoid scrutiny. One function of the VPTs is to work across clinical teams to improve ascertainment of ARAs. The result being that patients can be stratified according to the extent that they engage with the intervention.

i. Patients identified in the ED PMS data as having attended due to an assault, but with no further contact with the VPT.
ii. Patients identified in the ED PMS or VPT data as having attended due to an assault, but did not further engage with the VPT.
iii. Patients identified in the ED PMS and VPT data and who engaged with the VPT.

The primary analysis concerns group iii. The reasons for patients not engaging are potentially related to underlying characteristics and in secondary analyses we will explore this. However, it is reasonable to assume that the three groups represent varying levels of intervention dose, and therefore secondary analyses and therefore analyses using groups i to iii will be informative.

8.1.2. Objective 2 - Ascertainment

Our second hypothesis is that intervention implementation improves ARA ascertainment.

Patients attending ED can do so repeatedly within periods of time. This frequency is likely associated with the modifiable risks associated with ARA and is of interest here. For Objective 2 it is therefore appropriate to determine the proportion of attendances identified as violence-related. This generates time series data. The outcome of interest is therefore the count ARAs across all EDs. ARA attendance is defined as ARA in the ED PMS or, in the case of intervention sites, in the ED, PMS or VPT data. Codes indicating Provider Site in (the ED in its hospital) is available in the Emergency Department Data Set (EDDS), and this allows comparison between intervention EDs and control EDs. While intervention EDs have been in continual service since before the time series start dates, this is not so for all Type I EDs in Wales; there have been several changes with some EDs closing and others opening or being modified to receive additional patients. This, coupled with the intervention sites located at two of the largest hospitals in Wales, reduces the scope for selecting matching control sites [43], leading to potentially important baseline differences in the interrupted time series data [44]. The counterfactual will therefore be ARAs across all control Type I EDs.

8.1.3. Objective 3 – Cost-Effectiveness

We aim to determine whether the VPT represents value for money. The primary outcome will be quality adjusted life years, which will be estimated based on effectiveness estimates comparing ED attendance, reattendance, and any injuries received for those engaging in the VPT service relative to those who do not. Costs will be captured from an NHS perspective, reflecting the cost of the intervention but also other costs to the NHS due to referral. A secondary cost-effectiveness analysis will undertake a societal perspective, which will explore additional costs across social care, the police and the third sector (see Section 8.7.3).

8.1.4. Secondary Analyses

We aim to co-produce study protocols with collaborators and PPIE groups, to provide opportunities for them to shape secondary and additional epidemiological analyses. This facilitates opportunities to realise and contribute to what is a rapidly changing policy area. One example is our inclusion of school attainment, exclusions, and attendance in analyses, which have been highlighted in these early discussions. VPUs and VRUs have made little headway working with the education system to challenge the causes of violence, and this has been identified as a priority [45]. Furthermore, additional exploration is planned to characterise those excluded from the intervention but who have available ALFs.

8.2. Population and Data

This is a whole-population evaluation, including all residents of Wales, UK. Data is housed in the SAIL databank [39].

8.2.1. Data

8.2.1.1. Violence Prevention Team Data (Cardiff and Swansea)

Intervention sites record patient details (name, date of birth, gender), NHS number, extent of engagement with the VPT and whether any subsequent referral was made.

8.2.2. Administrative Data

Several administrative datasets are available to characterise patients and summarised in Table 1.

Table 1 – EDVIPE administrate data sets.

Dataset	Name and Summary
ADDE	Annual District Death Extract provides the date of death, used to describe right-side censoring of study participants.
OPRD	Outpatient Referral Dataset OPRD includes data from outpatient referrals from primary care which will help in understanding the referral pathway to secondary care. This data includes all clinical referrals from General Practitioners, General & Community dental practitioners, A&E departments, walk-ins, consultant-to-consultant referrals.
PEDW	Patient Episode Data for Wales Dataset PEDW covers people domiciled in Wales and treated in Welsh and English NHS Trusts and English Trusts and includes data on inpatient and day case activities. This includes spells and episode data on hospital admissions, which can used to track the frequency of patients attending services for treatment arising from an ARA.
WDSD	Welsh Demographic Service Dataset WDSD includes all individuals registered with a Welsh General Practitioner and via anonymisation identifies household groups, as well as week of birth decribeing left-side censoring.
WIMD	Welsh Index of Multiple Deprivation WIMD is the Welsh Government's official measure of relative deprivation for small areas in Wales, based eight domains including income, employment, health, and access to services. Typically grouped into fifths or "quintiles", the WIMD is included in several NHS datasets.
2011, 2021 Census	A census of the UK population is taken every ten years and includes questions relating to key demographics. Patient entry into and exit from EDVIPE can mean some will be missed in the 2011 Census (e.g., born after 2011), and some will be missed in the 2021 Census (e.g., died before 2021). Hence data from both censuses is required.

Table 2 summarises key patient socioeconomic and demographic characteristics, required to enable secondary analyses in relevant sub-groups.

Table 2 – EDVIPE patient characteristics

Characteristic	Source
Age (from Week of Birth, WoB)	WDS
Sex	WDS, 2011 and 2021 Census
Ethnicity	2011 and 2021 Census
Asian (Bangladeshi, Chinese, Indian, Pakistani, Other Asian)	
Black (Caribbean, African, Other Black)	
Mixed (White and Asian, White and Black African, White and Black Caribbean, Other Mixed or Multiple ethnic groups)	
White (English, Welsh, Scottish, Northern Irish, British, Irish, Gypsy or Irish Traveller, Roma, Other White)	
Other (Arab, Any other ethnic group)	
Quintile of Residential Deprivation	WIMD

Urban/rural residential classification	2011 and 2021 Census

8.2.3. Secondary Outcomes

To characterise the WSMA involvement of patients involved in the intervention, broader pathways will be explored across several related data sets, summarised in Table 3.

Table 3 – EDVIPE secondary outcomes

Dataset	Name
CAFCASS	Children and Family Court Advisory and Support Service Wales Family Justice Data Set CAFCASS includes information for residents of England and Wales on cases of divorce, private law, family law act, public law, adoption, family law applications. It also includes information on marriage and divorce characteristics. The information on cases also includes information on number of children involved and types of hearing.
MoJ	Ministry of Justice: Data First Magistrates' court defendant data Crown Court defendant data Criminal courts and prisons data Prisoner custodial journey data Family Court data.
NPD	National Pupil Database This dataset has four broad categories of demographics, attainment, absence and exclusion, and children in need and looked after children.
Police Data[1]	Police Crime Dataset Pending applications for police crime data from all four Welsh forces are progressing and will be explored.
SMSD	Substance Misuse Dataset SMDS, also known as Welsh National Database for Substance Misuse (WNDSM) has data for people in Wales who present for substance misuse treatment. It includes details on assessments, referrals and treatment history.
WLGPD	Welsh Longitudinal General Practitioner Dataset WLGP contains clinical information from General Practice in Wales, including diagnoses and referrals into tertiary care.

Note: [1] Data sharing agreements are currently being developed to bring all-Wales police crime data into SAIL.

8.3. Cohort Inclusion and Exclusion Criteria

All residents of Wales who 11 years of age or older are eligible for inclusion. Residents of Wales will be defined through their identification in the WDSD.

The NHS assigns each patient domiciled in the UK a unique number. This NHS number links across various NHS data systems. The encrypted and anonymised ALFs are derived from these NHS

numbers. Therefore, patients attending ED whose identity cannot be connected to an NHS number (e.g. overseas visitors and tourists) will not have a corresponding ALF and will, by necessity, be excluded from analyses.

8.4. Allocation

Intervention patients will be identified in the VPT data and will have attended intervention EDs (in Cardiff and Swansea), subject to the above inclusion criteria. Control patients will be identified in the EDDS, and where ED attendance was not in an intervention ED.

8.5. Progression criteria

This is a definitive study. As the primary focus of the study uses routinely collected data, which is available for analysis subject to information governance permissions and extraction, progression criteria are not applicable.

8.6. Sampling

From the intervention sites' data (Section 8.2.1), between October 2019 and December 2022, the Cardiff VPT contacted 2,312 patients, of whom 77% accepted VPT support (Figure 1). We conservatively estimated that there will be 2,500 patients that engaged with the Cardiff VPT across the four years (2019-2024) of VPT operation, and a further 900 from the two years (2021-2024) operation in Swansea. Across the entirety of Wales, there are approximately 1M ED attendances each year.

-= Insert Figure 1 About Here =-

Figure 1 - Count of patients, by month, identified by the Cardiff VPT as attending due to a violence-related injury, with the number that subsequently engaged with the VPT.

Initial estimates from Cardiff VPT suggest that 3% of those engaging with the VPT reattended ED at least once within one year, compared to 23% patients who did not engage with the VPT. Data from 2015 and 2016 suggest that the frequency of unscheduled attendances for patients with at least one ARA (mean = 2.35 attendances) is greater than patients making an unscheduled attendance without evidence of an assault (mean attendances = 1.73). For a simple Cox survival model, ($\alpha = 0.05$, $\beta = 0.90$) and a hazard ratio of 0.8, a total N of 845 is required.

To realise the recurrent nature of analyses, simulation [46] (1,000 estimates per point estimate) was used across varying follow-up periods, which suggests a 12 month follow-up period and total N of 300 is adequate to identify a significant effect. By increasing the number of controls, statistical power will be further enhanced [47].

8.7. Analytic Strategy

8.7.1. Objective 1 - Effectiveness

Our primary outcome is unplanned ED attendance. It represents the cost to the NHS of serious healthcare events and acts as a proxy for events eliciting acute healthcare needs. EDs provide acute care for patients without prior appointment, and the aftercare of patients who have received ED treatment but where there is no alternative provision (e.g., for out of area tourists). There can, therefore, be follow-up and planned appointments in ED. These appointments in ED will be made

where, for example, there is an element of diagnostic uncertainty and a review is required in the ED context, or for patients where other follow-up arrangements are likely to fail (e.g., visitors to the area without access to primary care) [48]. Follow-up and planned appointments in ED are typically a continuation of the initial unplanned attendance or referral from another healthcare provider and are not valid outcomes for EDVIPE, as they are not elicited in response to acute healthcare need. Thus, for Objective 1 we will censor the timeline. Left-side censoring at birth or when someone takes up residence in Wales. Right-side censoring when someone dies or moves out of Wales. We further interval censor the timeline, to account for repeat ED attendances associated with a health event, such as referral from a local emergency hospital to a Major Trauma Centre.

8.7.1.1. Discontinuous Risk Interval

Accounting for periods when individuals are not at risk is an essential consideration in repeated time-to-event models [49-52]. The clearest example in the current context is ensuring time at risk does not extend beyond date of death or originates before birth. Similarly, time at risk will also be left side censored, if patients move into Wales, and right side censored if they moved away from Wales. With no adjustment for these discontinuous risk intervals, the time at risk will be incorrect, increasing a greater likelihood of Type II errors.

How patients are routed through emergency care pathways in Wales also influences time at risk. ED attendances are mainly determined by the acuity of the patient's condition and the urgency with which they need to be seen. These decisions can be made by the Welsh Ambulance Service Trust (WAST), a Minor Injuries Unit (MIU) or in the local ED. It is feasible that a patient initially attends a local ED to be stabilised, is assessed, and requires referral to a Major Trauma Centre (MTC), or Trauma Unit (TU). Each MTC and TU are attached to an ED, and therefore in response to severe injury, patients are registered in more than one ED if they are referred from an ED without trauma facilities, to EDs that are attached to a TU or MTC.

In Wales, emergency care in Wales is provided in MIUs, EDs (Local Emergency Hospitals, LEH, and Rural Trauma Facilities, RTFs), TUs, and MTCs. There is one MTC in Cardiff UHW, which services South and West Wales, and South Powys, and acts as a TU for the local population. Morriston Hospital in Swansea is a TU, but with additional specialist services (e.g., orthoplastics) meaning some patients otherwise destined for the MTC would be referred there instead. North Wales is serviced be the MTC in the Royal Stoke University Hospital in England.

Patient admission is described using spells and super-spells. A spell represents patient care by speciality, and a super-spell is a collection of spells – two spells are included in the same super-spell if admission to the second speciality is within 48 hours of discharge from the first. ED attendances included within the same super-spell (e.g., transfer from an ED to an MTC) will therefore be attributable to the same initiating event, whether planned or unplanned. Therefore, only unscheduled attendances at the initiation of a super-spell will be included, and additional ED attendances within the same super-spell will be analytically censored. The duration of a super-spell constitutes a discontinuity in a patient's exposure to risk, which is then accommodated in our analytic approach, this is described further in Figure 2.

-= Insert Figure 2 About Here =-

Figure 2 - A simplified example of discontinuous risk intervals as they relate to unscheduled ED attendance and super-spells.

In Figure 2 a hypothetical analytic period runs from day 0 to day 20. Patient 1 lived in Wales for the duration of the study but had no ED attendances. Patient 2 lived in Wales at the start of the analytic period, but died on day 18, they had two ED attendances, with the first resulting in a two day stay in hospital. Their time at risk for the first ED attendance is three days, and for the second six days, with a total time at risk of 16 days. Patient 3 was born in Wales on day two, had three ED attendances and was alive and living in Wales at the end of the analytic period. However, their second ED attendance (e.g., transfer to a MTC) occurred in a super-spell associated with the first ED attendance, and this is dropped from consideration. They therefore had two ED attendances, with the time at risk for the first as four days, and the time at risk for the second two days. Their total time at risk is 10 days.

We assume that unscheduled ED attendances are independent and unordered, and therefore assume a common baseline hazard for all events. Thus, the hazard function, $\boldsymbol{\lambda_{ik}(t)}$, for the k^{th} ED event for each subject (*i*) is:

$$\boldsymbol{\lambda_{ik}(t) = \lambda_0(t)e^{x_{ik}\beta}} \quad 1$$

However, it is feasible that operational differences across Local Health Boards (LHBs) might influence the likelihood that ED attendance varies across groups of patients. For example, initiatives that influence the likelihood patients are conveyed into emergency care, or alternative provision in the community for lower acuity patients. We introduce a random effect, $\boldsymbol{\alpha_i}$, to describe variation in risk, or frailty, can be introduced [53]:

$$\boldsymbol{\lambda_{ik}(t) = \lambda_0(t)\alpha_i e^{x_{ik}\beta}} \quad 2$$

8.7.1.2. Dates and Times

Records on date and time of events in routine data requires consideration. With most events recorded by day, we are obliged to use day as the primary measure of time, and therefore collisions will occur.

In EDDS the date and time of attendance and discharge are recorded, and several events can occur on the same day. For example, it is feasible that a patient attends ED on multiple occasions and on the same day. ED attendances on the same day are collapsed onto one another under the super-spell assumption. In the WDSD, while date of birth is approximated to the Monday of the week in which they were born (their Week of Birth, WoB), date of death is accurate to that degree of granularity.

For example, a patient might attend ED at 9am and die at 2pm on the same day. To avoid inconsistencies such as this patient entering the study cohort after death, we will adopt the usual approach and add a small value (epsilon, ε) to dates to preserve the chronological order of events [54].

8.7.1.3. Matching

It is not possible to manipulate allocation to treatment, and we therefore rely on quasi-experimental methods to infer treatment effects. The purpose of matching control and intervention patients is to allow derivation of the average treatment effect under the assumption that allocation is not conditional on observed confounders. Matching on values of covariates between the treated and untreated groups avoids the bias introduced by covariates that influence the outcome variable. The

goal being to find a subset of data that is closest to an exact match on observed covariates [55]. The primary analysis will be conducted using Coarsened Exact Matching, with a minimum 1:1 ratio, with secondary analyses undertaken using Propensity Score Matching.

For categorial covariates, exact matching is a sensible alternative. Here a match is considered acceptable only if the values of all covariates are equal between treated and untreated potential matches. Continuous covariates can, for the purpose of using exact matching, be turned into categorial covariates by defining category intervals; the resulting method is called coarsened exact matching. For matching, covariate categories can be grouped together to form larger (and fewer) categories, improving efficiency [55-57]. This approximates to a fully blocked experiment and requires temporarily coarsening variables.

Propensity score matching reduces the multi-dimensional space of covariates to a single summary covariate, the propensity score, typically derived using a logistic equation and performing regression on the treatment group for the covariates chosen to match with. The proximity of a potential match to the given subject is estimated in terms of the closeness of their propensity scores. This method simplifies subsequent analyses as matching refers only to one variate, the propensity score. However, propensity score matching can increase, rather than decrease, the imbalance of the covariates in the samples [55]. A challenge is optimising the trade-off between the quality of matches and the sample size. A larger sample reduces sampling error and can increase the study power, but including matches of lower quality may lead to greater residual imbalance [58]. The R package Matching Frontier attempts to address these issues by calculating the entire balance-sample size frontier, from which the user can easily choose one, several, or all subsamples to use for their final analysis, given their own choice of imbalance metric and quantity of interest [59 60].

8.7.1.4. Missing Data

Missing data may arise specific to the use of census data, where it is feasible that records are missing entirely, or patients did not disclose personal characteristics. However, give that these characteristics are recorded across multiple data sets the expectation is that missingness will minimally impact on the analyses.

8.7.2. Objective 2 - Ascertainment

The hypothesis is that a violence-attendance is more likely to be ascertained as such with the additional VPT resource present in ED. All unplanned attendances can be coded as ARA, or not (1, 0). The time series begins in January 2012, and the two sites (Cardiff and Swansea) can be individually compared with all other Type I EDs in Wales. This indicates that a difference-in-difference model [61] is appropriate. We will analyse Cardiff first, using the implementation in Swansea as a future replication of the intervention to facilitate a more robust causal interpretation of any effect. Additional descriptive analysis can explore patient groups (age, gender, time of attendance) more likely to be ascertained by the VPTs. Unlike Objective 1, we are interested in all ED attendances as the opportunity to provision safeguarding is applicable across all ED attendances, irrespective of the frequency of attendance.

8.7.3. Objective 3 - Cost-effectiveness Analysis

The aim of the economic evaluation is to understand the costs and consequences of providing a VPT versus no VPT within EDs. For this study, we will focus on the objectives of understanding whether the VPT represents value for money from an NHS perspective.

8.7.3.1. Methods

A within study analysis will determine the short-term cost-effectiveness of offering VPT relative to not offering VPT within EDs. Estimates derived from this study will be used to inform a long-term decision analytic model examining the cost-effectiveness of providing, versus not providing, VPT within EDs over a longer time horizon. Alternative perspectives for the analysis will be considered, with the NHS perspective being the base case. Cost-effectiveness will be presented using standard statistics.

8.7.3.2. Exposure variable

The exposure variable consists of patients engaging with the VPT.

8.7.3.3. Outcome variables

Health-related outcome variables include improved mental health outcomes, measured as a reduction in primary and secondary care visits for a mental health reason, reduced substance use, improved physical health, measured as a reduction in assault-related attendances in ED, and improved health-related quality of life (HRQoL), measured using injury-related estimates from the literature. Data on all outcomes will be sourced from the SAIL databank [39]. Estimates will be measured on a quarterly basis for the follow-up period (12-48 months). HRQoL will be estimated using the literature, in line with other studies on hospital-based violence prevention programs.

8.7.3.4. Within study statistical analysis.

Differences in overall mean outcomes will be analysed using a fixed effects panel regression model, where we will control for individual and time varying effects [62].

8.7.3.5. Covariates of interest.

The following covariates will be included within the fixed effects panel regression model: patient age, gender, severity of injury, number of years VPT has been operating, year, and quarter. Referral uptake will be treated as a mediating variable and not adjusted for in the models.

8.7.3.6. Long term cost-effectiveness analysis (CEA)

A Markov decision model with quarterly cycles will be used to estimate the cost-effectiveness of offering VPTs in EDs. To determine cost effectiveness using a health and social care perspective (primary analysis), the Markov model will be health-state based, with key health states likely to be healthy, injured, or dead. To support a multi-sector perspective (secondary analysis), the Markov model will be event-based.

8.7.3.7. Resource use

Healthcare resource use will include number of and type of visits with

- primary care (e.g., GP),
- secondary care (e.g., inpatient stays, outpatient clinic appointments), and
- other services (e.g., other healthcare professional visits, physiotherapy, occupational therapy, mental health therapy, drug and alcohol treatment).

8.7.3.8. Cost data

Cost data will be estimated for health service use based on resource use from the SAIL databank with appropriate unit costs applied. Third sector resource use will be valued using cost data provided in the resource use questionnaires. Other Unit Cost estimates (e.g., NHS reference costs, Unit Costs of Health and Social Care) will be used to supplement where needed.

Differences in overall mean total health care costs (including primary and secondary care) between groups will be analysed using GLMM. Cost data are known to be left-skewed with a substantial number of zeroes and there is no single dominant method for analysis [63]. We will test several potential models from the GLMM family and identify the correct link function and distribution to use. Potential effect modifiers include age, gender, and deprivation. Mediating variables include intervention engagement. Potential confounding variables include age, gender, deprivation, number of years VPT has been operating. The regression model will also include time variables recording the year and quarter.

Costs and benefits will be discounted at 3.5% per annum as recommended by the HM Treasury [64].

8.7.3.9. Time horizon.

The time horizon for the decision analytic model will extend beyond the time frame of this study, to encompass a period of time where, if possible, all relevant costs and outcomes for this appraisal have been accrued [65].

8.7.3.10. Cost-effectiveness Analysis Outcomes.

For the primary analysis, we will report the incremental cost effectiveness ratio (ICER) as the cost per quality-adjusted life-year (QALY), the net monetary benefit (NMB), and the net health benefit (NHB), for those being offered versus not offered VPT assessment during their A&E visit. NMB and NHB will be assessed using a range of values (£15,000-£30,000 per quality-adjusted life year, or QALY) representing a health decision makers' willingness-to-pay (WTP) to obtain the distribution of net benefits at different levels of WTP.

For the secondary (multi-sector) analysis, we report the cost per unit of effectiveness in natural units (e.g., cost per reconviction avoided). We will also present the results using the extended impact inventory framework and consider alternative methods of aggregation [66].

8.7.3.11. Sensitivity Analysis

Parameter uncertainty will be assessed using a probabilistic sensitivity analysis (PSA), varying key parameters over a range of expected values, and running 1,000 Monte Carlo simulations.

8.7.3.12. Social Costs

Additional exploratory analyses will estimate the broader social costs associated with the VPTs. Social costs will focus specifically on organisation costs of supporting patients who have been referred to them by the VPTs. Cost data of organisations will be assessed using top-down gross costing. Questionnaires or interviews, depending in interviewee preference, will be conducted with members of organisations to assess (i) the total annual expenditure cost for third sector and

statutory organisations in the given year [67]. This cost is the total yearly cost of running the service including costs of supporting patients, staff cost, and consumables. (ii) The total number of users supported each year by the third sector and statutory organisations. (iii) The percentage of those supported that were referred by the VPTs each year.

The given year will be 2022 to 2023; this is due to the Swansea team being implemented in January 2022. Top-down gross costing allows data to be aggregated and will allow us to estimate the mean cost of a 'typical patient' to a 'typical organisation'. We will include the distribution for each organisation but will not attribute a specific cost to a specific organisation. Furthermore, we will ask organisations for standard cost data (e.g. cost per counselling session); this will be used as a comparison of our mean average. We will ask about waiting lists for support which will be used to inform our knowledge.

9. Strengths and Limitations

Linkage requires knowledge of the patients' identity, anonymised and encoded as ALFs, to be included in the data return. There are instances where individuals may prefer to remain anonymous. Analyses are therefore limited to those who can be identified in routine data and linked to the WDS and therefore EDDS and related datasets. It is feasible that some may attempt to conceal their identity, and this could correspond to greater vulnerability. Furthermore, our reliance on administrative data means there is no information on the context in which their exposure to violence arose. There maybe marked difference in the modifiable risks and vulnerabilities for patients sustaining injury in and around premises licensed for the sale and onsite consumption of alcohol, and those experienced criminal or sexual exploitation. Conversely, our primary hypothesis is that the additionality of the VPT intervention teams means ED is better able to work with patients and therefore address the variation of patients that attend.

10. Dissemination, Outputs and Anticipated Impact

A diffusion and dissemination plan will be co-produced with stakeholders and PPIE groups. In so doing, we will define audiences (policy, practitioner, academic, lay, etc.) that might find the project outcomes of interest. In so doing, we will determine appropriate modalities to communicate with each, including presentations, briefing documents, and media events, with content informed by audience need.

10.1. PPI, Policy and Practitioner Focused

An ongoing evaluation of VRUs and VPUs is to recommend that greater attention is paid to evidence-based interventions and that activities should consider the possible involvement of schools and therefore the Department for Education. Education data has been included and we can therefore contribute to the evidence based linking school activity to violence. In addition, our PPIE engagement highlighted the need to consider ARA predictors, and engagement with the Home Office will further identify intermediate outcomes. We therefore aim to undertake interim analyses that will inform the final analysis and respond to significant emerging policy questions as it relates to evidence-based violence prevention and reduction initiatives. While these will likely translate to academic papers, we also seek to produce more accessible outputs and exploit existing networks in that respect.

11. Data Availability

The routine data used in these studies are housed in the SAIL databank and are available through application. Code written to manage and analyse data is available on request.

12. Funding

This study is funded by the NIHR [Public Health Research Programme (NIHR134055)]. The views expressed are those of the authors and not necessarily those of the NIHR or the Department of Health and Social Care.

12.1. Role of the Funder

The funder had no role in the design of the study, and will not have any role during its execution, analyses, interpretation of the data, or decision to submit results.

13. Governance

A Study Steering Committee (SSC) was convened to oversee and advise on progress. The SSC included the Data Monitoring and Ethics functions and oversees any protocol amendments.

14. Acknowledgements

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15. Author Contributions

SC Moore: designed data collection tools, wrote the statistical analysis plan, drafted and revised the paper, guarantor, implemented the evaluation, analysed the data. S Brophy: drafted and revised the paper, implemented the evaluation. A Bandyopadhyay: designed data collection tools, wrote the statistical analysis plan, drafted and revised the paper, analysed the data. A Newbury: designed data collection tools, drafted and revised the paper. T Lowe: drafted and revised the paper, implemented the evaluation, designed PPIE engagement, conducted and wrote-up PPIE engagement. D O'Reilly: drafted and revised the paper, implemented the evaluation. D Rawlinson: drafted and revised the paper, implemented the evaluation. L Snowdon: drafted and revised the paper, implemented the evaluation. J Shepherd: drafted and revised the paper, implemented the evaluation. V Sivarajasingam: drafted and revised the paper, implemented the evaluation. A Watkins: designed data collection tools, wrote the statistical analysis plan, drafted and revised the paper, implemented the evaluation. S Walker: designed data collection tools, wrote the statistical analysis plan, drafted and revised the paper, implemented the evaluation. S Borgia: drafted and revised the paper, designed PPIE engagement. A Battaglia: designed PPIE engagement, conducted PPIE engagement. H Yeomans: designed and implemented PPIE engagement, conducted PPIE engagement. S Premji: designed data collection tools, wrote the statistical analysis plan, drafted and revised the paper. R Aslam: designed PPIE engagement. M Hamilton: designed data collection tools, drafted and revised the paper.

15.1. Conflicts of Interest

None

16. Author Contributions

The original manuscript was submitted for publication to BMJ Open on 8 March 2024. On 13 November 2024 the manuscript had the status “awaiting reviewer assignment.” The decision was therefore made to withdraw from BMJ Open and submit to BMC Public Health.

17. Checklists

Template for Intervention Description and Replication (TIDieR) is available in Appendix 20.1.

Standard Protocol Items: Recommendations for Interventional Trials (SPIRIT) checklist is available in Appendix 20.2.

18. Glossary

ADDE	Annual District Death Extract - All deaths registered in Wales. Including Welsh residents who died outside of Wales.
ALF	Anonymised Linkage Field – All individual records are assigned an ALF, allowing researchers to link different data sets together for a single person based on the ALF.
ARA	Assault-related Attendance – An attendance to an emergency department relating to the attendee being involved in an assault.
BAWSO	Black Association of Women Step Out – An All-Wales charity supporting Black and Minoritised individuals and communities.
CAFCASS	Children and Family Court Advisory and Support Service – A service that looks after the interests of CYP in family court proceedings. It is independent from Social Services and the courts.
CEA	Cost-effectiveness Analysis – Economic analysis using costs and outcomes of interventions.
CG	Control Group – A group that is not receiving the intervention that is being researched. The control group may receive the standard intervention or no intervention.
CYP	Children and Young People – Representing those from birth, usually up until the age of 18.
DASH	Domestic Abuse, Stalking and Honor Based Violence – A checklist used by practitioners for high-risk cases of DASH.
DBS	Disclosure and Barring Service – Part of the Home Office. It allows organisations to check the safety of those being recruited for work. Including criminal record checks and checks involving safety around CYP.
DHCW	Digital Health and Care Wales - An organisation that designs all-Wales digital health and care services. It provides digital services with the aim to improve people's health.
ED	Emergency Department – Area of the hospital for immediate and urgent care.
EDDS	Emergency Department Data Set – National data set from emergency departments. It includes why the patient attended the ED and what treatment they received.
EDVIPE	Emergency Department Violence Intervention Programme Effectiveness and Cost-effectiveness Evaluation – The acronym of the current study.
FoI	Freedom of Information – Freedom to share or consume information from government funded public agencies. This information can be requested by members of the public through a FoI request.

GLMM	Generalised Linear Mixed Models – An extension to a generalised linear model that includes fixed and random effects.
GP	General Practitioner – GPs locally treat common medical conditions. They can refer to hospitals.
GRIPP	Guidance for Reporting Involvement of Patients and the Public – A checklist for the inclusion of person and patient involvement in research to improve transparency and quality.
HRQoL	Health-Related Quality of Life – A concept that examines health's impact on quality of life.
HVIP	Hospital-based Violence Intervention Programme – A trauma-informed programme that ensures support for those who attend hospital with a violence-related injury.
ICD10	International Statistical Classification of Diseases - 10th revision.
ICER	Incremental Cost Effectiveness Ratio – Summary of the economic value of an intervention.
IDVA	Independent Domestic Violence Advocate - IDVAs work with those who have been affected by domestic violence through activities such as criminal justice support and representing the victim in legal proceedings.
IGRP	Independent Information Governance Review Panel – For the current study the IGRP was from SAIL. The IGRP includes representatives from various organisations and sectors to determine our access to SAIL databank.
ISTV	Information Sharing to Tackle Violence - An anonymised dataset that is collected by the NHS ED departments.
ISVA	Independent Sexual Violence Advisor – ISVA works with those affected by sexual violence.
ITSA	Interrupted Time Series Analysis – Used when looking at outcomes. It involves looking at data before and after an interruption, i.e. an intervention.
LEH	Local Emergency Hospitals – A hospital for immediate and urgent care. LEHs do not have a major trauma centre but are equipped to aid and transfer patients to major trauma centres.
LSOA	Lower Layer Service Output Areas – Geographical areas in England and Wales where data is collected, for example, population count and crime rate.
MARAC	Multi-Agency Risk Assessment Conference – A meeting to discuss high risk domestic abuse cases. The meeting includes professionals such as, the police, health, IDVA's, children's services and third sector agencies.
MARF	Multi-Agency Referral Form – A referral form used to report a concern about a child at risk.
MIU	Minor Injury Unit – A walk in unit in a hospital for non-emergency care. They provide care and treat injuries such as rashes, cuts, sprains and burns.
MoJ	Ministry of Justice – A government department that is responsible for the criminal justice system, probation, courts, safeguarding and to examine and adapt the legal service.
MoPI	Management of Police Information – Management of police records and data to collect necessary and proportional data.
MTC	Majot Trauma Centre – Unit in a hospital that provides support to patients with major trauma. Major trauma can be defined as an illness or incident that can cause permanent disability or death.
NHB	Net Health Benefit – The benefit given to an intervention, that is worked out using the total expected costs of the intervention divided by the maximum cost effectiveness ratio. If the net health benefit of an intervention is positive the health of the population would be increased.
NHS	National Health Service – Health care that is funded by the UK Government.

NMB	Net Monetary Benefit – Representing the value of an intervention in monetary terms, that is worked out by looking at the difference of monetary value of QALYs and the total estimated costs of the intervention.
NPD	National Pupil Database – Data set of all pupils in public schools in England including absence, exclusion and demographic information.
NRAC	National Retention Assessment Criteria – Scheduled reviews of information retention which poses several questions that assesses risk of harm posed by nominals. If the answer is 'yes' to any of the criteria, the records must be retained and reviewed at a scheduled later date.
OPCC	Office for the Police and Crime Commissioner - Police and crime commissioners are elected police officials that are responsible for their force areas, including the police budget and how the area is policed.
OPRD	Outpatient Referral Dataset - Data collected from the NHS including information on where the patient was referred to, the reason for referral and the service type requested.
PEDW	Patient Episode Database for Wales – This dataset included all inpatient and day case activity occurring in NHS Wales institutions. It also includes data on Welsh residents that were treated in England.
PMS	Patient Management System - A digital computer system for health professionals to access patient records.
PNC	Police National Computer – A system used by the UK police and law enforcement to access information in real-time.
PND	Police National Database – A national system to store an accumulation of policing information from all forces.
PPI	Public and Patient Involvement - The inclusion of the public in a research project.
PSA	Probabilistic Sensitivity Analysis – a method used in economic evaluations that allows the researcher to assess the level of uncertainty or confidence in a decision.
QALY	Quality-Adjusted Life Year – Years that are lived in perfect health. QALYs are used to assess the value of interventions.
RALF	Residential Anonymous Linkage Field – An ALF that includes residential information such as location, number of residents and the change in occupants. RALFs can be used the assess the interaction between a person's residential setting and their health. (see ALF).
RTF	Rural Trauma Facilities – Hospitals in rural areas that are equipped to aid major trauma patients.
SAIL	Secure Anonymised Information Linkage – SAIL is a data bank that allows researchers to access, link and assess patient and public health information.
SMDS	Substance Misuse Data Set – Data set on patients referred for a substance misuse problem. Also known as The Welsh National Database for Substance Misuse (see WNDSM).
SPIRIT	Standard Protocol Items: Recommendation for Intervention Trial – Recommendations for content for a clinical protocol.
SRG	Stakeholder Reference Group – A group made up of stakeholders that provide feedback and direction on the research project. SRGs are made up of stakeholders from different sectors.
SSC	Study Steering Committee – A group that provides oversight of the research activities. The members usually have lived or relevant experience of what is being researched.
SUPER	Service Users for Primary and Emergency care Research – A group that includes Welsh residents that represent diverse backgrounds and experiences. They provide perspectives on research topics and give suggestions on how to conduct PPI.

TIDier	Template for Intervention Description and Replication – A checklist and guide for describing interventions that can be used for replication.
TU	Trauma Unit – A unit in a hospital that aids those with major trauma. Trauma units are used when the patient is not stable enough to be moved to a major trauma centre.
UHW	University Hospital Wales – Hospital situated in Cardiff, Wales.
UK	United Kingdom.
VPT	Violence Prevention Team – The VPTs are a type of hospital-based violence intervention programme. They are currently situated in two South Wales emergency departments.
VPU	Violence Prevention Unit (Wales) – A unit funded by the Home Office. The VPU consists of a multi-disciplinary team that looks at evidence and research to reduce violence in Wales.
VRU	Violence Reduction Unit (England and Scotland) - A unit funded by the Home Office. The VRUs consist of multi-disciplinary teams that look at evidence and research to reduce violence in England and Scotland.
WAST	Welsh Ambulance Service Trust – An NHS trust providing an ambulance service for Wales.
WDSD	Welsh Demographic Service Database - WDSD includes all individuals registered with a Welsh General Practitioner and via anonymisation it identifies household groups.
WIMD	Welsh Index of Multiple Deprivation - The Welsh Government's official measure of relative deprivation for small areas in Wales.
WLGP	Welsh Longitudinal General Practitioner Dataset – A data set that contains clinical information from General Practitioners in Wales, including diagnoses and referrals to tertiary care.
WNDSM	The Welsh National Database for Substance Misuse - Data set on patients referred for a substance misuse problem. Also known as Substance Misuse dataset (See SMDS).
WSMA	Whole System Multi-Agency – An approach that includes people from multiple different agencies, for example, health care, police and the government.
WTP	Willingness To Pay – The maximum price that someone is willing to pay for a product. In health economics it can be used as how much people are willing to pay to improve health and reduce risk.
YEF	Youth Endowment Fund – The YEF fund research happening across England and Wales that is focused on preventing CYP becoming involved in violence.

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20. Appendices

20.1. TIDieR

The Template for Intervention Description and Replication (TIDieR)

Item	Description
Brief name	*Provide the name or a phrase that describes the intervention.* Hospital-based, clinically led Violence Prevention Team (VPT)
Voice	*"Who was involved in the preparation of TIDieR, how they were involved in the intervention/their perspective (e.g., researcher, service deliverer, patient, etc* **Research and evaluation team**: Wales Violence Prevention Unit (VPU) evidenced the need for the VPT and funded early implementation. University evaluation team – Cardiff University (Violence Research Group and DECIPHER), Swansea University (SAIL Databank team), and York University contributed to the TIDieR. Youth Endowment Fund (YEF) part-funded the intervention and funded the process and implementation evaluation. The National Institute for Health Research (NIHR134055) funded the effectiveness and cost-effectiveness evaluation. An expert advisory group provides oversight to the evaluations, including experts from Public Health Wales, Trauma Network, South Wales Police, Office of the Police and Crime Commissioner (OPCC), and third sector organisations including Welsh Women's Aid, The Wallich and Black Association of Women Step Out (BAWSO). **Service Delivery** VPT staff (nurse, nurse advocate, community youth workers), who implemented and continually develop the service. Clinical teams in the two Emergency Departments (EDs) in which the interventions are situated provide clinical governance. **Commissioners** Wales VPU (partner agencies including South Wales Police OPCC, and Public Health Wales), provided the bulk of the funding for the interventions and have on-going dialogues regarding the service development, implementation, and delivery at both implementation sites. The UK Home Office provided initial funding to the VPU and YEF
Why	*Describe any rationale, theory, or goal of the elements essential to the intervention.* EDs receive for treatment patients who have been exposed to violence. There are numerous reasons why some people are exposed to violence, including their alcohol use, illicit drug use, unstable or chaotic homelife, amongst other reasons. These vulnerabilities will also be associated with increased utilisation of Emergency Care generally. EDs therefore have a unique opportunity to offer these patients additional

	support, beyond treatment for acute health needs, either directly or through referral to other healthcare services, or in discharge planning signposting third-sector organisations, for example. If this support is successful, then the expectation is that patients will exhibit a reduced use of emergency care services in general, not just for violence-related injury. The primary objectives of the hospital-based service provision are to (i) identify patients attending EDs whose attendance is predicated on their exposure to violence, (ii) work with patients to understand any circumstances or vulnerabilities that increase their exposure to violence, and (iii) to either support their referral into secondary or third-sector care or to provide ongoing case-management alongside third-sector support. All patient-facing clinical staff in emergency care, and elsewhere, have a duty of care and will have received training necessary to undertake patient safeguarding. However, the additional resources involved with the VPT afford (i) greater time working with patients to determine need, (ii) deepen links with primary, secondary, and tertiary care, and third sector organisations, for improved referral processes, (iii) work across clinical teams to support colleagues with their safeguarding needs and referral into the intervention, and (iv) through direct contact with patients, support opportunities for disclosure and therefore increase ascertainment of assault-related attendances. While the VPT can and will refer to any community service provider based on patient need, specific funding has been dedicated to two different organisations where the VPTs are located. The community-based provision provides intensive support to high-risk children and young people (aged 11-24 years) involved in serious organised crime, drug-related activity, and showing signs of exploitation. The objective is to build resilience to enable these young people to be diverted away from further involvement in serious violence and organised crime.
What – material	*Describe any physical or informational materials used in the intervention, including those provided to participants or used in intervention delivery or in training of intervention providers. Provide information on where the materials can be accessed (e.g., online appendix, URL).* The VPT have made resources available to patients and their families, including leaflets providing details of the service, and information packs to inform them of key issues (e.g., county lines and exploitation). The VPT has available physical and informational materials usually available to ED staff. This includes access to patient records, both specific to the ED and community healthcare generally. This information facilitates risk assessment and safeguarding practices (e.g., identify patterns of attendance at health care settings for violent-related injury), as well as allowing the VPT ensure their engagement with patients is appropriate at that time (with consideration to the patient's clinical needs). In addition, the VPT have strong links with South Wales Police, and receive information and intelligence relating to violence related incidents and community problems. The provision of this information and intelligence to the intervention teams can help inform their interactions with patients and ensure the safety of the hospital and patients (e.g., in cases of youth violence where further attempts to harm a patient may occur).

	Training and support for staff by VPT The VPT provide training to a wide range of clinical and non-clinical staff within the hospital, including: Clinical hospital staff, on violence (e.g., youth violence) and vulnerability, identifying violence-related injury and engaging with patients, implementing safeguarding procedures for violence-related injuries (e.g., completing multi-agency referral forms, MARFs). Reception staff, on data entry and patient coding, to improve the quality of routine clinical data. The nature of medical education entails short-term postgraduate and speciality training, and therefore a steady flow of clinical staff new to the ED environment. The VPT provides education and training, and impromptu advice and support through one-on-one interactions, to hospital staff. This includes providing consultation on patients and facilitating patient interactions for more challenging cases.
What – procedures	*Describe each of the procedures, activities, and/or processes used in the intervention, including any enabling or support activities.* The VPT engages with patients at different stages of their journey, depending on the type and severity of their injuries, the time and day they attend the ED, and the longevity of their hospital stay. They are embedded in the ED clinical team, and have the same resources (e.g., access to electronic patient management systems) as other ED staff. **Referral** The VPT can receive patient referrals through multiple channels, including email, phone, and face-to-face contact. During their shift, VPT staff can be notified of eligible patients through a set of questions asked during patient registration, triage or by monitoring the ED patient management system. When the VPT is not on shift, paper-based referral forms are available, and staff can still use formats to refer patients and the VPT will retrospectively review the ED patient management system to identify any additional patients that may have been missed by clinical staff. **Process** The VPT provides individualised support to patients based on their needs and collaborates with primary, secondary and tertiary care, third sector organisations and other statutory organisations (e.g., local government safeguarding teams, the police, and school nurses). They establish a relationship with the patient and, where appropriate, their family. They provide emotional and practical support. They also manage vulnerabilities and risks to patients by gathering information and through collaborative multiagency work. This can be through existing resources, such as the Domestic Abuse, Stalking, Harassment and Honour Based Violence Assessment (DASH) tool, and referrals into the Multi Agency Risk Assessment Committee (MARAC). The VPT will either discharge patients to receive support elsewhere, or, in the case of high risk, high need children exposed to criminal or sexual exploitation, continue their

	support of the patient alongside third sector organisations specifically funded to support the VPT in this area. **Access to information** The VPT has access to usual healthcare patient management systems, both ED specific and community-based, that can be accessed to inform patient assessments and safeguarding decisions. Furthermore, the VPT access information on patients to inform risk assessment and management. For example, following incidents of serious violence (e.g., stabbings and shootings), they will gather information on risks and known associations through the police, VPU team (i.e., police and probation), hospital staff, and through the safeguarding team (who routinely meet to discuss patients). **Assessment** The VPT completes a risk- and needs-based assessment in collaboration with patients if they agree to engage and, where appropriate, their families. This will also include information obtained through patient records (e.g., PARIS and clinical portal) on previous hospital visit.
5. Who provided	*For each category of intervention provider (e.g., psychologist, nursing assistant), describe their expertise, background and any specific training given.* VPT staff will be trained to Level 2 or Level 3 Safeguarding, available through continuing professional development to all frontline staff in the NHS. VPT staff are typically seconded from the broader ED team and will typically be nurse-led. Additional third-sector support is funded to provide support to high risk, high need children.
6. How	*Describe the modes of delivery (e.g., face-to-face or by some other mechanism, such as internet or telephone) of the intervention and whether it was provided individually or in a group.* The VPT team meets with patients face-to-face in the ED if they are on shift, or on hospital wards if the patient is admitted. If the team is not on shift, or receive referrals from Minor Injury Units, they will follow-up with a phone call and conduct an assessment. All contact is done an individual basis, or in collaboration with the family (for under 16-year-olds, or in cases the patient consents to family involvement). Under usual safeguarding processes, the clinician who first receives any disclosure is expected to lead on the subsequent referral to the VPT, so that patients are not required to repeatedly describe circumstances they might find distressing. In this latter case, the VPT will support the patient's referral.
7. Where	*Describe the type(s) of location(s) where the intervention occurred, including any necessary infrastructure or relevant features.*

	The VPT are physically based in the ED. However, they can accept referrals from Minor Injury Units, and also provide support to patients on the wards if they are admitted following serious injury. The VPT also work with patients that are transferred from other health care facilities- which is particularly pertinent when the hospital is a major trauma centre, or trauma unit, and therefore accepts out-of-area patients. The VPT engage with other health care settings to facilitate transfers (e.g., provide information on known risks and vulnerabilities), and inform care planning.
8. When and how much	*Describe the number of times the intervention was delivered and over what period of time including the number of sessions, their schedule, and their duration, intensity, or dose.* Patients will either engage with the VPT or will refuse support. If the latter, they will have been in contact with the VPT once. For patients who engage with the VPT, the frequency and duration of engagement with patients will be determined through the patient's age, clinical need, and any underlying vulnerability. *Hospital based VPT* The VPT typically have one or two interactions with most patients, such as a phone call or text message. However, patients with greater needs may have more frequent contact and remain on the caseload for several weeks. Inpatients are supported until they are discharged. The VPT can only maintain a small caseload of patients who require longer-term support, typically those on waiting lists or who are too vulnerable to disengage with. Patients referred to the caseworker have minimal involvement with hospital-based services. *Caseworker* The caseworker offers high-intensity support for high-risk, high-need young people and engages with them two to three times a week. To maintain this level of contact, the caseload is limited to five young people at a time. Some service users may be on the caseload for an extended period if they resist engagement. However, for patients referred to hospital-based services, the caseworker has minimal involvement or contact.
9. Tailoring	*"If the intervention was planned to be personalised, titrated or adapted, then describe what, why, when, and how.* **Level of harm** The VPT engages with patients attending ED in consequence of their exposure to violence. All patients are eligible and initial assessment will determine how patients are managed. In the case of domestic abuse, the patient will be handed over to an Independent Domestic Violence Advocate (IDVA). In the case of sexual abuse, the patient will be handed over to the Independent Sexual Abuse Advocate or the Sexual Assault Referral Clinic. In the case of self-harm, the patients will be handed over Mental Health Services. The VPT will therefore typically engage with patients attending with non-domestic violence-related injuries, of varying acuity. The team offers immediate support to patients with non-life-threatening injuries, while for high acuity patients, they wait until the patient is stable before offering their services. The VPT team

	conducts assessments for patients admitted into the hospital, which allows them to provide more intensive support. *Caseworker* The caseworker engages with patients either in the hospital or in community settings and maintains a caseload of up to five young people at a time for high intensity support.
Stage of Implementation	*(i) What stage of implementation does the TIDieR checklist cover?* *(ii) Is this a revision of an earlier TIDieR checklist* This is an initial TIDieR, generic to two sites at which the VPT model has been implemented. The VPTs at the two sites are at different stages of implementation with one having a significantly longer operational period.
How well – planned	*"If intervention adherence or fidelity was assessed, describe how and by whom, and if any strategies were used to maintain or improve fidelity, describe them.* The VPT model is subject to a formal evaluation, and a process and implementation evaluation, which this TIDieR informs. The outcome from these evaluations will be a revised logic model, an understanding of the adaptations made to the intervention based on locality, and a formal effectiveness and cost-effectiveness evaluation.
How well – actual	*"If intervention adherence or fidelity was assessed, describe the extent to which the intervention was delivered as planned.* *Describe the extent to which the intervention was delivered as planned and outline the factors which had an* *impact on actual delivery.* Delivery of the intervention has been impacted by staffing changes in both sites, with both sites operating with reduced staff during periods of their operation. As a result, this has led to delays engaging with and referring some patients for further support.

20.2. SPIRIT

SPIRIT

Section	N	Description	Page
Administrative information			
Title	1	Descriptive title identifying the study design, population, interventions, and, if applicable, trial acronym	3
Trial registration	2a	Trial identifier and registry name. If not yet registered, name of intended registry	ISRCTN 41868
	2b	All items from the World Health Organization Trial Registration Data Set	See 2a
Protocol version	3	Date and version identifier	1
Funding	4	Sources and types of financial, material, and other support	20
Roles and responsibilities	5a	Names, affiliations, and roles of protocol contributors	20
	5b	Name and contact information for the trial sponsor	N/A
	5c	Role of study sponsor and funders, if any, in study design; collection, management, analysis, and interpretation of data; writing of the report; and the decision to submit the report for publication, including whether they will have ultimate authority over any of these activities	20
	5d	Composition, roles, and responsibilities of the coordinating centre, steering committee, endpoint adjudication committee, data management team, and other individuals or groups overseeing the trial, if applicable (see Item 21a for data monitoring committee)	20
Introduction			
Background and rationale	6a	Description of research question and justification for undertaking the trial, including summary of relevant studies (published and unpublished) examining benefits and harms for each intervention	3
	6b	Explanation for choice of comparators	13
Objectives	7	Specific objectives or hypotheses	6
Trial design	8	Description of trial design including type of trial (eg, parallel group, crossover, factorial, single group), allocation ratio, and framework (eg, superiority, equivalence, noninferiority, exploratory)	9
Methods: Participants, interventions, and outcomes			

Study setting	9	Description of study settings (eg, community clinic, academic hospital) and list of countries where data will be collected. Reference to where list of study sites can be obtained	9
Eligibility criteria	10	Inclusion and exclusion criteria for participants. If applicable, eligibility criteria for study centres and individuals who will perform the interventions (eg, surgeons, psychotherapists)	12
Interventions	11a	Interventions for each group with sufficient detail to allow replication, including how and when they will be administered	5
	11b	Criteria for discontinuing or modifying allocated interventions for a given trial participant (eg, drug dose change in response to harms, participant request, or improving/worsening disease)	N/A
	11c	Strategies to improve adherence to intervention protocols, and any procedures for monitoring adherence (eg, drug tablet return, laboratory tests)	N/A
	11d	Relevant concomitant care and interventions that are permitted or prohibited during the trial	N/A
Outcomes	12	Primary, secondary, and other outcomes, including the specific measurement variable (eg, systolic blood pressure), analysis metric (eg, change from baseline, final value, time to event), method of aggregation (eg, median, proportion), and time point for each outcome. Explanation of the clinical relevance of chosen efficacy and harm outcomes is strongly recommended	10
Participant timeline	13	Time schedule of enrolment, interventions (including any run-ins and washouts), assessments, and visits for participants. A schematic diagram is highly recommended (see Figure)	N/A
Sample size	14	Estimated number of participants needed to achieve study objectives and how it was determined, including clinical and statistical assumptions supporting any sample size calculations	13
Recruitment	15	Strategies for achieving adequate participant enrolment to reach target sample size	13
Methods: Assignment of interventions (for controlled trials)			
Allocation:			
Sequence generation	16a	Method of generating the allocation sequence (eg, computer-generated random numbers), and list of any factors for stratification. To reduce predictability of a random sequence, details of any planned restriction (eg, blocking) should be provided in a separate document that is unavailable to those who enrol participants or assign interventions	15
Allocation concealment mechanism	16b	Mechanism of implementing the allocation sequence (eg, central telephone; sequentially numbered, opaque, sealed envelopes), describing any steps to conceal the sequence until interventions are assigned	15

Implementation	16c	Who will generate the allocation sequence, who will enrol participants, and who will assign participants to interventions	N/A
Blinding (masking)	17a	Who will be blinded after assignment to interventions (eg, trial participants, care providers, outcome assessors, data analysts), and how	N/A
	17b	If blinded, circumstances under which unblinding is permissible, and procedure for revealing a participant's allocated intervention during the trial	N/A
Methods: Data collection, management, and analysis			
Data collection methods	18a	Plans for assessment and collection of outcome, baseline, and other trial data, including any related processes to promote data quality (eg, duplicate measurements, training of assessors) and a description of study instruments (eg, questionnaires, laboratory tests) along with their reliability and validity, if known. Reference to where data collection forms can be found, if not in the protocol	13
	18b	Plans to promote participant retention and complete follow-up, including list of any outcome data to be collected for participants who discontinue or deviate from intervention protocols	N/A
Data management	19	Plans for data entry, coding, security, and storage, including any related processes to promote data quality (eg, double data entry; range checks for data values). Reference to where details of data management procedures can be found, if not in the protocol	10
Statistical methods	20a	Statistical methods for analysing primary and secondary outcomes. Reference to where other details of the statistical analysis plan can be found, if not in the protocol	13
	20b	Methods for any additional analyses (eg, subgroup and adjusted analyses)	13
	20c	Definition of analysis population relating to protocol non-adherence (eg, as randomised analysis), and any statistical methods to handle missing data (eg, multiple imputation)	16
Methods: Monitoring			
Data monitoring	21a	Composition of data monitoring committee (DMC); summary of its role and reporting structure; statement of whether it is independent from the sponsor and competing interests; and reference to where further details about its charter can be found, if not in the protocol. Alternatively, an explanation of why a DMC is not needed	20
	21b	Description of any interim analyses and stopping guidelines, including who will have access to these interim results and make the final decision to terminate the trial	N/A

Harms	22	Plans for collecting, assessing, reporting, and managing solicited and spontaneously reported adverse events and other unintended effects of trial interventions or trial conduct	N/A
Auditing	23	Frequency and procedures for auditing trial conduct, if any, and whether the process will be independent from investigators and the sponsor	N/A
Ethics and dissemination			
Research ethics approval	24	Plans for seeking research ethics committee/institutional review board (REC/IRB) approval	7
Protocol amendments	25	Plans for communicating important protocol modifications (eg, changes to eligibility criteria, outcomes, analyses) to relevant parties (eg, investigators, REC/IRBs, trial participants, trial registries, journals, regulators)	20
Consent or assent	26a	Who will obtain informed consent or assent from potential trial participants or authorised surrogates, and how (see Item 32)	N/A
	26b	Additional consent provisions for collection and use of participant data and biological specimens in ancillary studies, if applicable	N/A
Confidentiality	27	How personal information about potential and enrolled participants will be collected, shared, and maintained in order to protect confidentiality before, during, and after the trial	N/A
Declaration of interests	28	Financial and other competing interests for principal investigators for the overall trial and each study site	20
Access to data	29	Statement of who will have access to the final trial dataset, and disclosure of contractual agreements that limit such access for investigators	19
Ancillary and post-trial care	30	Provisions, if any, for ancillary and post-trial care, and for compensation to those who suffer harm from trial participation	N/A
Dissemination policy	31a	Plans for investigators and sponsor to communicate trial results to participants, healthcare professionals, the public, and other relevant groups (eg, via publication, reporting in results databases, or other data sharing arrangements), including any publication restrictions	19
	31b	Authorship eligibility guidelines and any intended use of professional writers	19
	31c	Plans, if any, for granting public access to the full protocol, participant-level dataset, and statistical code	19
Appendices			
Informed consent materials	32	Model consent form and other related documentation given to participants and authorised surrogates	N/A

Biological specimens	33	Plans for collection, laboratory evaluation, and storage of biological specimens for genetic or molecular analysis in the current trial and for future use in ancillary studies, if applicable	N/A

20.3. STROBE

1 Title and abstract	Page
(a) Indicate the study's design with a commonly used term in the title or the abstract	1
(b) Provide in the abstract an informative and balanced summary of what was done and what was found	N/A
Introduction	
2 Background/rationale	
Explain the scientific background and rationale for the investigation being reported	3-5
3 Objectives	
State specific objectives, including any prespecified hypotheses	6
Methods	
4 Study design	
Present key elements of study design early in the paper	9-10
5 Setting	
Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	9
6 Participants	
(a) Cohort study—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up Case-control study—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls Cross-sectional study—Give the eligibility criteria, and the sources and methods of selection of participants (b) Cohort study—For matched studies, give matching criteria and number of exposed and unexposed Case-control study—For matched studies, give matching criteria and the number of controls per case	10-12
7 Variables	
Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	10-12, 17
8* Data sources/ measurement	
For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	13-16
9 Bias	
Describe any efforts to address potential sources of bias	
10 Study size	
Explain how the study size was arrived at	
11 Quantitative variables	
Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	
12 Statistical methods	
(a) Describe all statistical methods, including those used to control for confounding	
(b) Describe any methods used to examine subgroups and interactions	
(c) Explain how missing data were addressed	

(d) Cohort study—If applicable, explain how loss to follow-up was addressed	
Case-control study—If applicable, explain how matching of cases and controls was addressed	
Cross-sectional study—If applicable, describe analytical methods taking account of sampling strategy	
(e) Describe any sensitivity analyses	
Results	
13* Participants	
(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	
(b) Give reasons for non-participation at each stage	
(c) Consider use of a flow diagram	
14 Descriptive data	
(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	
(b) Indicate number of participants with missing data for each variable of interest	
(c) Cohort study—Summarise follow-up time (eg, average and total amount)	
15* Outcome data	
Cohort study—Report numbers of outcome events or summary measures over time	
Case-control study—Report numbers in each exposure category, or summary measures of exposure	
Cross-sectional study—Report numbers of outcome events or summary measures	
16 Main results	
(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included Report category boundaries when continuous variables were categorized If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	
17 Other analyses	
Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	
Discussion	
18 Key results	
Summarise key results with reference to study objectives	
19 Limitations	
Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	
20 Interpretation	
Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	
21 Generalisability	
Discuss the generalisability (external validity) of the study results	
Other information	
22 Funding	

Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	
*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.	

FIGURE LEGENDS

Figure 1

Count of patients, by month, identified by the Cardiff VPT as attending due to a violence-related injury, with the number that subsequently engaged with the VPT.

Figure 2

A simplified example of discontinuous risk intervals as they relate to unscheduled ED attendance and super-spells.