

HSDR Evidence Evaluation Centre Topic Report

Youth violence intervention programme for vulnerable young people attending emergency departments in London: a rapid evaluation

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HSDR Rapid Evaluation Centre Topic Report

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Abstract

Background

Youth violence intervention programmes (YVIPs) involving the embedding of youth workers in NHS emergency departments (EDs) to help young people (broadly aged between 11 and 24) improve the quality of their lives following their attendance at an emergency department as a result of violent assault or associated trauma are increasing across the NHS. This study evaluates one such initiative run by the charity Redthread in partnership with an NHS trust and aimed at .

Objectives

To evaluate the implementation and impact of a new YVIP at University College London Hospital NHS Trust (UCLH) and organised by the charity Redthread:

- literature review of studies of hospital-based violent crime interventions
- evaluation of local implementation and of UCLH staff and relevant local stakeholders concerning the intervention and its impact
- assessment of the feasibility of using routine secondary care data to evaluate the impact of the Redthread intervention
- cost-effectiveness analysis of the Redthread intervention from the perspective of the NHS.

Methods

The evaluation was designed as a mixed-methods, multi-phased design, including an in-depth process evaluation case study and quantitative and economic analyses. The project was undertaken in different stages over two years, starting with desk-based research and an exploratory phase suitable for remote working whilst COVID-19 was affecting NHS services. A total of 22 semi-structured interviews were conducted with staff at Redthread and UCLH and others (e.g. a senior stakeholder involved in NHS youth violence prevention policy). We analysed Redthread documents, engaged with experts and conducted observations of staff meetings to gather more in-depth insights about the effectiveness of the intervention, the processes of implementation, staff perceptions and cost. We also undertook quantitative analyses to ascertain suitable measures of impact to inform stakeholders and future evaluations.

Results

Redthread's service was viewed as a necessary intervention, which complemented clinical and other statutory services. It was well-embedded in the paediatric ED and adolescent services, but less so in adult ED. The diverse reasons for individual referrals, the various routes by which young people were identified, and the mix of specific support interventions provided together emphasised the complexity of this intervention, with consequent challenges in implementation and evaluation.

Given the relative unit costs of Redthread and UCLH's inpatient services, it is estimated that the service would break even if around a third of Redthread interventions resulted in at least one avoided emergency inpatient admission.

This evaluation was unable to determine a feasible approach to measuring the quantitative impact of Redthread's YVIP , but has reflected on data describing the service, including costs, and make recommendations to support future evaluation.

Limitations

The COVID-19 pandemic severely hampered the implementation of the Redthread service and the ability to evaluate it. The strongest options for analysis of effects and costs were not possible due to constraints of the consent process, problems in linking Redthread and UCLH patient data and the relatively small numbers of young people having been engaged for longer-term support over the evaluation period.

Conclusions

We have been able to contribute to the qualitative evidence on the implementation of the YVIP at UCLH, showing, for example, that NHS staff viewed the service as an important and needed intervention. In the light of problems with routine patient data systems and linkages, we have also been able to reflect on data describing the service, including costs, and make recommendations to support future evaluation.

Future work

No future work is planned.

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List of Abbreviations

A&E	Accident and Emergency
APC	Admitted Patient Care
BI	Brief intervention
CAG	Confidentiality Advisory Group
CAMHS	Child and Adolescent Mental Health Services
CBA	Cost-benefit analysis
CBI	Computer-based intervention
CBT	Cognitive Behavioural Therapy
CCA	Cost-consequence Analysis
CDC	Center for Disease Control and Prevention
CEA	Cost-effectiveness analysis
COVID-19	Coronavirus disease
CPD	Continuing Professional Development
CPI	Consumer Price Index
ECDS	Emergency Care Dataset
ED	Emergency Department
EDTC	ED/Trauma Centre
EDVIP	ED Violence Intervention Programme
Embase	Excerpta Medica Database
EPIC	UCLH data management system
EYIPP	Empowering Youth Through Interpersonal Violence Prevention Programme
FCE	Finished consultant episode
GP	General Practitioner
HES	Hospital Episode Statistics
HIE	Health Information Exchange
HPA	Health Promotion Advocates
HRA	Health Research Authority
HRG	Healthcare Resource Group
HVIP	Hospital-based violence intervention programme
LSOA	Lower Super Output Area
MDT	Multidisciplinary Team
MEDLINE	Medical Literature Analysis and Retrieval System Online
MESH	Medical Subject Headings
MOPAC	Mayor's Office for Policing And Crime
MRN	Medical record number
MS	Microsoft
MSOA	Middle Super Output Areas
MST	Multisystemic therapy
MTC	Major Trauma Centre

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N/A	Not applicable
NFP	Nurse Family Partnership
NHS	National Health Service
NIHR	National Institute for Health and Care Research
ONS	Office for National Statistics
PC	Programme Coordinator
PLICS	Patient level information and costing system
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
PTSD	Post-traumatic stress disorder
PubMed	Public/Publisher MEDLINE
RCT	Randomised controlled trial
RSET	Rapid Service Evaluation Team
SCTID	SNOMED CT Identifier
SD	Standard deviation
SDQ	Strengths and Difficulties Questionnaire
SNOMED	Systemized Nomenclature of Medicine
SOP	Standard Operating Procedure
TARN	Trauma Audit Research Network
TBI	Therapist-delivered intervention
T+CBI	Therapist and computer-based intervention
UCLH	University College London Hospital
UK	United Kingdom
USA	United States of America
VIAP	Violence Intervention Advocacy Program
VR	Violence reduction
WDYT	What Do You Think
WHO	World Health Organization
YP	Young person
YVIP	Youth violence intervention programme
YW	Youth worker

Scientific summary

Background

Youth violence intervention programmes (YVIPs) - and in particular those based in EDs – aimed broadly at young people aged between 11 and 24, are part of a wider national strategy to tackle violence, the risk of violence or other types of harm. Despite many such programmes there is limited knowledge about their impact and cost-effectiveness. Prior attempts to demonstrate the efficacy of ED-based programmes have also been underpowered and results have been largely equivocal.

Redthread has been implementing YVIPs in hospitals since 2006. In 2020 they started a service at University College London Hospitals National Health Service (NHS) Trust (UCLH). This programme embeds specialist youth workers into some of the Trust's clinical departments, capitalising on 'teachable moments' to engage young people and encourage positive change in their lives.

The aim of this study has been to evaluate the implementation and impact of the Redthread intervention at UCLH with the following research questions:

- What benefits does implementation of the Redthread YVIP have at UCLH for both staff and patients?
- What evidence exists in the published research and grey literature about the effectiveness, benefits and impact of interventions in urgent care and hospital settings that focus on violent crime and young people? What lessons can be learned from United Kingdom (UK) and international studies to help NHS trusts implementing such interventions?
- How can a combination of routine secondary care and Redthread data inform an evaluation of the impact of the Redthread service on the use of NHS hospital services?
- What are the views of UCLH NHS staff on the Redthread intervention?
- What organisational factors, processes, resources and staff training are necessary for the successful implementation and delivery of the Redthread service?
- How cost-effective is the implementation of the Redthread service at UCLH?
- What evaluation approaches and methodological designs appear particularly well suited and feasible for evaluations of the Redthread service and similar services in the NHS?

Methods

We undertook a mixed-methods evaluation in two phases.

Phase 1 involved feasibility and scoping of the evaluation, including an exploratory search for published evidence. This was mostly undertaken whilst COVID-19 was affecting the service Redthread were able to deliver at UCLH and was, thus, predominantly desk-based. Activities were:

- An exploratory review of the literature, including checking for other Redthread evaluations.
- Nine semi-structured interviews with: Redthread staff, clinical staff involved with the early implementation of the service at UCLH (e.g. consultants working in paediatrics and children and young people's services) and one senior NHS stakeholder involved in youth violence prevention programmes nationally. Interviews were analysed alongside Redthread documents to confirm Redthread's programme theory, the intervention at UCLH and adaptations due to COVID-19.

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- An investigation into the feasibility of a quantitative evaluation of the service by studying local data flows and processes and analysing routine hospital data.
- A desk-based review of available Redthread and UCLH documents to inform the economic analysis

Phase 2 - from April 2021, when the Redthread service at UCLH was able to restart - involved a more in-depth study of the implementation at UCLH and other activities:

- A targeted, scoping literature review to identify any recent published evidence
- A qualitative process evaluation involving 13 additional interviews with clinical and youth worker staff at UCLH and Redthread, plus three observations of three staff meetings, to understand the perceived impact and effectiveness of the service as well as identifying factors that enable the successful delivery of youth violence intervention programmes
- Analysis of data collected by Redthread to understand more about the delivery of the service and those who engaged with it
- A cost-consequence analysis using local data on the costs of the Redthread service and relevant hospital interventions.

If we were able to establish during Phase 1 that it would be possible to undertake a quantitative evaluation of the impact of service, then this would have been included in Phase 2 alongside a cost-effectiveness analysis. However, we concluded that this was not going to be feasible and for an economic evaluation we adopted a cost-consequence analysis.

Results

Evidence review and current evaluation evidence (Chapter 3)

We found a number of empirical studies, largely from North America, but a limited amount of peer-reviewed evidence from the UK about hospital-based interventions focused on young people. Available evidence indicates that young people who present in EDs from gun and knife-crime injuries are at significant risk of repeat injury. Moreover, young people are vulnerable to a variety of risks in the community and can therefore re-present to EDs due to physical assault, interpersonal violence, substance misuse and severe mental health problems.

Because much of the existing empirical evidence comes from the United States of America (USA), it is often associated with programmes that focus on gun or injuries as well as from other types of harm to young people (e.g. risky behaviour associated with drug and alcohol use). The impact of violence prevention programmes is mostly measured as hospital reattendance with reinjury and other measures such as service uptake, with many studies demonstrating that YVIP can be cost-effective and are often well received by young people. However, the range of youth-based interventions being studied has been wide – covering brief interventions to longer-term case work - and the quality of evidence is variable, with some studies including relatively small sample sizes and limited follow-up times.

Of 20 academic papers identified, only one specifically focused on the UK. We therefore found limited evidence of the impact of youth-violence prevention interventions within the NHS and UK health system, although Redthread has commissioned a number of independent evaluations at hospital level. There were few peer-reviewed studies applying qualitative research methods. Furthermore, there is a lack of RCT and experimental studies specifically from the UK when

compared to the USA. Overall, we found limited evidence about the impacts of these programmes on cohorts of young people from the UK, confirming conclusions from similar evidence reviews.

Assessment of programme theory and implementation at UCLH (Chapter 4)

Redthread interventions focus on young people aged 11 to 24 that experience a traumatic event and present at hospital. Youth workers in the hospital emergency departments work alongside clinical staff to engage with victims of violence, assault or exploitation.

Redthread's programme theory draws on a number of influences, such as behaviour change theory and 'contextual safeguarding'. The central concept is the 'teachable moment' which focuses on a youth worker initiating a dialogue with a young person about their health risks and their motivation and commitment to change. The Redthread service model at UCLH was consistent in terms of this programme theory, although the service had been adapted to local conditions and contingencies, for example on account of COVID-19.

Within UCLH's adolescent and paediatric services, the Redthread service was viewed positively by staff as filling a gap in service provision. Youth workers were able to help a young person to better engage in their medical care and treatment. They were also bridging non-healthcare services within the community and thus enable frontline clinicians to better support vulnerable young people following discharge from hospital.

Although there was severe disruption to the service due to the COVID-19 pandemic, by winter 2021/22, Redthread were perceived to be well embedded in the paediatric ED and adolescent services, and there was increasing awareness of the service in outpatient departments. Redthread and clinical staff noted that more could be done to raise staff awareness of Redthread across the Trust, especially amongst nurses, junior doctors and other staff working in adult ED.

Identification of young people was not solely dependent on youth workers being in ED. Other routes of referral included multidisciplinary team (MDT) and safeguarding meetings, direct staff referrals, active searches of the hospital's patient administration system (EPIC) and the live board in ED. Reasons for referral were by no means limited to young people experiencing physical assault, but also included substance misuse, sexual assault, suicidal ideation and mental health crises.

The key barriers to implementation included the impact of Covid-19, staff changes, lack of physical space for Redthread staff and difficulties engaging young people aged over 18 presenting in adult ED. :

Staff suggested various factors that helped embed the YVIP. These included championing by senior clinical staff, integration of Redthread staff in processes for identifying vulnerable young people, space near the ED to engage with young people, the ability for clinicians to refer young people via the hospital's patient record system and clear and agreed operating procedures for the YVIP.

Description and review of data used to manage the Redthread service at UCLH (Chapter 5)

Redthread collect data on their service users; this enabled us to establish profiles of their characteristics. Some information is recorded on individuals who are referred but do not engage, which has, to some extent, enabled us to identify differences between the two groups and whether some types of individuals are more likely to engage than others.

There is scope for improving the data captured by the local hospital system. For example, ensuring Redthread referrals are consistently flagged, and where recorded, indicating whether the individuals accepted or declined support. UCLH are improving their recording of information on the intent behind injuries, which would help understand whether an individual was eligible to receive Redthread services.

Costs of service at UCLH (Chapter 6)

We were unable to conduct a cost-effectiveness analysis due to a lack of good quality evidence describing the effect or impact on subsequent use of hospital services.

A cost-consequence analysis showed that, over the course of a young person's engagement with the service, a statistically significant decrease in some risks were found, specifically, for the 'risks associated with experiencing further harm', and with 'not maintaining positive relationships with their families'. However, this analysis is limited by the small sample of patients and that these are subjective assessments of risk made by Redthread staff.

The mean cost per Redthread user (for both fully engaged and lightly-touch supported combined) for the Redthread YVIP service over a 21-month period was calculated to be £1,865. The mean cost for the emergency inpatient treatment of an artificially constructed group, similar to those likely to be referred to Redthread in UCLH, was estimated to be £5,789, while the mean cost per attendance at Accident and Emergency (A&E) was £203.

Feasibility of quantitative evaluation of service at UCLH (Chapter 7)

A number of possible options for a rapid quantitative evaluation of the impact of the service on reducing hospital reattendance were considered, but it was concluded that none would be currently feasible due to:

- Small numbers of young people who have so far engaged with the full longer-term Redthread programme at UCLH (59 over the period of the study).
- Lack of consent to enable access to individual person-level data for Redthread users to link to hospital administrative data.
- Likely difficulty in being able to detect the indirect impact of the service on wider groups of young people who live in the same neighbourhoods.
- A lack of key information recorded in UCLH ED records.
- Our inability to link national hospital inpatient and emergency care records due to the lack of linkable patient identifiers across the datasets.
- The difficulty in identifying comparable control groups from routine hospital data.

Matched case-control designs or approaches based on geographical areas of residence appeared to be the most feasible. We therefore made the following recommendations to facilitate future evaluation:

- For analysts to use reattendance as one measure of impact, and work with clinicians and Redthread to develop criteria from routine hospital records that can be used to identify which attendances are potentially avoidable.
- Similarly, develop criteria for identifying groups of patients attending other hospitals from which control groups can be selected.

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- For Redthread and acute hospital partners to consider mechanisms by which information from the service, as to who chooses to engage, and who chooses not to engage, can be linked to the routine data for analysis purposes.
- For clinicians to routinely record when a Redthread referral has been made by using the relevant code in the patient administration system – rather than only using free text. If a person is identified by Redthread themselves, then for this to be also flagged in the routine patient data.
- That suitable geographical areas are decided upon between Redthread and UCLH, making it feasible to test an area-level approach.

Limitations

The implementation of the service was disrupted by the COVID-19 pandemic, which affected how the service developed within UCLH. It also made it difficult to engage with staff outside Redthread and hospital paediatric services, in particular, those working within the adult emergency department. We were unable to conduct any observations on site and qualitative data was collected remotely. We were also unable to approach young people who had engaged with Redthread for a number of reasons outlined in this report (e.g. patient confidentiality, the sensitive nature of the clinical cases presenting at UCLH).

Further work

Suggested areas of further work include studies of the perceptions and experiences of young people receiving Redthread support, studies that are able to overcome the data challenges we have encountered in our own study, studies that look beyond hospital-based outcomes and multi-site case studies.

Conclusions

Our evaluation was not able to determine a feasible approach to measuring the quantitative impact of Redthread's YVIP at UCLH in the time available, but we have been able to reflect on data describing the service, including costs, and make recommendations to support future evaluation.

We have been able to contribute to the qualitative evidence on the implementation of the service. Redthread's service was largely viewed as a necessary service for young people at risk of harm (beyond involvement in violence), and one which was complementary to clinical and other statutory services. The service became particularly well embedded in paediatric ED and adolescent services, but less so in adult ED, possibly in part as a consequence of the impact of COVID-19. The diverse reasons behind individual referrals, the various routes by which young people were identified, and the mix of specific support interventions provided together emphasised the view that this was a complex intervention, with challenges in implementation.

Recently published guidance to support implementation of violence reduction services has emphasised the need for evaluation to be undertaken as a key improvement activity, and touches on

data that ought to be routinely collected. There is a clear need for good quality evidence of impact and our recommendations may help to improve future evaluation.

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National Institute for Health Research Health Services and Delivery Research programme (RSET: 16/138/17)

Word count: 2385

Plain English summary

Youth violence intervention programmes (YVIP) in the National Health Service embed specialist youth workers into a hospital's emergency paediatric departments. These staff can engage young people and encourage positive change in their life. YVIPs are part of a broader national strategy to prevent violence among young people. To improve our knowledge of the impact on young people and the cost-effectiveness of YVIPs, we carried out an evaluation of a YVIP introduced in 2020 at University College London Hospital (UCLH) and run by the charity Redthread.

We reviewed the international evidence on YVIPs, and other studies of Redthread services in particular, but found few studies measuring impact within the NHS.

We reviewed documents and conducted 22 interviews with UCLH and Redthread staff among others. We found that the service is viewed positively by NHS staff. We also found that youth workers are able to help a young person to better engage in their medical care and treatment. YVIPs also provide a link with non-healthcare services within the community. Overall they help NHS staff to better support vulnerable young people following discharge from hospital.

We also established the cost of delivering Redthread services per user was £1,865. This compares to a cost per inpatient of £5,789 for a group of patients similar to those helped by Redthread. The average cost of a Redthread-type patient attending the emergency department was £203.

We looked at whether it was possible to measure if Redthread reduced young people's readmissions to the hospital's emergency departments. However, we concluded that fully answering this question was not possible over the timescale of the project. This was due to the impact of COVID-19 on Redthread and other paediatric services, the low numbers of young people engaging with Redthread (59 receiving the full programme) and difficulties with linking hospital and Redthread data..

We have therefore made various recommendations in this report to improve data capture and linkage to aid future evaluations.

Word count: 320

Chapter 1: Context

Background

There are rising levels of knife crime and other serious injuries among young people in London and elsewhere in the United Kingdom (UK). The Office for National Statistics¹ showed that, excluding homicides and threats to kill, figures for violence-related crime offences involving a knife or sharp object rose by 46% to 45,863 offences between 2010 and 2020 in England and Wales (Figure 1). The drop in offences between April 2020 and March 2021 is almost certainly related to COVID-19 and, in particular, measures introduced to combat the pandemic such as lockdowns and school closures.

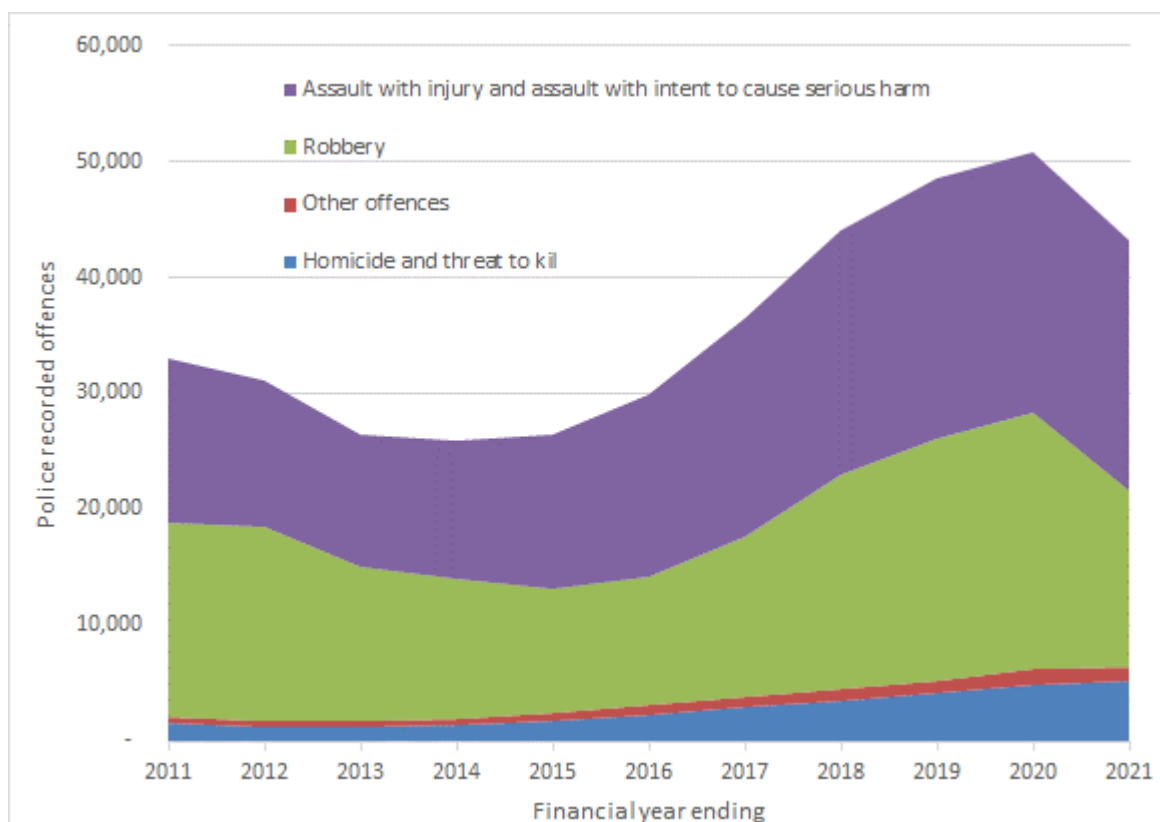


Figure 1. Number of police recorded offences involving a knife or sharp instrument, year ending March 2011 to year ending March 2020: England and Wales.

Source: Office of National Statistics (2021).¹

Assault with injury and assault with intent to cause serious harm rose by 58% between 2010 and 2021. Meanwhile, the number of hospital episodes with a classification of assault by sharp object (including, but not limited to, knives) has fluctuated over the last ten years, falling between 2010/11 and 2014/15, then rising to 2018 and dipping in 2019/20 and 2020/21 (Figure 2).² As with violent offences, the dip in 2020/21 is almost certainly associated with COVID-19 and measures taken to deal with the pandemic.

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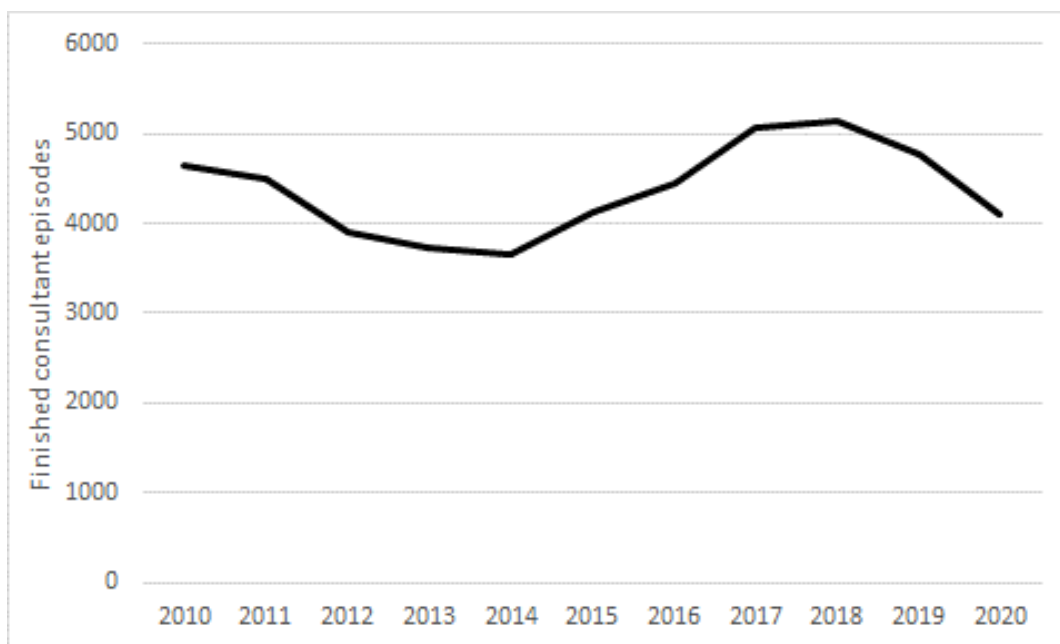


Figure 2. Finished Consultant Episodes for assault by sharp instrument (Clinical code X99 in ICD-10): England 2010/11 to 2020/21.

Source: Data: House of Commons Library (2021).²

In addition, assault-injured young people are at significant risk of repeat injury.³ The rate of repeat visits to the emergency department (ED) for violence-related injuries may be as high as 44%, and the risk of recurrent injury may be 80-times that of ‘unexposed’ individuals.^{4,5}

When assessed in the ED, the majority of injured young people and parents believe their injuries are preventable, and over a third also believe that a similar violence-related injury is likely to occur in the future.³ Moreover, youth assault injuries are often related to repeated disagreements and retaliatory behaviour that fuels repeated violence.⁶ Interrupting this cycle of reactive decision making has the potential to significantly reduce the burden of injury to young people in the UK.

The causes of these recent trends in violent assaults are multiple and varied and include factors related to deprivation and childhood poverty,^{7,8} and suggest multi-agency approaches to tackle the problem. Scotland, for example, has pioneered a public health approach to violence as advocated by the World Health Organisation (WHO),⁸ including knife crime.⁹ This has included educational programmes, multi-agency working as well as interventions such as the Navigator Programme based in EDs and designed to support people who have suffered injury from violence.¹⁰

As we discuss in our evidence review chapter later in this report, there is a literature base going back to the late 1990s and early 2000s describing violence prevention strategies that target vulnerable younger people and aim to reduce physical and emotional harm from peer violence.^{6,11,12}

Emergency department youth violence prevention programmes have been studied more extensively in the USA than in the UK, including using RCT and comparative study designs. These programmes vary in their implementation and approach, and may be supported by specialist youth workers,

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social workers, community mentors and wider inter-disciplinary teams of experts. There is also a literature about ‘brief interventions’ (BIs)¹³ which are also delivered in emergency care settings and involve screening young people for safety risks and providing structured, short-term support. Common to all these interventions is engaging with a young person in an urgent care hospital setting and trying to reduce that patient’s exposure to harm in the community by encouraging positive behaviour change following discharge.

Research suggests that injuries serious enough to require medical intervention may make young people and their parents uniquely susceptible to behavioural intervention.³ As Wortley and Hagell (p. 6)¹⁴ observe, ‘The incident bringing the young person to the ED may provide a hook for change’. Consequently, ED-based interventions that provide a ‘teachable moment’ offer a unique opportunity to identify and reach young victims of violence, inform individuals of the benefits of lifestyle changes and link them with supportive treatment programmes and agencies that can function in their daily life beyond the hospital, such as in education. However, as we discuss in this report, the evidence base about the implementation and impact of these programmes in the UK health system is still small (albeit growing) because these programmes are relatively new to the NHS.

Youth violence intervention programmes in the UK

Youth violence intervention programmes (YVIPs) and, in particular, those based in EDs, are part of a broader strategy and policies to tackle violence in general at national and local levels and involving many agencies, including local authorities, the police, the National Health Service (NHS) and third sector organisations. For example, in London, the Mayor’s Office set up the Violence Reduction Unit¹⁵ in 2019 with a ten-point plan¹⁶ which includes reducing the prevalence and impact of violence through a variety of interventions, notably, a public health approach and involving NHS organisations and others such as specialist youth worker groups. As part of this, the NHS in London established a violence reduction clinical network in 2019,¹⁷ part of whose aim is to define best practice standards for in-hospital violence reduction services currently embedded in EDs.

Out of a total of 38 such services across England, Wales and Scotland, currently across London, 15 trusts have ED-embedded YVIPs involving a number of organisations providing such services in partnership with the NHS¹⁸ (Table 1).

Table 1. London trusts with embedded YVIPs.

Trust	Service provider
Kings College Hospital	Redthread
St George’s Hospital	
St Mary’s Hospital	
Homerton University Hospital	
Croydon University Hospital	
University Hospital Lewisham	
Greenwich District Hospital	

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University College London Hospital	
The Royal London Hospital	St Giles
Newham Hospital	
Northwick Park Hospital	
Whittington Hospital	
Whipps Cross Hospital	
North Middlesex University hospital	Oasis
St Thomas' Hospital	

Redthread

One provider - Redthread – currently operates in eight trusts in London and in three trusts in other parts of England. Redthread is a charity set up in 1995 with the aim to involve young people in community activities. It developed interventions to improve young people's access to healthcare, originally in General Practitioner (GP) practices, but more recently in hospitals. Its YVIP was designed to support young victims of violence.¹⁹ The programmes embed trauma-informed, crisis-intervention specialist youth workers into existing health systems, capitalising on 'teachable moments' to engage young people and encourage positive change (Box 1).

As the Behavioural Insights Team noted in their 2020 report²⁰ for the London Violence Reduction Unit, there are currently hundreds of violence prevention interventions and approaches (not just those based in the NHS) being delivered across London, of which the vast majority are not being rigorously evaluated. This is reflected in the relative paucity of studies and economic evaluations of YVIPs and limited knowledge about their implementation processes and mechanisms, leading to repeated recommendations for further research and evaluation. Prior attempts to demonstrate the efficacy of ED-based programs have also been underpowered and, though promising, results have been largely equivocal.⁵

With the opening of the Redthread service at University College London Hospital (UCLH) and in consultation with Redthread and UCLH clinical colleagues, an evaluation of the service as part of the work of the National Institute for Health and Care Research (NIHR) Rapid Service Evaluation Team (RSET) was originally planned and scoped in 2019/20 with a start date in April 2020. However, the impact of COVID-19 on services required a delay in some aspects of the evaluation (although some desk-based work was possible), and a final protocol was published in May 2021 with the evaluation planned for one year.²¹

A team of Redthread's specialist crisis-intervention youth workers is embedded in the ED at the participating hospital.

- The team aim to meet every young person aged between 11 and 24 who attends the ED as a victim of violence, assault or exploitation, or where there are concerns around undisclosed vulnerabilities.
- The team use the 'teachable moment' of arriving at hospital as a foundation from which to build a beneficial, trusting relationship with young people.
- The team complete safety planning and risk assessments – identifying risk indicators and mapping personal and professional support networks for each young person.
- The team create a bespoke package of support for each young person according to their needs and goals, prioritising the building and scaffolding of robust professional networks. They:
 - Support (re-)engagement with professional agencies – for young people who are known to statutory services and already engage.
 - Advocate on behalf of young people, and coordinate networks of professionals across disciplines and locations.
 - Support other agencies and scaffold key professional relationships.
 - Make 'relational referrals' to new key worker, inviting professionals into the hospital or accompanying young people to initial meetings – for young people who do not have any current input from statutory agencies.
 - Complete intensive casework with young people – including goal-setting for the future or discussions around self-esteem, safety or healthy relationships.
- Support and train medical staff and other professionals, to increase their confidence in working with young people and identifying those who may be at-risk.

Study aims and research questions

Using quantitative and qualitative research methods, the overall aim of the study for both phases of the evaluation was to evaluate the implementation and local impact of the Redthread intervention at UCLH, including a cost-effectiveness analysis of the intervention, and identify wider lessons and insights for similar initiatives drawing on published literature and the analysis of secondary data. The main objectives were as follows:

- To conduct a scoping review of peer-reviewed evidence and grey literature about hospital-based violent crime interventions that focus on young people and behaviour change, identifying lessons for researchers, health professionals and policy makers.
- To review and summarise existing and current evaluation(s) of Redthread interventions/services, in particular evaluation methods and main findings to identify lessons for Redthread, evaluators and NHS trusts.
- To evaluate processes of local implementation and capture perceptions of UCLH staff and relevant local stakeholders concerning the intervention and its impact.

- To assess the feasibility of using routine secondary care data (e.g. national Hospital Episode Statistics (HES)), local UCLH records to evaluate the impact of Redthread intervention through the comparison of appropriate control and intervention groups.
- To conduct a cost-effectiveness analysis of the Redthread intervention at UCLH from the perspective of the NHS and personal social services.
- To draw conclusions about the types of evaluation approaches and methodological designs that appear well suited and feasible for evaluations of the Redthread service and similar youth-based interventions in the NHS.

Key research questions were:

RQ1: What measurable impacts on the use of NHS services and wider benefits does implementation of the Redthread youth violence intervention programme have at UCLH for both staff and patients?

RQ2: What evidence exists in the published research and grey literature about the effectiveness, benefits and impact of interventions in urgent care and hospital settings that focus on violent crime and young people? What lessons can be learned from UK and international studies to help NHS trusts implementing such interventions?

RQ3: How can a combination of routine secondary care and Redthread data inform an evaluation of the impact of the Redthread service on the use of NHS hospital services?

RQ4: What are the views of UCLH NHS staff (e.g. paediatric consultants, ED nurses, service managers) of the Redthread intervention, its feasibility, service-level impacts and overall effectiveness?

RQ5: What organisational factors, processes, resources and staff training are necessary for the successful implementation and delivery of the Redthread service?

RQ6: How cost-effective is the implementation of the Redthread service at UCLH?

RQ7: What evaluation approaches and methodological designs appear particularly well suited and feasible for evaluations of the Redthread service and similar services in the NHS?

Structure of report

The rest of this report firstly covers the methods used to evaluate the Redthread service (see *Chapter 2*, and further elaborated in following chapters where appropriate); the review of the international published evidence on interventions similar to Redthread (see *Chapter 3*); findings from the qualitative research examining the programme theory and implementation of Redthread at UCLH (see *Chapter 4*); a description and review of data used to manage Redthread's services at UCLH (see *Chapter 5*); an analysis of the costs and consequences of Redthread (see *Chapter 6*), a feasibility assessment of options to evaluate the impact of Redthread (see *Chapter 7*); and finally, a discussion of the evaluation and some conclusions.

Chapter 2: Methods

Design

The evaluation was designed as a mixed-methods, multi-phased design, including an in-depth process evaluation case study and quantitative and economic analyses. The project was undertaken in different stages over two years, starting with desk-based research and an exploratory phase suitable for remote working whilst COVID-19 was affecting NHS services. During the second stage we gathered more in-depth insights about the effectiveness of the intervention, including processes of implementation, staff perceptions and economic evaluation. We also conducted quantitative analyses to ascertain suitable measures of impact to inform stakeholders and future evaluations.

Phase 1

Phase 1 was the feasibility and scoping stage of the study, including a literature review of published evidence. Our activities in this phase were:

- An evidence review of the literature including a review of other Redthread evaluations.
- Documentary analysis alongside qualitative scoping interviews (conducted remotely) with the Redthread team and youth workers to confirm the interpretation of Redthread's programme theory and the intervention at UCLH. This included any recent adaptations due to COVID-19.
- An investigation into the feasibility of a quantitative evaluation of the service by studying local data flows and processes and analysing routine hospital data.
- A desk-based review of available Redthread and UCLH documents to inform the economic analysis.
- Setting up an advisory group for the project.

Evidence review

The evidence review was conducted in two parts and focused on youth interventions delivered in hospital settings to reduce or prevent violent crime and harm to young people (e.g. from criminal and gang exploitation) and involving professionals such as social workers, trauma experts and youth specialists who work alongside clinicians. We followed recommendations on conducting systematic scoping reviews²² (e.g. predefined eligibility criteria and research questions) to map out the topic and to identify recent evidence available on this topic and any theories or conceptual frameworks that have been applied. We used a two-phased search process – one exploratory, one targeted - focusing on the medical literature to understand what was currently known about youth-orientated violence reduction services delivered in hospital settings, specifically their impact and outcomes monitored, and to determine if there are gaps in knowledge, such as, for example, cost-effectiveness. We also looked for evidence of factors that either support or hinder the implementation of such services and identified any conceptual or theoretical lenses applied in this area, such as behavioural concepts applied to evaluate 'teachable moments' and drawn from social science sub-disciplines, such as cognitive psychology. Our searches looked for evidence about these interventions from both within the UK and internationally.

Further details on the methods used in the review including the search methodology are described in *Chapter 3*.

Qualitative scoping interviews and documentary analysis

Qualitative data collection was conducted in two phases, and involved semi-structured interviews, observations of staff meetings and review of Redthread documents and materials. Phase 1 was an exploratory stage which aimed to understand the Redthread programme theory and the background to the introduction of the charity at UCLH. Phase 2 (described below) consisted of a single-site, process case study to understand implementation of the Redthread intervention at UCLH as well as staff perceptions of Redthread's impact and progress.

All interviews were conducted from April 2021 once Redthread youth workers were back on-site at UCLH. Recruitment used a mixture of purposive and snowball sampling to capture the views of a range of respondents – both those close to the Redthread intervention (e.g. youth workers), subject experts, and those who might be less familiar with Redthread (e.g. junior doctors/nurses working in emergency care). The main criteria for UCLH staff respondents to take part was being directly involved in the care of young people at risk of harm and in a position to refer young people to the Redthread service. Staff were identified with the support of UCLH clinical collaborators and all respondents emailed an information sheet prior to taking part, and given the opportunity to ask questions about the evaluation and interview process.

During Phase 1, available Redthread documents were supplied to the evaluation team to map out referral pathways into the service and analyse the programme theory, i.e. what the intervention aimed to do and how, and its main component parts. Programme theory can be defined as describing 'how an intervention is expected to lead to its effects and under what conditions.'²³ We sought to understand Redthread's programme theory (what they call their 'theory of change') to explore how the service was being implemented and was understood by staff at UCLH, and identify any contextual adaptations. We did not attempt to further develop or revise the Redthread logic model but were aware that the charity regularly reviews and updates its own materials.

This work was supplemented by exploratory discussions with key stakeholders at UCLH and members of the evaluation advisory group. We also examined the findings of previous Redthread evaluations undertaken at other trusts to see how they interpreted the Redthread programme.

During Phase 1, we conducted nine scoping qualitative interviews with key stakeholders. Respondents were: two hospital consultants working in children and young people's services at UCLH, six Redthread youth workers and other staff (e.g. managers, programme coordinators) and one senior NHS director involved with youth violence reduction interventions with knowledge of similar programmes at other NHS Trusts. The aim of these interviews, which were semi-structured, was to capture insights about the early introduction of the Redthread service at UCLH and the wider context. In particular, the early interviews aimed to understand what meaningful success looked like to those involved in delivering the intervention at UCLH (e.g. reduction in admissions, onward referrals to other services, positive case work with an individual) and to explore any skills and training required to deliver the intervention. Finally, we noted any novel service components that were new to the UCLH setting or arising because of COVID-19 (e.g. virtual delivery). Further details of our methods are described in *Chapter 4*.

Feasibility study of a quantitative evaluation

The aim of the quantitative component of Phase 1 was to explore the feasibility of evaluating the

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impact of the Redthread service given the available data. The results of this investigation would then inform the nature of any quantitative analysis that would be undertaken in Phase 2.

For a measure of impact, we focused on the use of hospital services, specifically, future hospital attendance either at ED or as an inpatient relating to assault, mental health, substance abuse as well as those who were perceived to be at risk of harm. We developed a set of options for evaluating impact that covered different perspectives:

- The perspective of someone using the service.
- The perspective of the acute trust where the service is based (UCLH).
- The perspective of the local communities where people using Redthread's service live.

These were assessed by investigating each option's data requirements, including any access to individual person-level data, the linking of their records, the identification of comparators and necessary sample sizes. We also identified possible barriers to accessing the necessary data such as patient consent, information governance approvals and time to obtain these approvals in relation to the duration of the project. Our analysis was informed by an investigation of HES Admitted Patient Care (APC) and Accident and Emergency (A&E) datasets and the Emergency Care Dataset (ECDS) alongside discussions with Redthread, UCLH, NHS Digital and our expert advisory group.

Further details on the methods used in this feasibility analysis are described in *Chapter 6* and *Appendices 3* to *5*.

Preliminary economic assessment

During Phase 1 we conducted a documentary analysis of the Redthread evaluations that had already taken place since 2021. We collected information on the evaluation aims, their main components and their results in order to identify the existing gaps in the evidence. This informed the assumption and parameters we adopted in our economic analysis.

Set up of an Evaluation Advisory Group

During Phase 1 we also set up an Evaluation Advisory Group to meet up to three times during the course of the evaluation (virtually, or in person) and involving representatives from the NHS, healthcare and relevant public agencies. Terms of reference were drafted with the aim of each meeting to provide helpful challenge and advice to the evaluation team from stakeholders more external to the programme.

Phase 2

Phase 2 involved a more in-depth study of the service at UCLH and included:

- A qualitative process evaluation with interviews of staff at Redthread and UCLH, to understand the perceived impact and effectiveness of the service as well as identifying factors that enable the successful delivery of youth violence intervention programmes.
- Analysis of data collected by Redthread over the course of the project to understand more about the delivery of the service and what it tells us about who engages with it.
- A cost-consequence analysis using local data on the costs of the Redthread service and relevant hospital interventions.

We had intended to include a quantitative evaluation of the service as part of Phase 2, but our Phase 1 work established that this would not be feasible.

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Process evaluation – qualitative case study

For Phase 2 of the qualitative data collection, we completed a process evaluation, where the unit of analysis was emergency and specialist children's and adolescent services at UCLH. A process evaluation was considered suitable because the Redthread service is a complex intervention and randomisation was not feasible in this study. What was required, were insights about delivery and overall impact to inform future implementation.²⁴ Process evaluations aim to understand how a programme or intervention is implemented, including any important decisions that influence how it operates in practice, any important adaptations, and the contextual factors that influence the intervention and its implementation.²⁵ We were therefore particularly interested in understanding:

- the different processes and mechanisms at work locally, such as different referral pathways to access the Redthread service.
- any adaptations made to the service over time (e.g. due to COVID-19).
- The reach of the service (e.g. the extent to which it had spread across different hospital departments).
- critical implementation factors (e.g. what was reported to help youth workers to deliver the programme, or hospital staff to refer young people to it).

This part of the study involved additional qualitative data collection (13 further semi-structured interviews and three observations of staff meetings) and focused on the mechanisms and emergent themes identified in Phase 1, including any linkages between them, and any features of the hospital setting and its environment that were shaping delivery of the Redthread programme. Examples of the factors that we explored in this phase included:

- *Internal context*: departmental leadership and cross-departmental working; professional buy-in (especially by emergency, trauma and paediatric staff); hospital data sharing and governance policies; senior/executive team support for the intervention; staff training; perceptions of need; communication of information about the intervention.
- *External context*: demands on hospital services (e.g. young people presenting at UCLH and their needs); any Trust collaboration with external public agencies; lines of accountability within the area (e.g. responsibility for youth crime prevention and safeguarding for children and young adults).
- The additional semi-structured interviews were with clinical and non-clinical UCLH employees, and Redthread staff. They included hospital social workers, Redthread youth workers and managers, a paediatric nurse, consultants (children and young people's services, child and adolescent psychiatry) and a junior doctor. Of the interview respondents, a small number of individuals were interviewed twice – in Phases 1 and 2 - due to their close involvement with implementing the Redthread service. All interviews and observations were conducted remotely via MS Teams (due to COVID-19) following consent to participate. Interviews were digitally recorded and transcribed verbatim. Three observations of staff meetings were completed (e.g. an adolescent ward psychosocial MDT meeting) alongside review of essential Redthread documents. Anonymised field notes taken during staff meetings.
- To support analysis and interpretation of the qualitative findings, the qualitative researcher and wider evaluation team held discussions with the evaluation advisory group (EAG), and

held meetings with other researchers involved in Redthread evaluations at different NHS trusts, plus meetings with Redthread staff and UCLH clinical collaborators. For the final analysis, all interview transcripts (n=22) and observational field notes were read by the lead researcher for data familiarisation, alongside key materials such as the Redthread planning and implementation guidance, and other relevant documents (e.g. the Redthread youth worker manual). Findings were analysed thematically with a specific focus on answering the evaluation questions (see *Chapter 4* for further details of the themes).

- Unfortunately, it was not possible to conduct interviews with young people who had experienced the Redthread service at UCLH or at other NHS trusts for ethical and practical reasons (e.g. identifying young people would have data sharing and confidentiality implications), although this possibility was explored with Redthread. Further details on the methods employed are described in *Chapter 4*.

Analysis of local Redthread data

Over the course of the project, we obtained data from Redthread that included the characteristics, and reasons for hospital presentation, of individuals who engaged with the service and of those who declined to take part. Using univariate analyses, we compared these characteristics to identify any differences between those who chose to engage and those who did not. All the data were provided at an aggregated level for each characteristic separately, which precluded more complex multivariate approaches. Further details of the methods employed are described in *Chapter 5*.

Economic evaluation

Based on the outcomes of Phase 1 of the evaluation and documentary analysis, we conducted a cost-consequence analysis of the Redthread service at UCLH. Consequences were derived from Redthread's risk assessment tool, which measures changes in perceived risks faced by young people before and after intervention. Costs of delivering the service were obtained from Redthread, and these were compared to the costs of hospital A&E attendances and admissions for reasons that might suggest eligibility for Redthread, over the three-year period from 2018 to 2021. Hospital costs were obtained from UCLH. Further details of the methods are described in *Chapter 6*.

Patient and Public Involvement (PPI)

We involved patients and the public in this evaluation in a number of ways. During the Rapid Service Evaluation Team (RSET) Patient and Public Involvement (PPI) Panel meeting in November 2021, we asked our patient representatives for suggestions on how to effectively disseminate study findings to various stakeholders. While writing up this report, we worked with our patient representatives - Raj Mehta, Fola Tayo, Jenny Negus and Nathan Davies - to ensure that the Plain English Summary was clear and accessible. In line with the RSET PPI strategy, our patient representatives were paid for their support in the development and write-up of this evaluation. We will also involve our patient representatives in producing accessible output to share the study findings.

We wanted to involve young people that had received support from Redthread, or with similar lived experience in the planning and delivery of the evaluation. However, as the study progressed, a number of barriers to engaging with young people became evident (as described in *Chapter 4's Discussion*) and it was decided that this approach would not be pursued.

Ethical and local Research & Development permissions

On the basis of the NHS Health Research Authority's online decision tools, the study was classified as

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a service evaluation. We undertook local data collection after obtaining permission from clinical leads at UCLH (e.g. consultant paediatricians) and a formal letter of support from the Clinical Director of Emergency Services.

Chapter 3: Evidence Reviews

What was already known?

- Hospital-based violence prevention interventions (HVPIs) have been adopted since the late 1990s and early 2000s in the United States of America (USA) given high rates of gun crime and mortality rates amongst young people across American cities. A number of these have been studied using randomised controlled trials (RCTs) and experimental designs to estimate efficacy, although often with relatively small follow-up time period (e.g. of 12 months).

What this chapter adds

- An up-to-date review of evidence about hospital-based (ED/trauma centre) youth interventions and programmes that aim to bring about behaviour change in young people and reduce their overall level of risk to harm found:
 - A limited evidence base in the UK, specifically, a lack of empirical studies
 - A lack of studies which focused on ways to increase referrals or reasons for low uptake by young people.
 - Studies reporting a variety of outcomes for both case management and brief interventions instigated in ED departments: depressive and PTSD symptoms; decreased feelings of aggression and involvement in peer violence; varying effects on victimization; outcomes related to service uptake and utilization; mortality and morbidity outcomes; recidivism;
 - Two literature review studies confirming our findings that there are few studies following long-term outcomes which limits conclusions about impact, as do the small sample sizes on studies.
 - Studies from the USA which suggest there may be positive benefits with respect to recidivism and patient reported involvement in violence from interventions in ED settings.
 - A small, recent and emerging grey literature consisting of evaluations evidencing the impact of programmes in the UK, such as Oasis and Redthread
- Suggestions for future research and evaluation (for example, multi-site, longitudinal comparative studies, and more qualitative research with staff and young people – especially to understand reasons why some engage and some choose not to engage).

Background

Offences classified as assault with injury and assault with intent to cause serious harm have risen by 46% between 2011 and 2020 in England and Wales.¹ The number of repeat violent offenders is also rising. The majority of cases are concentrated within metropolitan areas, and most offenders, as well as victims, are male (55-74%). Also of note, in 2018, 37% of homicides in London were gang-related, and just 14% of all violent incidents in England were linked to alcohol use.^{1,26} Risk factors for involvement in violent crime are complicated and multi-factorial. Offenders and victims often have a history of childhood maltreatment, and strong evidence links future violence with having suffered violent experiences or abuse as a child.²⁷ There is some limited evidence to suggest that school exclusion and undiagnosed mental health issues are also contributors to youth violence.^{28, 29} Other

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well-accepted risk factors are linked to environmental exposures, and include living in areas of socioeconomic deprivation and where damaged community relations with law enforcement exist.^{30,}

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Research evidence indicates that assault-injured youth are at significant risk of repeat injury.³ Whilst estimates vary, the risk of recurrent injury may be 80-times that of an ‘unexposed’ individual.^{4,5} When assessed in the ED, the majority of injured youths believe their injuries are preventable, though over a third also believe that a similar violence-related injury will occur in the future. Patients face significant obstacles after discharge (such as access to follow-up care, safe housing, return to work/school, or managing post-traumatic stress). Such hurdles often lead to continued engagement in high-risk behaviours that lead to repeat injury. Moreover, youth assault injuries are often related to repeated disagreements, and retaliatory feelings fuel repeated violence.⁶ Over time, the victims and perpetrators become interchangeable. The goal of ED-based interventions is to interrupt the cycle of reactive decision making.

Prior studies further suggest that trauma serious enough to require medical intervention may make youths uniquely susceptible to behavioural intervention and change. Consequently, ED-based interventions may provide a ‘teachable moment’ and a special opportunity to identify and reach youth victims of violence, as well as inform them of the benefits of intervention and link them with supportive treatment programmes that can function beyond the hospital.

Aims and Methods

The evidence review aimed to answer the following overarching questions:

- What evidence exists in the published research and grey literature about the effectiveness, benefits and impact of interventions in urgent care and hospital settings that focus on violent crime and young people?
- What lessons can be learned from UK and international studies to help NHS trusts implementing such interventions?

In addition, the review aimed to:

- Identify existing gaps in the knowledge base, such as the cost-effectiveness and any economic evaluation of youth-orientated services based in hospital settings.
- Identify factors that support or hinder the implementation and impact of youth-focused behavioural and preventative interventions delivered in hospital settings, particularly those that involve collaboration between secondary care professionals and youth workers / specialists.
- Identify any conceptual or theoretical lenses applied in this area, such as behavioural concepts applied to evaluate ‘teachable moments’ with young people.

The review was organised into two phases, one conducted early into the evaluation project to inform data collection and provide a clearer understanding of the topic, and a scoping review conducted later into the project to ensure any recent, peer-reviewed evidence was captured.

Phase 1 – exploratory search

Phase 1 consisted of an initial scoping review focused on youth-focused interventions delivered in emergency and hospital settings to reduce violent crime and address safeguarding risks (e.g. from

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knife crime, assault). It was led by one researcher (JF) with input from another researcher (JL). The review was intended to be broad in scope, with the aim of better understanding the topic and confirming the types of key terms that could be employed in a more targeted search to be conducted later. It was conducted in the earliest stages of the project, prior to empirical data collection.

A PICO framework was used to define the search terms:

- Population – youth patients 10-24 years of age, victims of interpersonal violence (excluding victims of self-harm, sexual violence, and child abuse).
- Intervention – youth or social-worker hospital-based interventions.
- Comparison – standard of care, no treatment, or differential treatment of a control group.
- Outcome - recidivism, readmission, social services utilisation, feasibility, or patient self-reported outcomes.

The exploratory search was conducted in January 2020 and limited to English text sources but with no date restriction as the review was intended to be exploratory, as part of an initial search for available papers. The databases searched were: PubMed, MEDLINE, Cochrane Library, and Embase databases. The a priori decision was made to limit screening to the first 200 hits (as sorted by best match) to provide a manageable number of initial sources of evidence; thereafter, further inclusions were determined based on reviewing cited literature for its relevance. Conference abstracts, editorials, and commentaries were excluded. Fourteen studies were identified for inclusion due to their relevance to the evaluation – namely, studies that could help the researchers to understand the wider context of youth violence hospital interventions and programmes, and the types of prevention strategies commonly found in health care settings. These findings are presented in this chapter.

Phase 2 – structured scoping review

A rapid scoping review was deemed appropriate due to the complexity of the topic, the emerging nature of the knowledge in this field, and a need to understand the nature of the evidence base quickly, and any knowledge gaps. In short, we needed a quick overview of the latest evidence related to hospital-based, youth-focused emergency care interventions such as Redthread. The findings of the Phase 1 exploratory search informed drafting a review plan (not published) to guide a more systematic search of the medical and health care literature databases, which received team input (e.g. listing key words). The Phase 2 scoping search also took into account early empirical findings from the qualitative interviews to understand the Redthread programme at UCLH (see *Chapter 4*).

This review was open to capturing a range of potential benefits of youth violence prevention services and youth worker programmes in hospital settings, and followed a modified version of the PICO structure used in Phase 1. As per guidelines for scoping reviews, we were chiefly focused on the population, concept (e.g. ‘teachable moment’, youth intervention following admission for trauma) and context (e.g. emergency departments) due to the wide range of possible outcomes of YVIPs. In terms of types of evidence, we were interested in identifying peer-reviewed published studies using a variety of study designs and any other evidence reviews (e.g. systematic and scoping).

The guiding questions and aims of the review remained the same - as outlined above - and the review inclusion criteria was as follows:

Review inclusion criteria:

- Population: young people, adolescents and children (aged up to age 30 – to capture a wider literature), specifically groups at risk from gang-related exploitation, physical assault and injury (e.g. from knife attacks, shootings), sexual exploitation, human trafficking, and other forms of violence (e.g. from peers and fighting).
- Intervention: youth or social-worker (or equivalent roles) hospital-based interventions aimed at risk management and prevention – and initiated within EDs/major trauma centres (MTCs).
- Context: Hospital-based interventions.

Inclusion parameters:

- Study type: any (e.g. feasibility study/pilot, RCT, qualitative, evaluation, mixed-methods, cost benefit analysis) and literature reviews (narrative, scoping, systematic).
- English language.
- Peer-reviewed (i.e. no conference proceedings or abstracts).
- Publication period: 2012-2022.

Searches were carried out on two medical databases: Medline and Embase, in February 2022 to focus on the health literature using key words and Medical Subject Headings (MESH) terms (see *Appendix 1*).

Results from Medline and Embase were imported into EndNote for de-duplication and then exported to Rayyan.ai software for screening. Two researchers (JL and JF) independently assessed the retrieved sources using the inclusion criteria and considering relevance for answering the aims of the review. Papers were discussed and selected against the inclusion criteria and in light of their quality (e.g. an explication of the study design, nature of the intervention, intervention context and any limitations). Excluded papers included: crisis interventions that did not feature a hospital-based youth or social worker's input or equivalent role (e.g. sexual health crisis teams); conference and meeting abstracts and clinical case reports. A large number of studies were found to focus on community-based youth interventions, where young people are recruited to external programmes via ED departments and seen by community youth workers or mentors. , and this required further discussion and accessing full papers. It was decided that these studies should also be excluded. However, the boundary between hospital and community interventions was sometimes difficult to discern. Finally, mental health crisis interventions and any programmes designed to educate health professionals about youth violence (e.g. e-learning modules) were also excluded. The results for Phase 2 are provided in the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) diagram below (Figure 3).

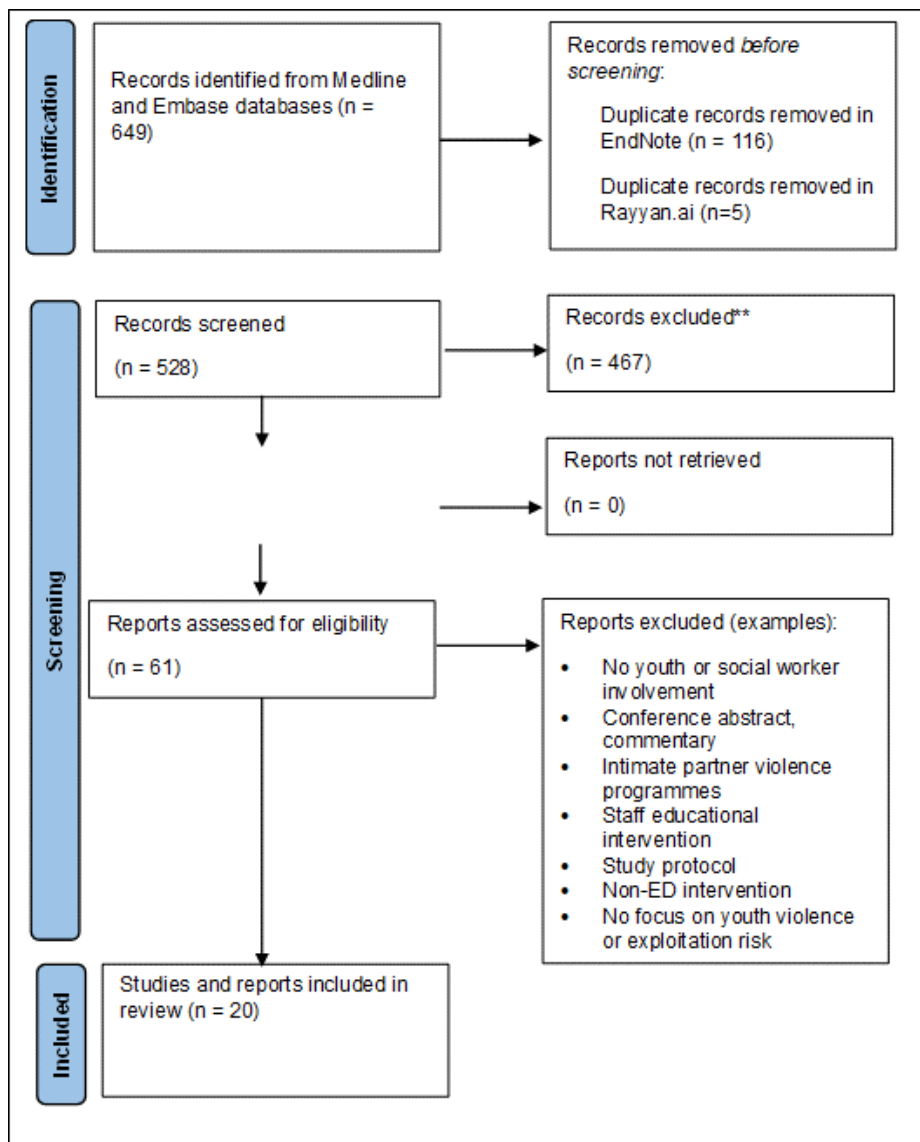


Figure 3. Phase 2 search results.

*Adapted from: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, *et al.* The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ* 2021;372:n71. doi: 10.1136/bmj.n71³²

As we were following guidance for scoping reviews and conducting the search under resource and time restrictions, the focus was on mapping the evidence base in the literature rapidly, with the aim of describing the types of studies available according to our pre-defined eligibility criteria, and analysing any knowledge or research gaps in light of this rapid evaluation. The evidence search was not intended to be a systematic review, and no meta-analysis of the results were performed. Results were limited to two databases and we summarised the findings in a table detailing the study type and main findings. Extracted data focused on: study location; intervention characteristics/components; population; setting / context; outcomes; key findings.

In the final phase, we performed a search on Google for grey literature using key terms (e.g. 'youth hospital violence programme', 'Redthread evaluation' 'violence prevention and hospital') to see if there was any additional evidence arising from the UK. We also engaged with the Redthread charity

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about past or current service evaluations they were involved with. In this way, we identified some evidence scans and evaluation reports that had not been picked up in our search of health care databases, as well as published evaluations of youth violence prevention programmes. We discuss these at the end of this chapter. All sources were assessed for their relevance to the evaluation – namely, a focus on youth violence prevention and hospital-based interventions (i.e. programmes such as Redthread or similar).

Principal findings

Phase 1: Exploratory review

Approaches to the prevention of violence in children and young people

Early intervention programmes aim to improve parenting skills and early child-parent relationships. They are often home-based and targeted at vulnerable parents whose children are at risk of poor outcomes. There is a solid base of literature supporting their efficacy and long-term cost savings.^{33, 34} More specifically, such programmes are designed to improve parenting practices and reduce child maltreatment, leading to less down-the-line behavioural problems and mental health issues that would otherwise increase the likelihood of a youth being involved with violence. The Nurse Family Partnership (NFP) (USA and UK), Early Start (New Zealand), and Triple P (Australia) are well-known examples of such programmes. An economic evaluation of NFP (USA) found that the programme generated a saving of \$2.88 for every \$1.00 invested; and by 15-years of age, youths whose parents participated in NFP ran away from home less, had fewer arrests or criminal convictions, and fewer behavioural problems or substance abuse issues. An evaluation of Triple P (Australia) suggested that the programme could reduce conduct disorder by 25-48%.^{34, 35} Furthermore, assessment of a similar intervention in the UK for parents of five-year old children with conduct disorder estimated that a saving of £9,288 per child could be generated over a 25-year period, when accounting for future potential NHS, social service, and criminal justice system costs.³⁶

Prevention strategies for older (for example, aged between 18 and 24) at-risk youths, in the form of substance-use deterrence, after-school enrichment programmes, or social media campaigns, have been less effective at reducing violence than early-life prevention programmes. Though promising, such interventions, including those to deter alcohol use (shown to strongly correlate with violence in some environments), have proved especially difficult to evaluate.³⁷⁻³⁹ After-school enrichment programmes offer academic support and recreational activities to at-risk youths. Evaluation of such programmes in the USA and UK have demonstrated mixed and even negative effects on violence deterrence, especially when interventions single out high-risk youths.^{34, 40, 41} Little evidence also exists to support the effectiveness of challenging social norms through mass media campaigns. Such programmes have demonstrated effects on changing social perceptions, but not on changing actual behaviour or violent outcomes, though social campaigns do serve to drive social debate and support other prevention work.^{42, 43} For example, the '#KnifeFree' campaign in the UK uses real-life stories of youths involved in violence in order to encourage more positive alternative choices.⁴⁴

Other interventions, most of which comes from outside the UK, consist of 'therapy'-based and behavioural programmes to break the cycle of repeated youth violence.⁴⁵ Comprehensive meta-analytical studies have found that 'skill'-building-based interventions are strongly correlated with

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recidivism reduction, measured as repeat contact, probation violation or incarceration, and self-reported 'delinquency'.⁴⁶ The most successful 'skill'-building programmes for young people are designed around cognitive behavioural therapy (CBT) techniques and aim to develop adaptive behaviour and social skills. Effective programmes, beyond providing counselling or mentoring, also include multiple coordinated community services, and are restorative in nature, involving the participation of family members. This combination of efforts is collectively referred to as 'multisystemic therapy' (MST).^{47, 48}

Criminal justice system-based interventions, such as increased use of 'stop and search' techniques or installing weapon detection systems in schools, are rarely effective in isolation, though may have merit as part of larger, multi-systemic interventions when thoughtfully implemented. There are data to suggest that such strategies may work as effective short-term deterrents, make some youths feel more secure in their environment and increase school attendance.^{49, 50} However, this type of policing also has the potential to stigmatise, induce anxiety, and cause resentment among those who might be searched or caught, as well as damage police-community relationships when used more often against members of ethnic minority groups.^{39, 50} The Offensive Weapons Bill, which was passed by Parliament in May 2019, further limits youths' ability to purchase bladed-weapons, firearms and corrosive substances. Little is known, however, regarding the effectiveness of such policies and prior similar legislative efforts, such as knife amnesty or longer prison sentences for possession, have had no lasting effect on youth violent crime deterrence.^{34, 51} Finally, 'zero tolerance' or fear-based police enforcement of laws has been shown to either have no effect on or exacerbate violence.⁵²

Hospital-based youth violence prevention programmes

There have been a number of studies going back to the late 1990s and early 2000s describing hospital-based violence prevention interventions, some of which compare these interventions to outcomes arising from standard to care.

One RCT was conducted in Baltimore (USA) by Cheng *et al.* from 2000-2001 at a large urban level-1 trauma centre.⁵³ Eighty-eight youth victims of violence were enrolled who were aged 12-17. Patients were identified by records review and enrolled within two weeks over the phone. A 14-point standardised assessment was performed during the initial interview to assess needs and then prioritise services. The treatment group were assigned master's-trained youth workers who oversaw their case. The case workers offered intense weekly services by telephone and in-person for a period four months, as well as facilitating the use of community resources and programmes by the patient and the family as deemed appropriate. The control group received referrals to further services as appropriate at time of enrolment alone. Follow-up interviews were assessed at six months. There was no significant difference between the study groups on social service utilisation; there was also no difference in reported fighting, fight injury or weapon carrying. Limiting factors were a low overall follow-up rate (57%) and an average time from ED visit to enrolment of 19.5 days, more than two weeks after the violent event and potentially missing the 'teachable-moment.'

A larger follow-up RCT was performed by the same group (Cheng *et al.*) in the Washington DC-Baltimore metropolitan area (USA) from 2001-2004 at two large level-1 trauma centres, where 166 youth victims of violence aged 10-15 were included.¹¹ Patients were enrolled either in-hospital or by phone just after admission, and the initial needs assessment was conducted at the home residence of the patient through a standardised process. The treatment group received an assigned youth worker 'mentor,' recruited from the community, who met with them at least six times over a six-

month period. Mentors spent time with the participants in an activity at either their home or in the community, while also completing a standardised violence prevention curriculum based on the Center for Disease Control and Prevention's (CDC) Best Practices in Youth Violence Prevention. The curriculum was based on social cognitive theory and included constructive skill-ascertainment focused sessions on conflict management, problem-solving, and decision-making. Parents of participants also received three home visits by licensed health educators who went over topics covered in the youth curriculum and conducted sessions on parental monitoring and involvement. The control group received case management in the hospital setting, two follow-up telephone calls, and tailored referrals were made for patients to appropriate community services and programmes. Follow-up assessments were conducted at six months. More than 90% of treatment group participants were satisfied with their experience, 71% completed follow-up interviews, and 54% completed the entire programme. A trend toward significance was found for self-reported 'misdemeanour activity,' aggression scores, and general 'self-efficacy' (increased conflict avoidance). No differences were found among youths regarding self-reported, or parental-reported, aggression, attitudes about retaliation, or weapon carrying. Low study power, despite a higher number of participants, remained a limiting factor in detecting differences between study groups.

In a retrospective study, Marcelle and Melzer-Lange conducted chart analysis of youth victims of violence who were treated in an urban ED in Milwaukee (USA) in 1998.⁵⁴ Patients were aged 10-18; and 218 out of 394 received the intervention and were included in the analysis. Those in the treatment group were assigned an experienced youth worker during the initial ED visit who then arranged further programme services, such as home visitation counselling, mental health services, and youth activities. Referral to additional community services was also provided on an ongoing basis. Only three youths returned to the ED with a new injury within 12 months of study enrolment. This was the only outcome measure reported. Outcomes of control youths and attendance to other EDs in the area were not tracked, and no comparison was made between study groups.

'Caught in the Crossfire' is another example of a hospital-based youth violence intervention programme, based in Oakland (USA). Youth victims of violence were tended to in the hospital by experienced youth workers, called 'intervention specialists,' who were themselves prior victims of violence. These interventionalists provided case management, mentorship, and connected both the patient and family to further community services for up to 12 months following the violent event. Two separate retrospective reviews of the programme have been performed. The first analysis was conducted by Becker *et al.* in 2004.⁵⁵ They evaluated 138 patients admitted to a large urban hospital who received the intervention, aged 12-20 years, and between 1999 to 2000. Matched controls were over-selected from violently injured youths admitted in 1998 to the same hospital who had not received the intervention. Follow-up was assessed at six months, and 43 of 69 patients (62%) in the intervention group completed the treatment and were included in the analysis. There was no significant difference in subsequent arrests or any criminal involvement between treatment or control groups.

Another, larger retrospective evaluation of 'Caught in the Crossfire' was performed by Shibru *et al.* in 2007.⁵⁶ They evaluated 158 victims of youth violence who received the intervention, aged 12-20, admitted to the same hospital between 1998 to 2003. Follow-up was assessed at 18 months in this study, and criminal justice data were also obtained by the Oakland Police Department for review. Those eligible for inclusion in the treatment group were required to have had a minimum of five interactions with programme services outside of the hospital. Matched controls were selected,

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similar to the first evaluation. There was no difference between study groups regarding reinjury or rehospitalisation. The treatment group did demonstrate a statistically significant lower risk of subsequent criminal justice involvement at 18 months (relative risk reduction of 0.67). The authors estimated \$750,000 to \$1.5 million in annual societal savings based on county juvenile detention system costs and Number-Needed-to-Treat analysis. It was not clear, however, given the requirements for treatment group inclusion, if some of the controls started in the treatment group. Moreover, the choice at the onset to limit 'non-users' of programme services from inclusion in the treatment group affects the broader validity of the findings. Small cohort sizes also limited statistical power.

Summary: Phase 1

Our exploratory review found evidence regarding different types of interventions to reduce youth violence recidivism, dating from the early 1990s onwards. This suggests the following: 1) that successful programmes are generally long-term, restorative in nature, and based on CBT techniques designed to help victims identify cognitive distortions and develop adaptive social skills, 2) successful interventions often include active participation of family members and coordinated community services, and 3) hospital-based youth worker programmes may increase social services use, decrease self-reported peer violence, and lower hospital recidivism rates. However, most of the available literature is limited by reporting outcomes over a period of less than 1-one year, and the long-term durability of self-reported effects and recidivism rates is unknown. Moreover, recidivism rates are often described at single institutions, potentially limiting their validity as an outcome measure. Long-term, multi-centre longitudinal studies are necessary to better understand the effect of hospital-based youth violence interventions.

Phase 2

The Phase 2 structured search identified 20 academic articles and more recent studies. The search focused on papers published post-2012 to bring the first review up-to-date. The findings below are organised thematically around our evaluation questions and lines of enquiry. Table 2 outlines the twenty studies, 15 of which involved young people directly. Studies were predominately from the USA, plus one study from Canada and one from the UK. Programmes covered a wide age range (6 – 30 year olds), included males and females and different ethnic groups (Black, White, Asian, Turkish, Mixed, Hispanic).

Table 2. Phase 2 literature search results

No.	Study Type	Reference	Location	Intervention characteristics / components	Target population (e.g. age)	Setting (e.g. paediatrics, ED, MTC)	Outcome(s) monitored	Key findings
1	Case series (no control group)	Bell <i>et al.</i> 2018 ⁵⁷	Indianapolis, USA	Hospital-based violence intervention programme (HVIP): Prescription for Hope	328 patients (aged 15-30 years)	Hospital Trauma Centre (urban, public hospital)	Violent-injury recidivism in state-level data (ED visits for new injuries) in 328 patients enrolled in the programme between 2009-2016	<p>Only 15 patients (4.4%) were found to have recidivated due to physical assault, firearm or stabbing injuries.</p> <p>Of the cohort experiencing new injuries, more than half were treated at different hospitals (access to multiple hospital datasets is key for evaluation).</p> <p>There is a range of medical problems associated with violent injury – e.g. pain and chronic pain (patients re-present in ED for issues from the original injury).</p>
2	Cross-sectional study	Bernardin, Moen and Schnadower (2021) ⁵⁸	Missouri, USA	HVIP: social workers assess all ED paediatric presentations for violence and firearm injury and offer enrolment in the programme	407 patients (aged 6-19 years)	Hospital ED	Service uptake / enrolment	<p>104 (25.6%) of those offered the HVIP were enrolled.</p> <p>The average age of enrolled young people was 14 years.</p> <p>Those least likely to enrol in the programme were older adolescents, on probation, or had illicit substance misuse.</p> <p>No significant difference in enrolment between injury type, physical assault or fire arm.</p>
3	Descriptive Single Site Case Study	Bernstein <i>et al.</i> (2017) ¹³	Boston, USA	Health Promotion Advocates (HPA) screen young people for risky behaviours using a survey (e.g. substance misuse, violence, safety concerns). There is a structured conversation - a brief intervention (BI) - resulting in a plan to address behaviours, and referral to community / other relevant services if needed. Gun and knife crime victims are referred to the hospital-based trauma programme	2149 eligible patients (aged 14 – 21 years)	Paediatric ED department	Engagement and implementation	<p>The HPA programme went beyond drug and alcohol issues to assessing young people's level of risk. The HPA role required integration into clinical teams so that staff would use the service and to ensure staff bought into the preventative approach. HPA role had to be distinguished from other professional roles, e.g. hospital social workers. Administrative and budgetary issues a challenge for the service.</p> <p>636/785 screened at risk for drug or alcohol use and received the brief intervention. Numbers on those receiving support for violence not reported.</p>
4	Retrospective review	Borthwell <i>et al.</i> (2021) ⁵⁹	Los Angeles, USA	Biopsychosocial assessments for individuals with firearm injuries; history taking around social,	115 young people (aged under 18 years)	Hospital trauma centre	Use of inpatient biopsychosocial assessments	57% of young people were "bystanders" injured by crossfire. 21% were reported to be gang-related assaults. 43% completed BA assessments.

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	(firearm injuries)			medical, behavioural, educational factors, and violence and gang exposure. Hospital introduced a HVIP			(BAs), specialist trauma consultations, post-discharge services (e.g. financial advice) and HVIP service	17 patients enrolled in the HVIP service (implemented for last two years of the study). HVIP integration with trauma approach and BAs. Need to link inpatient and outpatient care for patients at risk.
5	Quasi-experimental study	Carter <i>et al.</i> (2016) ⁶⁰	Michigan, USA	One aspect of a violence prevention programme: a 30-minute behavioural intervention based on motivation interviewing techniques. This consisted of a standardised, computer-assisted counselling delivered by a therapist to a young person about their involvement in violence	618 eligible patients (aged 14-20 years).	Hospital ED	Physical aggression, victimisation, and self-efficacy for avoiding fighting (intervention group and comparator)	Only 17.9% of young people refused the intervention. Self-reported data at two months suggested a significant decrease in violent aggression and self-efficacy for avoiding fighting. There were no significant changes for victimisation. 86% of participating young people rated the intervention as “very” or “extremely helpful”.
6	RCT	Cunningham <i>et al.</i> (2012) ⁶¹	Michigan, USA	SafERteens intervention: BI delivered by a therapist with computer assistance (therapist-delivered intervention (TBI)), or delivered by computer alone (computer-based intervention (CBI)), plus control group. The intervention was aimed at adolescents who screened positive for violence and alcohol use	4296 eligible patients (aged 14-18 years)	Hospital ED	Alcohol and aggression – self reported survey data at 12 months	829 individuals met the study criteria and 726 completed the baseline survey, with 607 completing the 12-month follow-up survey. The mean of participants was 16.8. The main reason for ED presentation was injury (26.8%) or a medical condition (65.7%). Participants receiving the TBI were less likely to report severe peer aggression and peer victimisation at 12 months compared to the control arm. Effects were better for the TBI than the CBI. Empathy from a therapist may be a factor in explaining the findings.
7	Retrospective study	Cunningham <i>et al.</i> (2013) ⁶²	Michigan, USA	SafERteens: secondary data analysis focused on dating violence sub-group of the study above (Cunningham <i>et al.</i> 2012). Intervention content was tailored to dating violence prevention strategies (e.g. a role play). It was delivered as a stand-alone CBI or delivered by a therapist and computer assisted (T+CBI)	397 individuals who endorsed dating violence when surveyed (aged 14-18 years) – a sub-group of 726 in the programme	Hospital ED	Dating victimisation and aggression self-reporting at three, six and 12 months	Effects seen for dating victimisation with the CBI at six months. The therapist intervention (CBI+T) was effective at 12 months for those with a more severe history of dating violence. CBI is effective at reducing dating violence within ED settings.
8	RCT	Ehrlich <i>et al.</i> (2016) ⁶³	Michigan, USA	‘U-Connect’ study: BI delivered by a computer or therapist for	4,389 eligible patients screened	Hospital ED	Alcohol consumption	Those with injury more likely to be male; injured patients more likely to have higher alcohol consumption at three-month follow

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				young people screening positive for risky drinking, and admitted for any reason	(aged 14-20 years), 836 of which were enrolled in the intervention – a third of which had presented with injury (intentional or unintentional)		and consequences Follow-up at three months	up than other medical patients. A computer or therapist BI can reduce alcohol consequences and consumption amongst young people, and a computer BI was found to be effective for those presenting with an injury.
9	Single-site service evaluation	Jacob <i>et al.</i> (2020) ⁶⁴	England, UK	Hospital-based youth worker prevention service aimed at young people suspected of involvement (victim, perpetrator or neither) in gang-related violence. 12 sessions working with a youth worker was the minimum to for completing the programme. Based around concept of the 'teachable moment'	496 young people (aged under 25 years) referred to the service	Hospital ED	Self-reported risk screening tools: Strengths and Difficulties Questionnaire (SDQ); Asset: What Do You Think (WDYT) questionnaire Feedback from young people	The mean age of referrals in the study was 14.9 years (range 7–26). Most were seen on the weekends having been caught up in violence, and nearly a quarter had involved a weapon. 17% engaged with youth workers and 18% completed the programme. 31% declined the service, 29% could not be contacted and 22% were ineligible (e.g. out of area). Of those that completed, 93% showed reduced or no change in their criminality and emotional disturbance scores. Young people interviewed welcomed the programme.
11	Prospective, randomised pilot study and retrospective data analysis	Lumba-Brown <i>et al.</i> (2020) ⁶⁵	St. Lois City, USA	Empowering Youth Through Interpersonal Violence Prevention Program (EYIPP), 2012-2015: social workers are based in emergency services for timely engagement with young people. Patients enrolled in EYIPP received mentoring and advocacy support by specially trained social workers who deliver individual and group therapy, and family training. These mentors are described as being both therapists and advocates and help with a range of activities (e.g. court appearances, education)	Young people aged <19 years who presented for interpersonal violence in the ED (family or any type of assault)	Paediatric ED	Morbidity (ED visits with injury) and mortality (secondary to interpersonal violence), recidivism (self-reported or police reported)	Following the pilot, the programme was rolled out as standard care. 160 were approached in ED to take part. 16 were ineligible and 78/135 eligible young people declined the intervention. 57 received the intervention, with a median age of 14.5 years. Most were black males. Participants spent 25-40 hours over one year receiving mentorship. The morbidity and recidivism rate was 3.5%. There were no mortalities. Co-location of social workers deemed critical for the feasibility of the intervention due to some eligible victims of violence not being admitted as patients. But high numbers of eligible young people decline to take part (e.g. nearly 60% in the standard programme).
12	Integrative Systematic Review	Mikhail <i>et al.</i> (2016) ¹²	N/A	Youth violence interventions based in trauma centres	N/A	N/A	N/A	10 studies included, published between 1970 and 2013, and limited to interventions in the USA. The authors applied a social ecological model to their analysis. Outcome measures were variable across all included studies (e.g. self-reported, referrals, 'needs met', re-arrest, conviction, reinjury and trauma recidivism).

								Case management that leverages community resources more likely to be associated with violence reduction than BIs.
13	Cost-Benefit Analysis Simulation	Purtle <i>et al.</i> (2015) ⁶⁶	N/A	HVIPs using data from 2012, with calculations for different effect sizes	Hypothetical patient population of 180 individuals violently injured – half of whom are allocated to the HVIP, and half who are not	N/A	Healthcare costs, intervention costs, criminal justice costs, and 'lost productivity' costs, calculated over five years	Savings ranged from \$82,765 to \$4, 055. HVIPs can produce cost-savings for hospital and society (e.g. criminal justice costs), although their estimates are more conservative than those identified in other studies.
14	Feasibility study and pilot RCT	Ranney <i>et al.</i> (2018) ⁶⁷	USA	iDOVE: a BI instigated in the ED (in person, computer assisted), followed by an eight-week programme of automated text messaging based around CBT. Participants are screened by research assistants. Those included were deemed at risk for violence (victimisation or perpetration) and depression	1,190 patients presenting in ED, aged 13-17 years	Paediatric ED	Changes in peer violence and depressive symptoms at eight and 16 weeks (self-reported) from screening, baseline and follow-up, retention rates and enrolment. Ratings by service users	1063 patients were screened, 142 were eligible and 116 eligible patients consented to take part in the trial. The mean for the ED intervention was 22 minutes. All participants rated the programme as "excellent" or "good". High participation rates (86%) and retention (91% at 16-week follow-up). Study unable to prove efficacy of the intervention to reduce peer violence and depression symptoms.
15	Cost Effectiveness Study (based on a prior RCT)	Sharp <i>et al.</i> (2014) ⁶⁸	USA	SafERteens study: BI for adolescents presenting in ED and screened positive for aggression and alcohol consumption in the last 12 months. The intervention is social worker-delivered, computer assisted, and based around motivation interviewing techniques	N/A	ED	Peer aggression, peer victimisation, and violence consequences as cost estimates; intervention costs	Implementation costs of the intervention were estimated to be \$70,000. The intervention is estimated to avoid 4208 violent events per year among adolescents at \$17 per episode. Downstream benefits of violence reduction were not calculated (e.g. additional use of mental health and criminal justice services).
16	Feasibility and Pilot RCT	Snider <i>et al.</i> (2020) ⁶⁹	Winnipeg, Canada	ED Violence Intervention Programme (EDVIP) based on the 'Circle of Courage' framework. Support workers who have direct experience of violence contacts the young person in hospital, and then conducts assessments with a social worker to set goals for a	130 eligible young people aged 14-24 year presenting with a violence-related injury	ED	Recruitment, fidelity, adherence, safety, hospital visits for repeat injury, mental health and substance use	452 screened patients were deemed eligible. Uptake was low: 36% of eligible youth consented to take part in the cohort study. 68 participants were randomised to the EDVIP and 65 to a control arm. 74% of participants were still engaged in the intervention at six months and 57% at one year. There was a non-significant decrease in violence-related injuries amongst the intervention group (10.4%) and injury from a weapon. Participants were also

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				programme of support lasting up to one year, and engaging with community resources				more likely to present earlier to ED for repeat violence-related injury.
17	Quality Improvement project	Watkins <i>et al.</i> (2021) ⁷⁰	Wisconsin, USA	Project Ukima – a HVIP: young people receive case management support and crisis intervention, with links to community support	7-18-year-olds presenting with injuries related to violence assault	ED / Trauma Centre (EDTC)	Referrals	Staff sought to increase referrals to the HVIP from 32.5% to 70% within one year. They did this through educating staff regarding eligibility requirements and other staff-based interventions. Referrals increased from 32.5% to 61.1%, but the improvement was not maintained.
18	Scoping Review	Wortley and Hagell (2021) ¹⁴	N/A	Youth violence interventions involving youth workers and ‘teachable moments’	N/A	N/A	N/A	13 papers were identified, published between 2004-2018. There is no evidence that these interventions cause harm. Study sample sizes tend to be small. Results about overall impact are inconclusive, although there are positive indications of success (e.g. feedback from young people).
19	RCT	Zatzick <i>et al.</i> (2014) ⁷¹	Washington, USA	Stepped collaborative care intervention focused on risk behaviours and symptoms: young people received screening and an intervention based around motivational interviewing techniques, delivered by a social workers and nurse practitioner	12-18-year-olds admitted with intentional or unintentional physical injury and admitted for 24 hours or more	ED	Risk scores for violence, alcohol and drug use, and symptom scores for post-traumatic stress disorder (PTSD) and depression – all at two, five and 12 months	Of 598 admitted patients, 493 were eligible for participation and 120 were randomised to the intervention or standard care. A third of engaged young people that participated had scored for carrying a weapon; significant reductions found in weapon carrying at 12 months after hospitalisation found amongst the intervention group.
20	Qualitative	James <i>et al.</i> (2014) ⁷²	Boston, USA	Violence Intervention Advocacy Program (VIAP): advocacy, case, needs assessment, management and onward referral to other relevant services	Victims of penetrating trauma aged over 15 and under 30 years	ED	Client experiences and perceptions	Ten interviews were done with English-speaking ED patients aged 18 or over and enrolled in the programme. Key themes amongst patients were: fear and safety; trust (or rather, lack of trust); isolation; bitterness; PTSD symptoms and mental health aspects of violent injury. The intervention can provide positive life-changing experiences through mentorship and support, helping to build trust in clients.

What is the evidence of effectiveness, benefits and impact of youth-violence interventions in hospital settings?

The majority of studies of ED youth violence prevention programmes originate from the USA due to the high number of gun-related deaths and injuries affecting young people, a large proportion of which may simply be 'bystanders' harmed by gun cross-fire.⁵⁹

Some hospitals have introduced hospital-based YVIPs aimed at lowering a young person's risk of harm with a focus on physical injury and gun-related hospital attendances, supported by youth and social workers. There are also 'brief interventions' (BIs) delivered in EDs which involve screening and assessing young people's safety risks, such as harm resulting from substance misuse, fights and aggression, and involving shorter, structured interventions focused on motivating young people to make changes. Common to these interventions is approaching a young person in an ED and using a young person's clinical presentation as an opportunity to conduct a risk assessment, reduce the individual's exposure to risk in the community, engage the young person in positive behaviour change, and to refer the engaged young person to other types of support following discharge, such as charities or services based in the community.

As found in the initial exploratory review, hospital-based youth violence interventions involve specialist social and youth workers working alongside health professionals to support young people. A primary outcome of these interventions is a reduction in readmissions to EDs for injury. For example, Bell *et al.* 2018 describe the 'Prescription for Hope' hospital-based violence intervention programme (HVIP) in Indiana, USA.⁵⁷ The programme was set up in 2009 and treats young people aged 15-30 presenting in EDs and 'admitted to the trauma center for treatment of injuries that were inflicted by another person and resulted from assault, a firearm, or stabbing'. The intervention provides multidisciplinary and holistic support to young people via social workers, youth violence specialists and advocates. Through enrollment in the programme, young people obtain assistance with securing a health insurance plan, primary care access, full-time employment / a return to education and help with meeting other needs (e.g. legal, housing).

To assess the impact of 'Prescription for Hope', the researchers looked at injury recidivism using state-level ED hospital data. They found a 4.4% recidivism rate for new violent injuries in a cohort of 328 patients engaged in the HVIP over an eight-year period. Whilst there was no control group in the study, the authors concluded that the programme was able to reduce injury recidivism rates amongst this group of younger patients and maintained positive benefits over time. As well as providing evidence to support the use of HVIPs, the study authors stress that obtaining access to hospital data across different geographies is essential for the evaluation of HVIPs because young people present at different hospitals, often as a result of pain or complications arising from an initial violent injury.

One of the few UK studies⁶⁴ was a service evaluation of a youth violence prevention service which placed youth workers in a district hospital ED (rather than a MTC). The evaluation team looked at self-reported outcomes (criminality and emotional disturbance scores) using questionnaire-based screening tools, and feedback from young people engaged with the programme. Four hundred and ninety-six young people were referred to youth workers during the study period (all aged under 25 years) and were eligible if they were suspected of involvement in gang-related youth violence. The authors found that engagement and completion rates were disappointing: 85 engaged (17%) and of these, 15 (17%) completed the full programme, defined as 12 sessions with a youth worker.

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However, 155 (31%) declined to engage, 110 (22%) were ineligible, and 146 (29%) could not be contacted. Of those that did complete the programme, 14/15 (93%) did not reattend ED during the study (2014-2017), and the majority had no change or reduction in their risk scores. Feedback from young people engaged with the services suggested they appreciated 'the opportunity to talk openly, ease of access, having reliable and credible mentors, and the chance to develop effective strategies.'

In terms of detail about the perceptions of young people engaged in these programmes, rich qualitative evidence is particularly limited. One study,⁷² involved interviews with 20 young people who had been engaged in the Boston Violence Intervention Advocacy Program (VIAP), which was established in 2006. This programme attends to young people who present with gun and stabbing penetrating injuries in ED and uses a 'peer advocate model and trauma-informed care approach'. Residents of the Boston community are trained as violence prevention advocates and employed by the hospital and provide case management, mentoring and onward referrals. Advocates also have access to hospital electronic health records and can screen for admissions and eligible young people. All those who present to ED with a penetrating injury from violence and aged over 15 are eligible for support. In addition, those young people who may be at risk of emotional distress arising from their injury are referred to trauma mental health specialists. The advocates foster relationships with young people within the hospital setting, and maintain this contact following discharge, in ways similar to the Redthread model.

The researchers found from interviews with programme participants - all of whom were aged 18-30 and English-speaking - that: 1) these group were at risk of isolation due to feeling unsafe, 2) had feelings of distrust (e.g. towards the legal system), 3) expressed emotions consistent with symptoms of PTSD, 4) described changing attitudes towards programme advocates over time and valued being listened to (a trusting relationship developed), and 5) through advocates, the programme was able to provide a service that was otherwise not available, 'a caring and understanding adult that went beyond the scope of physical recovery from injury' (Ibid.). Even if the impact of an advocate on a person's day-to-day life was fairly minimal, as was reported by a minority of respondents, advocates were still viewed in a positive light. This research underscores how youth-violence ED programmes can address a gap in existing service provision and how mental health and support needs intersect with young people at risk of harm in the community.

Lumba-Brown *et al.* (2017)⁶⁵ present a study of the 'Empowering Youth Through Interpersonal Violence Prevention Program' (EYIPP), based in St. Louis, USA. This developed specially trained social workers in youth violence prevention and co-located them in the hospital's paediatric ED, with the service adopting a mentoring and advocacy approach for young people presenting with violent injuries. Following a RCT pilot study to assess the service's feasibility and impact between 2012 and 2014, the programme was rolled out and a retrospective analysis conducted in 2014-2015 to review outcomes. Participants would have at least six mentorship lessons with a social worker who had made contact with them in ED, and were followed up for a year with ongoing tailored support as required. One hundred and thirty-five young people were eligible, of which 78 declined to take part in the programme and 57 accepted and became engaged. The primary outcomes for the participating group were mortality, ED visits with reinjury (for violence) and recidivism (based on reports of involvement in violence). Whilst there was a high rate of decliners from young people to engage with the programme, the authors found evidence that the intervention reduced violence and recidivism and emphasise the importance of having specially trained social workers working alongside medical staff.

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It was notable that to measure the impact of these programmes, a number of centres had attempted to pilot RCT and quasi-experimental study designs alongside feasibility analyses to determine whether a programme could be integrated with existing emergency services. Another example, this time from Canada, is Snider *et al.* (2020)⁶⁹. They enrolled young people aged 14-24 who had suffered a violent injury and presented to ED. Support workers with personal experience of violence engage with the young person – and possibly their family – during their hospital visit and address risks of further violence. Following discharge, support is provided with social worker input and may involve other community resources. Outcomes for a cohort of 68 young people randomised to the intervention were analysed, the majority of which were still having regular, weekly contact after six months with the programme. Whilst not statistically significant, decreases were found amongst participants for violence-related injury. However, overall uptake of young people in the study was relatively low resulting in a small sample size.

Most studies found in this review report on levels of engagement with youth violence prevention services in ED and there is evidence that a young person's age and other life circumstances impact on the likelihood of engagement with a youth-violence prevention service based in a hospital. Bernardin *et al.* (2021) completed a cross-sectional study to understand the 'demographic, psychosocial and behavioural factors' associated with presentation to hospital for physical assault or firearm injury and the willingness of young people to join a HVIP in the USA.⁵⁸ The children's hospital provides a service for 6-19yearolds which also involves social workers assessing and enrolling eligible patients that have presented to ED with a firearm or physical assault injury. The authors found that 104 of 407 (25.6%) patients enrolled in the programme and younger patients were significantly more likely to enrol. Older adolescents, those on probation and those involved in illegal substance misuse were least likely to enrol. The authors suggest their work has implications for HVIP programmes that should focus on more 'targeted recruitment' to reach 'high risk' individuals and younger patients not yet displaying the main risk factors associated with firearm and physical assault injuries.

Watkins *et al.* (2021) conducted a quality improvement project over one year to increase the number of patients referred to a HVIP – 'Project Ujima' which was introduced to the paediatric department.⁷⁰ Eligible young people for the programme were aged 7-18 years old and presented at ED for physical assault, stabbing, or gunshot wounds. The primary outcome measure was the number of young people referred to the service over the study period. The team delivered staff education about eligibility to increase referrals, such as to nurses and social workers. The researchers were able to increase the number of patients referred to the programme from 32.5% to 61.1%. However, this improvement was not sustained. The researchers largely attributed this to staff turnover, particularly amongst social workers, and the fact that key social worker roles were often part-time.

Another intervention involving social workers (Zatzick *et al.* 2014) was studied using a RCT. One hundred and twenty patients aged 12-18 years were randomised (59 to the intervention) having been randomly sampled after presenting to the hospital trauma centre with a traumatic physical injury.⁷¹ The intervention was delivered by a social worker and nurse practitioner for 12 months within a trauma team and involved motivational interviewing and CBT techniques. The researchers found that patients in the intervention group had 'clinically and statistically significant reductions in self-reports of carrying a weapon during the year after injury compared with controls.'

Economic evidence

Two cost analyses were identified in the review. Purtle *et al.* (2015) completed a cost-benefit analysis simulation and estimated savings of a HVIP over 5 years.⁶⁶ In a hypothetical situation of 90 patients who had received the HVIP, the team estimated savings would be in the range of \$82,000 to \$4 million (approx. values) based on an effect estimate of 25%. They concluded that costs savings are likely to arise from HVIPs.

Sharp *et al.* (2014)⁶⁸ conducted a cost-benefit study based on Walton *et al.* (2010)⁷³ and the SafERteen - a BI in ED aimed at reducing peer aggression and violence in young people aged 14-18 (see below). They demonstrated cost estimates in the range of \$4 to \$55 dollars for every violent event averted. Implementation costs (fixed and variable annual costs) were estimated to be \$71,000. The authors conclude that if the BI avoids a single gun-related hospital admission each year, this can cover the cost of implementing the intervention.

Brief ED interventions

Similar to Mikhail *et al.* (2016)¹², our review identified shorter, BIs delivered in EDs, yet we found more evidence about impact suggesting research on BIs is growing. These shorter interventions may be delivered in hospitals by an advocate, social or youth worker or similar professional role. They may or may not be computer-assisted to encourage standardisation in delivery. BIs typically target a wider range of risky behaviour among the younger population such as drug and alcohol use, or aggression, that can result in ED presentations for injury.

Two further articles refer to the SafERteens intervention at a hospital in Missouri, USA, and researched by the University of Michigan.^{61, 62} These studies examined a BI delivered to young people typically within less than 30 minutes in a hospital ED. In one study,⁶¹ the BI was either delivered by a therapist with computer assistance (TBI) or by computer alone (CBI), and compared to a control group. The intervention was aimed at adolescents that had screened positive for violence and alcohol use. The researchers followed a cohort of 829 individuals who met the study criteria, of which 607 completed the intervention and a follow-up survey at 12 months. The researchers found that young people that received the therapist and computer assisted version of the TBI were less likely to self-report peer aggression and victimisation compared to the control group. A second, retrospective study,⁶² focused on dating violence amongst a subgroup of 397 14-18-year-olds. This study found outcomes for dating victimisation were positive using a CBI at six months, although for young people with a severe history of dating violence, a therapist and computer assisted intervention (CBI+T) was more effective for reducing dating violence at 12 months.

Other BIs found in this review focused on screening young people for alcohol use, some of whom present with injury,⁶³ violence,⁶⁰ or both¹³, and use similar approaches which incorporate therapists or advocates, structured motivational conversations with young people, and may or may not be computer-assisted. Some of these studies report positive outcomes, although these may be for shorter follow-up periods of three months or less.

The use of technology was an interesting finding of this review, with several studies reporting interventions that integrate computer-based tools. Ranney *et al.* (2018) conducted a pilot RCT of iDOVE, a 'technology-augmented violence and depression prevention intervention' aimed at high-risk adolescents aged 13-17 seen in the ED.⁶⁷ The intervention comprises a brief computer-guided session (lasting around 15–20 minutes), which in the pilot was delivered by research assistants,

followed by an eight-week programme of automated text-messaging, e.g. with crisis information and

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support in the form of daily check-ins. Like other BIs, the content was grounded in motivational interviewing and CBT techniques. A control group received a technological intervention not based on these techniques which provided healthy lifestyle information only. The intervention was rated positively by those engaged in the trial and engagement rates were high over the eight weeks. However, the trial was not able to demonstrate efficacy between the control and intervention groups for depression and violence, although the analysis suggested that a cohort of young people with higher baseline scores for violence and depression might benefit most from this text-based intervention.

Relevant literature reviews

Our search identified two relevant literature reviews about the impact of ED-based youth violence prevention programmes and interventions. The first, a scoping review by Wortley and Hagell (2021), specifically examined the evidence base on ‘teachable moments’ delivered by youth workers in EDs and whether there was any evidence about the outcomes arising from this type of intervention.¹⁴ Their review used only a handful of key search terms: ‘teachable moment’, synonyms for ‘young person’, ‘youth worker’ and ‘Emergency Department’, and found that whilst the term ‘teachable moment’ was used variably in the literature, it was clearly associated with behaviour change models and theory. The authors identified 13 studies and found that they could not be conclusive about the overall impact of youth workers embedded in EDs because evidence on young people’s reattendance rates was mixed. They did suggest that the evidence exists that young people are positive about ED youth worker interventions overall. Interestingly, given that the ‘teachable moment’ is a core component of the Redthread service – which is presented in their paper as a case study example - the authors were unable to locate comparative or quasi-experimental studies that have contrasted the ‘teachable moment of ED admission against other intervention methods.’ They conclude there is a lack of evidence to guide the implementation of these services within the UK health sector, despite positive findings of similar programmes in the USA, and also note the ongoing challenges to evaluation.

A systematic, integrative review by Mikhail *et al.* (2016) looked at youth violence prevention programmes based in trauma (tertiary) health centres, targeting their search at identifying RCTs or observational studies published between 1970 and 2013, and applying a theoretical framework: the social ecological model that ‘asserts that an individual’s behaviour is affected by both personal characteristics and the social environment’.¹² The authors located ten studies eligible for inclusion, and of these, the main interventions consisted of either BIs or case management with young people, which started in EDs and extended to inpatient units. The studies reported on nine violence prevention programs, across ten urban centres in the USA (the review excluded interventions delivered outside of the USA). The age profile of those engaging in the programmes covered adults (up to 50 years of age in some cases), however, the majority of studies (80%) focused on children, adolescents and younger adults aged under 30. Studies tended to rely on a mixture of ‘indirect’ outcomes measures, such as self-reported questionnaires (e.g. attitudes towards aggression or retaliation, injury, substance use) and referral rates, and ‘direct’ outcome measures, such as re-arrests, convictions, reinjury and ‘trauma recidivism’. Although the programmes varied widely, case management approaches were ‘positively associated with a reduction of violence outcome measures’ and the majority of studies demonstrated improvements in at least one outcome measure. Based on their review, the authors suggest that brief interventions alone are insufficient for reducing trauma recidivism and that:

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‘case management programs allow trauma centers to move beyond that of providing physical care only, to that of addressing the social determinants of violence by addressing upstream inequities that promote downstream injury.’ (p.514)

Whilst this review only included studies up to 2013, it does underscore the potential positive impact of case management youth violence programmes that link into community resources and promote in-depth support for young people that extends beyond the hospital setting.

Summary: Phase 2

Our updated Phase 2 search found new studies published after 2012 which had not been discussed in previous reviews due to our search terms and more recent date range. In particular, we found two new economic studies, new RCT and feasibility studies and a UK service evaluation. We observed that factors described in the literature that support or hinder the implementation of youth-violence interventions in hospital settings include:

- Staff training and awareness to make referrals.
- Characteristics of young people who may decline to engage with programmes (e.g. older adolescents).
- Staff turnover.
- Co-location of specially trained social and youth workers in ED departments.

Lessons are primarily drawn from North America however, where case management approaches and BIs to youth violence prevention typically apply motivational interviewing techniques and cognitive behavioural approaches. Notably, some brief interventions now employ technology to standardise delivery, such as automated messaging to young people. Some interventions now employ technology to standardise intervention delivery, such as automated messaging to young people.

The evidence on efficacy and effectiveness across different interventions is mixed due to variations in study design, the professionals involved in delivery (youth workers, trauma nurses, social workers, researchers, mentors), relatively small sample sizes (given the numbers of young people presenting to EDs clinically with violent injuries and from exploitation), the nature of the interventions themselves, variable follow-up time periods, and differences in the primary and secondary outcomes reported.

Many studies rely on self-reported measures using questionnaires and only one study had attempted to examine reinjury and admission rates across more than one hospital setting. The theoretical lens we found applied was a social ecological model whilst the concept of the ‘teachable moment’ was discussed widely in the literature.

Our review found very limited qualitative evidence exploring the perceptions of young people and staff who had implemented the interventions, and reasons for engagement (or lack thereof). Any evidence that was presented tended to be positive and represented the views of those that had chosen to take part in these programmes.

Grey literature: additional reviews and evidence from the UK

One evidence summary report for the Scottish Violence Reduction Unit published in 2021⁷⁴ discussed the effectiveness of school-based programmes – such as on preventing violence in intimate partner and dating relationships; however, hospital-based interventions were out of scope

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of the review. The report suggests that it is ‘not yet possible to draw reliable conclusions on the effectiveness of programmes that specifically aim to prevent gang involvement and subsequent gang violence.’ (p. 7).

A mapping review and horizon scanning on ‘good practice in youth violence prevention’ was completed in 2020 for the Violence Prevention Unit (VPU) in South Wales, drawing on over 100 sources of information.⁷⁵ The report describes how mentoring for high risk young people is delivered across a variety of settings, such as hospitals, although most mentoring schemes are based in the community and the evidence base for their effectiveness is mixed. The report draws attention to the Cardiff Model (ADD REF 3)– a data-driven approach to violence prevention – as having a strong evidence base; here hospital data about violent injuries is combined with police information to prevent further violence.^{76, 77} The report does mention hospital-based youth violence intervention programmes in the UK –Redthread and Oasis specifically – both of which it says report positive outcomes. The authors suggest that the evidence base is ‘promising’, but cautions against drawing conclusions due to risks of selection bias and limited follow-up times.

Several ‘tertiary prevention’ hospital-based programmes were picked in a review for a public health team based in Lambeth, London.⁷⁸ These were Oasis, Redthread, SafeERteens, Project Sync and Caught in the Crossfire, as well as brief interventions in emergency departments (these findings are similar to our own review). Whilst there is no detailed discussion of these programmes and their underpinning evidence, the report suggests that a general indicator of success across different types of tertiary prevention interventions, such as counselling approaches with young people, is ‘high quality implementation with fidelity to original specification’ (p. 38).

It is important to note that a number of evaluations of the Redthread service have already been undertaken and that these findings were shared with the NIHR RSET evaluation team. However, not all findings from these evaluations and final reports are publicly available. We identified six completed evaluations and two in progress, plus our own evaluation. Below we summarise information about Redthread evaluations and provide references where information is publicly available (the information below was reviewed and confirmed by the charity):

- Redthread in the Midlands and wider programme: three evaluations funded by The Health Foundation – qualitative and quantitative focused evaluations on the Midlands sites and the feasibility of scaling up the intervention to other areas (Nottingham University Hospitals NHS Trust, 2019-2020) and a cost benefits analysis for Redthread’s YVIP across all areas. Positive findings include: young people engaged in Redthread’s YVIP were 51% less likely to re-attend emergency departments than those who didn’t engage; YVIPs fill a crucial gap in support in the NHS; and economic and social benefit valued at £4.90 for every £1 spent.^{79, 80}
- Redthread, St Mary’s Hospital, London: three-year evaluation by NPC Associates (2015-2018) using qualitative and quantitative data. Positive feedback from stakeholders about Redthread’s work, with hospital re-attendance rates falling and the risk of harm and involvement in violence being reduced among young people who engaged in the YVIP. Collaborative working and sharing of data between relevant agencies was said to have improved, as well as emergency staff confidence, understanding and awareness of violence related and exploitation issues affecting young people.⁸¹

Evaluations in progress:

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- Redthread in the Midlands: a service evaluation funded by NHS England Midlands (2020-2022) was being undertaken by Liverpool John Moores University and nearing completion.
- Redthread: a quasi-experimental design evaluation funded by the Youth Endowment Fund (2021-23) involving the University of Birmingham. This is an initial one-year pilot from April 2022 to March 2023 focused on 10 - 17 year olds as part of the Another Chance - Diversion from the Criminal Justice System round.⁸²
-

Finally, a six-year, mixed methods evaluation of the Oasis hospital-based violence prevention programme at St. Thomas' hospital, London, by researchers at Middlesex University was published in 2016. This evaluation found positive findings in terms of efficiency, implementation and impact on young people who had engaged with the service, some of whom were followed up after at least one year (REF 6). Benefits also included high staff satisfaction with the services and fewer re-attendances amongst those had received the intervention.

Conclusions

The majority of peer-reviewed studies found in both phases of this review originate from the USA. Only a small number of studies have focused on how to increase referrals or reasons for low uptake by young people. We found studies reporting a variety of outcomes for both case management and BIs instigated in ED departments: depressive and PTSD symptoms; decreased feelings of aggression and involvement in peer violence; varying effects on victimisation; outcomes related to service uptake and utilization; mortality and morbidity outcomes; recidivism; and one study exploring the perceptions of engaged young people; plus cost analyses. Other literature review studies confirmed our findings that there are few studies following long-term outcomes with young people which limits conclusions about impact, as do the small sample sizes on studies (this being due to limited uptake amongst eligible patients).

Nevertheless, studies from the USA do suggest there may be positive benefits with respect to recidivism and patient reported involvement in violence from interventions in ED settings, with growing evidence that BIs may also have a positive impact (e.g. on weapon carrying). There are also promising economic assessments about the value of these interventions, yet these have to be read in the context of high-treatment costs in the USA, therefore the extent to which these findings translate to other countries and tax-funded systems, like the UK NHS, is limited.

Overall, there is a paucity of studies from the UK health care system context as well as a lack of qualitative studies exploring, in-depth, the perspectives of staff and young people involved in these programmes. Rather, engagement or enrolment in a programme is often taken as a positive outcome, and there are risks that engagement could be relatively low in programmes studied and the factors for this under-explored. There is however some promising evidence emerging from evaluations of programmes such as Redthread and Oasis, suggesting potential benefits alongside positive feedback from staff and patients. Overall, this evidence review suggests a need for more multi-site studies (e.g. using hospital records) to track re-admissions and re-injury across different hospitals and geographies, longitudinal studies with longer follow-up times, studies with control groups and in-depth qualitative research (e.g. ethnographic, participatory or comparative case studies) to provide more rounded insights about effectiveness, implementation factors and young people's lived experiences and their reasons for engaging (or not engaging) in hospital based violence reduction programmes. .

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Limitations of this review are firstly formally searching two databases in the Phase 2 scoping review and only Google for the grey literature, due to time limits, which means that some studies may have been missed. Secondly, not performing a meta-analysis of the results of the empirical studies included in Phase 2. The review was intended to provide the team with a snapshot of the topic and available evidence rather than being a rigorous or comprehensive systematic review. Whilst the Phase 2 search was conducted in a transparent manner across two databases using an explicit inclusion and exclusion criteria, with more key terms used than in some other available reviews on this topic, and screening and data extraction being conducted by two researchers, pragmatic choices had to be made to save time.

Chapter 4: Qualitative findings: programme theory and service implementation at UCLH

What was already known?

- Redthread is a youthwork charity that provides a range of services within healthcare settings. The charity aims to support young people as they navigate the transition to adulthood with a focus on prevention (e.g. injury from violence).
- Redthread's flagship programme is a hospital-based YVIP which has been adopted at 13 NHS organisations across London, Birmingham and Nottinghamshire (within seven local trauma units and six MTCs). A number of these services have had local evaluations.
- Other charities provide similar services to Redthread within London (Oasis, St. Giles Trust).
- NHS organisations may choose to adopt hospital-based youth violence reduction services due to the number of adolescents they see presenting (and reattending) in EDs and trauma services due to violent assault (e.g. stabbings) and criminal exploitation.
- There has been growing attention on a public health approach to youth violence reduction in recent years. For example, NHS England and NHS Improvement London has a violence reduction programme.

What this chapter adds

- Evidence about the types of clinical presentations to a local adult and children's ED in London which flag safeguarding concerns amongst health care staff.
- Evidence that hospital staff – both clinical and non-clinical - were receptive to working alongside youth workers in the hospital setting.
- Understanding of the organisational enablers to implementing the Redthread youth violence intervention programme in a London hospital; for example, physical space for youth workers located near the emergency department and electronic health record integration.
- Understanding of the organisational barriers to implementation, such as high staff turnover.
- Insights about service-level impacts and adaptations during the COVID-19 pandemic. specifically, how COVID-19 affected early implementation (qualitative data collection was conducted during COVID-19) and influenced the development of referral pathways into the service.
- Views of clinical staff at UCLH about the potential benefits of placing youth workers within multi-disciplinary teams to help safeguard young people, including encouraging young people to engage in their care and treatment as both in-patients and outpatients.
- Insights about why young adults aged over 18 might be less likely to engage with the Redthread service or be referred, such as challenges around consent and follow-up.
- Suggestions, based on empirical findings, to help the Redthread service continue to embed successfully at UCLH and across other NHS hospitals, and reach young people eligible for the service.

Introduction

In this chapter, we present background information about how the Redthread service came to be implemented at UCLH NHS Foundation Trust and data illustrating how the service is perceived by frontline NHS staff and Redthread youth workers. The chapter draws on a variety of qualitative data sources to answer the following evaluation questions:

- RQ4: What are the views of UCLH NHS staff of the Redthread intervention, its feasibility, service-level impacts and overall effectiveness?
- RQ5: What organisational factors, processes, resources and staff training are necessary for the successful implementation and delivery of the Redthread service?

This chapter covers in detail: the nature of the Redthread intervention at UCLH, including the components of the intervention and programme theory, early and later implementation phases at UCLH, and staff and youth worker perceptions of the challenges and opportunities associated with introducing the service locally. Finally, the chapter briefly describes how the Redthread service at UCLH was affected by the COVID-19 pandemic.

It should be noted that qualitative data was collected following the re-direction of patients aged under 18 away from the UCLH site in the period 2020-2021. Therefore, we provide a brief account of how the Redthread service and clinical staff responded to these challenges.

Methods

This chapter is based on qualitative data collection at UCLH, which was conducted in two phases. Phase 1 was an exploratory stage aimed at understanding the Redthread programme and the background to its introduction at UCLH. This phase involved speaking with those closest to the service and its early implementation. During Phase 1, available Redthread and UCLH documents were supplied to the NIHR RSET evaluation team and reviewed to confirm what the service aims to do, and how, and its core components.

As part of Phase 1, nine qualitative interviews were conducted between April and July 2021 with Redthread staff and a small number of senior NHS clinicians closely involved in the treatment and care of young people (Table 3). Data collection was instigated once Redthread youth workers were back on-site at UCLH, following disruption to the service on account of the COVID-19 pandemic. All data was collected remotely. Phase 1 data helped to situate the Redthread service at UCLH within a wider London context and uncover what meaningful success looked like to those closely involved in introducing the service to UCLH (e.g. reduction in admissions, onward referrals to other services, positive case work with an individual). Redthread documents were useful for understanding how the service intended to operate (e.g. the UCLH proposal for the service) and recording the changes wrought by COVID-19. This initial qualitative work was accompanied by discussions with members of the study evaluation advisory group and meetings with researchers involved in other Redthread evaluations at different NHS trusts to understand how the Redthread service had been introduced elsewhere.

Table 3. Qualitative data collection.

	Respondent type				
INTERVIEWS	Redthread	UCLH staff	External stakeholder (e.g. NHS youth violence prevention programme)	Example of job roles	Combined total
Phase 1 – exploratory interviews	6	2	1	Consultant – children and young people’s services, Redthread youth worker / manager / team leader, NHS clinical director	9
Phase 2 – implementation interviews	4	9	0	Social worker, paediatric nurse, consultant – children and young people’s services, junior doctor, paediatrician, child and adolescent psychiatrist, Redthread youth worker / team leader / manager	13
Total	10	11	1		22
	OBSERVATIONS				
Phase 2 – non-participant observations of staff meetings	<ul style="list-style-type: none"> ● Paediatric ED safeguarding meeting ● Adolescent ward psychosocial MDT meeting ● Level 3 child safeguarding training with Redthread presentation 				3

Phase 2 consisted of a single-site, process case study informed by qualitative data collection and followed directly on from the data collection above. The organisational unit of analysis was UCLH, specifically, the children and young people's services and adult ED within the hospital. The aim was to understand, in greater depth, the processes that were supporting the implementation of the Redthread intervention at UCLH and staff perceptions of Redthread's impact and progress thus far. Data were collected between October 2021 and January 2022 to allow time for the service to embed following the phased re-introduction of Redthread youth workers to the UCLH site in Spring 2021. This was important due to the fact that there had been re-direction of UCLH paediatric patients during COVID-19 to the Whittington Hospital and the UCLH paediatrics ED only fully returned to UCLH in April 2021.

Three observations of staff meetings were conducted and an additional 13 qualitative interviews (see *Table 3*) for Phase 2. During this phase of data collection, the NIHR RSET evaluation team were interested in identifying any complicated or novel aspects of the Redthread intervention at UCLH, such as differentiated referral pathways, and any contextual factors that either supported – or made challenging – implementation of the service.

Interview data collection and analysis

A mixture of purposive and snowball sampling was used to identify UCLH staff that were both central and more peripheral to the Redthread intervention to take part in the evaluation. Interviews took place with a range of clinical healthcare staff (e.g. nurses, junior doctors, senior psychiatrists and paediatricians) and non-clinical staff (safeguarding teams, Redthread youth workers and hospital social workers). The primary objective was to speak with staff involved in the care of young people at risk of harm at UCLH who either knew about the Redthread service and/or might refer young people to it. Phase 1 interviewees were identified through scoping work, whilst Phase 2 interviewees were largely recommended by UCLH and Redthread staff involved with the service. The team were able to capture the views of both service 'champions' and staff with lower levels of awareness of Redthread service (e.g. junior doctors who worked across different EDs and wards). All respondents were individually emailed a study information sheet, consent form and given the opportunity to ask questions about the evaluation to a qualitative researcher before taking part. Some clinicians emailed their colleagues on behalf of the researcher to inform them about the study and encourage their participation.

Due to the impact of COVID-19, recruitment of frontline staff from the adult ED was particularly challenging, with some staff declining to take part because they felt they did not know enough about the Redthread service. This confirmed a finding from the case study: that the intervention had not fully embedded outside of children's and adolescent services at the time of this evaluation and that Redthread's awareness-raising activities had been severely disrupted by the pandemic.

One lead qualitative researcher (JL) conducted all the interviews, with a NIHR RSET colleague present in some instances where quantitative aspects – such as hospital and Redthread data flows - were being explored. Interviews were conducted remotely and on a confidential basis by telephone / Microsoft (MS) Teams. Interviews were digitally recorded with explicit written and / or verbal consent, and transcribed verbatim. A total of 22 interviews were completed across Phases 1 and 2, with a small number of individuals interviewed twice due to their close involvement with the service. Different topic guides were used for interviews with hospital and Redthread staff but explored

similar themes. Each topic was piloted to ensure that the questions resonated and were clear to respondents and then finalised (for topic guides, see *Appendix 2*).

Compared to Phase 1 interviews, which were more exploratory, Phase 2 interviews had a focus on the perceived impact and effectiveness of the service. Staff were asked to provide anonymised clinical case examples to explain how a young person had been referred to Redthread, why the young person had presented at UCLH, and how they had been supported by Redthread youth workers. This allowed two anonymised clinical case vignettes to be included in the findings below, helping to elucidate how the Redthread service operates in practice and connections between the Redthread service and other organisations, especially those within the community. Finally, the Phase 2 interviews explored factors that appeared especially important for the successful delivery of the Redthread programme in the hospital (enablers and barriers).

It was not possible to conduct interviews with young people who had experienced the Redthread service at UCLH or at other NHS trusts for ethical and practical reasons (e.g. identifying young people would have data sharing implications, although this possibility was explored with Redthread).

Observations

A qualitative researcher conducted a total of three non-participant observations of staff meetings to understand the implementation of the service, and to explain the purpose of the NIHR RSET evaluation to hospital staff at UCLH. This proved to be particularly helpful for Phase 2 interview recruitment, especially given that hospitals were dealing with the ongoing effects of COVID-19. Meeting observations were undertaken between October and December 2021 with explicit permission from UCLH clinical collaborators and attending staff. Two virtual MDT meetings were observed during which Redthread youth workers worked alongside clinicians, helping to identify young people potentially eligible for their support. A staff safeguarding training session was also observed in which Redthread discussed their service. All meetings were held via MS Teams on account of the COVID-19 pandemic. The researcher took carefully anonymised field notes which were typed up and then securely saved on UCL folders only accessible to the evaluation team.

Analysis

Interview transcripts and observational field notes were read by the lead researcher for data familiarisation and triangulated with the Redthread planning and implementation guidance gathered in Phase 1, and other relevant documents (e.g. the Redthread youth worker manual). Emergent findings were discussed in team meetings and with clinical collaborators to confirm initial interpretations. The final qualitative data set – integrated Phases 1 and 2 findings -were analysed with a specific focus on answering the evaluation questions.. Interview transcripts (transcribed verbatim), Redthread documents and field notes were reviewed by the qualitative researcher and data extracted and organised according to following themes:

- Redthread history and background; theory of change (e.g. ‘teachable moment’); key components of the intervention and associated processes (e.g. eligibility, consent model); data capture and monitoring; implementation context at UCLH (services and population); adaptations due to COVID-19; youth worker perceptions (e.g. implementation journey, impact, successes and challenges); staff perceptions (awareness of Redthread, impact, fit with existing services; successes and challenges); staff training; enablers and barriers to implementation; timeline and key events (e.g. Redthread introduction to UCLH).

Line-by-line coding of transcripts was not performed, but qualitative findings were compared in an iterative process with those arising from the economic and quantitative aspects of the evaluation. In addition, validation of findings was supported by providing draft chapters to Redthread for review; this was important to confirm a correct interpretation of the history of the charity, the local adaptations of the service offer at UCLH during COVID-19 and any sensitive issues regarding the presentation of qualitative findings (e.g. clinical vignettes to ensure patient anonymity).

Main findings

In this main section, we draw on the qualitative data sources described above (interview transcripts, documents and observations) to describe how the Redthread service was first introduced to UCLH and its early implementation, and how staff responded to the service following a longer period of embedding the service across paediatric, adolescent and adult departments admitting young people over 18 years.

Background to the Redthread intervention at UCLH

At the time of the evaluation, Redthread staff confirmed that the organisation (a registered charity) was established in 1995, in south east London, initially as a group set up by parishioners from a number of local churches in Herne Hill, Dulwich and the surrounding area. Researchers were informed that, in the early days of the charity, it was felt that local children and young people could be more involved in the community if provided with the facilities and activities to do so. This led to a Redthread Youth Club being set up providing a range of regular activities for young people.

Later, in 2002, the senior manager of the charity started to move its youth work into healthcare settings, realising that there was an opportunity to engage with young people (in particular higher risk groups) at the point when they accessed health care services. One Redthread interviewee described how the charity had been attentive to “high risk” young people who were falling outside of public services, such as social care and often had a deep mistrust of authorities. Redthread started a young people’s clinic in partnership with a local GP practice which was run after school for 13 – 19 year olds, regardless of whether they were registered or not. In primary care, it had been observed that young people could be missed and unknown to GP practices whilst being frequent attenders at local EDs or other health services, such as Child and Adolescent Mental Health Services (CAMHS) or sexual health clinics. Young people also risked being missed on account of silos existing between statutory services, and a lack of a joined up, preventative health approach for young people at risk of violence and exploitation at the pan-London level.

Against this backdrop, the first Redthread site was founded in 2006 at King’s College Hospital in South London. Later, the charity scaled up its activities with additional MTCs coming on board (at St. Mary’s Hospital in north west London in 2014, and St. George’s Hospital in South London in 2015). This was enabled by funding from the Mayor’s Office for Policing And Crime (MOPAC). A senior Redthread manager explained how youth workers and clinicians were noticing patterns of injury affecting young people presenting in the EDs of MTCs. Injuries ranged from knife and gunshot wounds to attacks from broken bottles that a young person would present as an ‘accidental’ injury,

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even if the wound was likely to have been caused by a violent assault. By running audits on hospital data at the adopting MTCs for the 11-24 age cohort, evidence about who attended for violent injuries and later reattended in emergency departments was identified:

there was this sort of propensity for reinjury and this escalation of injury. (Redthread manager, RED004)

Redthread gradually moved into local EDs across London, such as the Homerton and later UCLH, as well as to other hospitals based in the Midlands. This was viewed as a way of “‘joining the dots’ and not only focusing the charity’s work on MTCs.

The introduction of Redthread youth workers to hospital EDs coincided with growing policy attention on a holistic ‘public health’ approach to preventing youth violence⁸³ in England, and the introduction of violence reduction (VR) services within the NHS – both in London and outside of London.¹⁸ Redthread is one of a number of charities providing hospital-based interventions in London at the present time. For example, the St. Giles Trust, which is located at the Royal London Hospital (an MTC, part of Barts Health NHS Trust),⁸⁴ Newham University Hospital, the Whittington Hospital and Northwick Park’s accident and ED (part of London North West University Healthcare NHS Trust).⁸⁵ Oasis, another charity, has youth workers based in the ED of St. Thomas’ Hospital (part of Guy’s and St Thomas’ NHS Foundation Trust) and North Middlesex University Hospital.

Introduction of the Redthread service to UCLH

In the borough of Camden, where UCLH is located, a Camden Youth Safety Taskforce had been established in 2017 and published a report making recommendations to treat ‘youth violence as a broad public health issue rather than simply a law and order issue’, with better collaboration between public services.⁸³ The report encouraged the early identification of young people at risk of youth violence as a preventative measure, stressing the need for ‘appropriate referrals’ from public agencies and professionals, such as youth workers (Ibid.) In 2018, two young men from Camden estates died from stab wounds drawing attention to a high number of violent incidences occurring within the borough, and highlighting the ongoing risks of violence facing young people in the local community.⁸³ It was in this context that two hospital consultants, who were involved in safeguarding initiatives in the borough and aware of the work of the Camden Youth Safety Taskforce, began to consider the introduction of a violence reduction service at UCLH – around the same time that Redthread was starting to move into local hospital EDs. As one consultant closely involved in the service noted:

Redthread originally started in the community and it almost feels like it started out, it’s come in to hospitals and we are almost going out again a bit, and so that’s our motivation.

Clinicians involved in the introduction of Redthread’s service to UCLH spoke of their interest in providing ‘age-appropriate’ services for young people most at risk of harm in the community. Their review of hospital data at UCLH suggested there was a cohort of vulnerable young people presenting with suspicious injuries and being discharged into the community, meaning this was a missed opportunity to engage with and protect young people at risk of harm:

we did an audit ... although this was quite a while ago, that demonstrated that, although we don’t have major trauma here, a good twenty-five per cent of the young people coming through – say 13-to-18-year-olds – with soft-tissue injuries, or minor breaks, they would get

patched up and sent out without anybody asking anything other than their tetanus status, actually had a worrying back-story.”

Therefore, consultants working in paediatric and adolescent services at the Trust played a key role in supporting Redthread service adoption at UCLH and brokering initial discussions between hospital managers and the UCLH Charity in the period 2017-2018. Paediatrician and adolescent clinical staff were interested in linking up with the Redthread charity to learn more about young people’s reattendances for violent injuries and were motivated by the opportunity for skilled youth workers to interact with young people within the hospital setting in a holistic way. They observed that, whilst a multidisciplinary approach to adolescent and child healthcare was already employed at UCLH (e.g. with a hospital-based social worker and play worker already part of the team), the youth worker element was still missing:

Because older teenagers when they come in tend to not be that medically unwell, nobody really asks them who they are having sex with, or how they got a broken bone in their hand. They just go, “Okay, you’re fine. You can go.” It was increasingly becoming clear to me that that wasn’t good enough and that we needed to do things differently.”

Following discussions between Redthread and UCLH, it was agreed that the service would be introduced, supported by a three-year grant agreement from UCLH (with the funding being provided by UCLH Charity), with additional contributions from the London Boroughs of Camden & Islington’s Public Health Directorate in Year 1 to make the service fully funded during its mobilisation period and first year of operations. Clinicians favoured such a funding model because it was distinctive from ‘policing money’ (associated with prosecution) and meant that a hospital-based violence reduction service would predominantly be funded by health resources and viewed as a health-community initiative. Redthread relies on different sources of funding at each hospital site. This can include money from hospital charities, Redthread’s own fundraising activities, external government sources (e.g. the Mayor of London’s Office) as well as local authorities. Therefore, each hospital adopting the Redthread service will have its own funding arrangement to cover Redthread’s operating costs.

In early 2020, the Redthread service formally launched at UCLH, a few weeks before the COVID-19 pandemic struck.

UCLH: the hospital context

At UCLH, there is a dedicated children and young person’s ED (referred to by staff as ‘paeds ED’) which sees patients up to the age of 17. There are also two inpatient wards: an adolescent inpatient ward which treats patients from 13 upwards and a children’s ward treating children aged under 13. A multi-disciplinary approach is taken to providing care across these services, in particular the adolescent unit which encourages ‘contextual safeguarding’ and ‘psycho-social’ support.

In addition, there is a separate adult ED at UCLH which sees patients aged 18 and over. This is significant given that Redthread covers patients up to their 25th birthday (11-24-year-olds), thus the Redthread service at UCLH had presence across *two* EDs to cater to patients aged 11-24.

UCLH is located near Euston and King’s Cross stations, both major transport hubs in central London. Staff at UCLH pointed out the significance of the hospital’s location for the population it served: vulnerable young people often present from out-of-area and it was felt that other local EDs in

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London might serve a more borough-based patient population (e.g. at Homerton University Hospital in Hackney).

displaced children that would just come from Euston, or from King's Cross and either be found by the police or just be found, vulnerably, in the street. It just made me think about how can we serve this population better.

Vulnerable young people are sometimes brought to UCLH by emergency services and the police if they are experiencing a severe mental health crisis requiring urgent treatment. The hospital also serves a university population, refugees, and young people caught up in drug trafficking and other forms of criminal exploitation. Whilst staff had less experience of serious knife crime injuries presenting, since these are typically directed to MTCs, soft tissue injuries and wounds that raised safeguarding concerns about a young person at risk were reported to be common, along with severe mental health issues (such as suicidal ideation and suicide attempts), sexual assault, domestic violence, attacks/fights with peers, and problems related to substance misuse. Some clinical staff saw clear links between urgent clinical presentations amongst young people and potential gang involvement or sexual exploitation. Other staff felt that gang violence was not the main driver for young people presenting at UCLH:

We see quite a lot of young people that are either on the cusp or involved in gang culture, gang crime. (Nurse, RED0012)

We have lots of young people coming in with self-harm. Sometimes that will link to violence that's happening to them or around them. We have a small but clear group of young people who will come in having been assaulted or at risk of gun violence or involved with the gangs, particularly where we're located. (Consultant, RED0014)

I think what you'd find is that it's mostly alcohol, drugs, child mental health. (Non-clinical staff, RED0010)

When asked whether case presentations had shifted as a result of the COVID-19 pandemic, staff were unanimous in their perception that they were seeing a greater number of young people suffering from severe mental health crises associated with problems within the community or family home (e.g. isolation, unemployment, domestic abuse, housing instability).

The Redthread intervention at UCLH: programme theory

Guiding principles and theory of change

As described in *Chapter 1*, the Redthread intervention follows on from a young person experiencing a traumatic event that has led to a hospital presentation. The 'classic' Redthread intervention consists of youth workers engaging with young people aged between 11 and 24 attending EDs as a victim of violence, assault or exploitation, with youth workers placed directly within hospitals to work 'shoulder to shoulder' with clinicians. This model is most familiar with the London MTCs that receive higher numbers of young people presenting due to violent assault from knife crime.

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However, as is explained in more detail below, the Redthread service at UCLH was found to employ a number of referral pathways to the service, covering direct referrals from staff and active searching by youth workers for eligible patients.

The Redthread model draws on a range of research and academic influences: behaviour change theory (e.g. smoking cessation research), concepts such as the ‘teachable moment’ and ‘contextual safeguarding’, and frameworks such as the Anna Freud Centre’s ‘AMBIT Model’.⁸⁶ According to the Anna Freud website, AMBIT is ‘a collaborative project that involves feedback from practitioners, clients and evidence based treatment designers. It has been designed by and for community teams from Mental Health, Social Care, Youth work, or that may be purposefully multi-disciplinary/multi-agency. It emphasises the need to strengthen integration in the complex networks that tend to gather around such clients, minimising the likelihood of an experience of care that is aversive.’

Redthread’s youth worker manual describes the ‘teachable moment’ as comprising three essential parts:

1. Dialogue that links a young person’s (YP) concerns to the health risk.
2. Youth worker (YW) dialogue that fosters the YP’s motivation to change.
3. The YP’s response that shows a willingness to engage and commit to change the specific behaviour(s).

Redthread Hospital-Based Violence Intervention Programme, YW Manual: Programme Management Team, 2019⁸⁷

One Redthread interviewee described this concept as going beyond a ‘reachable moment’ to a ‘teachable moment’. This means that youth workers interact with a young person within the hospital setting and involve them in decision making and learning to empower them to identify where support is available, a task that clinical staff don’t have time to do due to other priorities:

The job of the Redthread worker is to help the young person identify who their network of professionals is. And then look to scaffold that teachable moment out to the appropriate key worker, the one that the young person identifies. Don't assume that you are going to be the key worker for the long term. (Redthread manager, RED004)

Redthread shared their ‘theory of change and assessment process’ document which is outlined in Figure 4 (note: see Appendix 6 for the most recent version (October, 2022)):

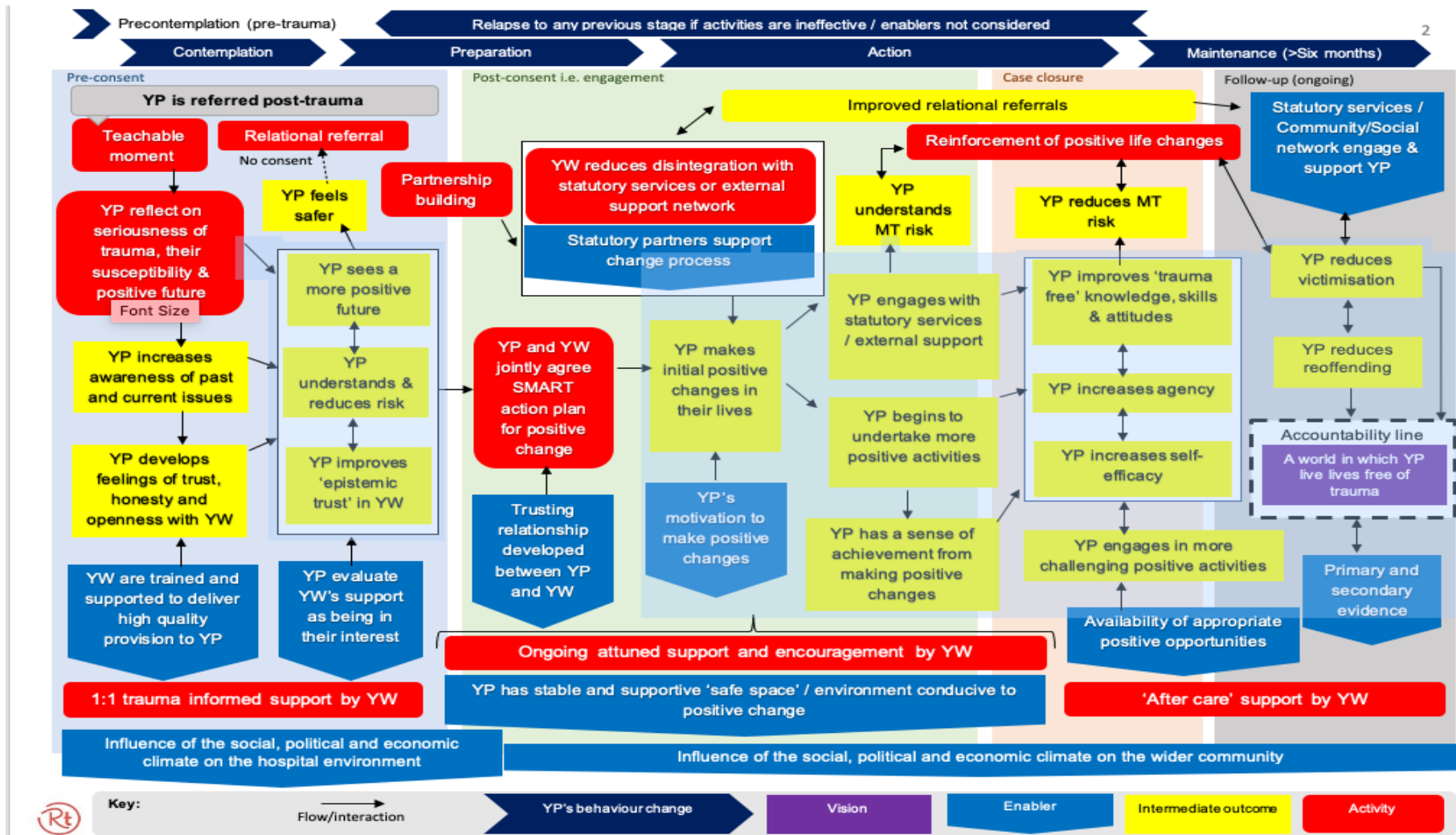


Figure 4. Redthread theory of change (2021-2022).

Reproduced with permission from *Redthread Theory of Change & Assessment Process*.⁸⁸

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Youth workers discussed Redthread's role at UCLH as having a rather broad remit, yet ultimately being focused on taking a sensitive and holistic approach to caring for traumatised young people who had come to harm through violence, criminal or sexual exploitation, or who were affected by other safeguarding issues:

the main aims overarchingly are to contribute to the health, safety and happiness of young people. Obviously, we talk a lot about violence and harm but it actually exists more broadly just to make sure young people are well from a broader perspective as part of this whole public health approach to youth issues and to violence specifically. (Redthread staff, RED009)

young people who come in really scared, anxious, unsure about what's happening, and we can be that really comforting and compassionate presence for them in a time of kind of trauma... providing a very compassionate and trauma-informed approach to working with them, advocating for them, and ensuring that they are at the centre of their care, where sometimes things are done to young people rather than with young people. (Redthread staff, RED003)

Intervention components

Redthread-employed youth workers become embedded within local hospital EDs and work alongside clinicians as part of the Redthread service offer. Youth worker engagement with a young person – the 'teachable moment' – can only occur if consent is received from the patient (see below for further details) following their presentation at hospital. The service provides a referral pathway for clinicians in EDs who can identify young people at risk, obtain consent, and refer them to youth workers for engagement and support.

Youth workers work with young people on a case-by-case basis providing tailored support (see the two clinical vignettes below for illustrative examples). The charity also delivers a wider set of services to the hospital once a Redthread team is on site, therefore the intervention has a number of interacting components. Table 4 outlines these components drawing on the qualitative data collected at UCLH:

Table 4. Redthread service activities – intervention components.

Intervention components	Examples	Objective(s)
Building relationships with hospital staff	Redthread youth workers and coordinators engage with hospital safeguarding teams clinical staff (e.g. paediatric and ED consultants, nurses and junior doctors in ED, paediatric and adolescent ward staff, safeguarding teams and in-house social workers)	Raise awareness in order that staff know to refer eligible young people to the service, and how to do so. Support a holistic approach to care of young people.
Awareness-raising events and communications for staff	Attend safeguarding meetings, deliver service launch events, posters displayed around the hospital, visible Redthread branding (e.g. youth worker T-shirts)	Service promotion. Raise awareness in order that staff know to refer eligible young people to the service, and how to do so.
Enabling referral pathways	The charity aims to ensure that the service receives referrals from clinicians. Youth workers also search hospital electronic health records for eligible young people who can be referred to the service (i.e. those that have presented in the last seven days) to ensure they are not missed.	Ensure vulnerable young people eligible for support are referred by clinicians and avoid ‘missed’ referrals following patient discharge from ED.
Advocacy	Engage with the young person to help represent their needs in the hospital setting	Youth workers explain medical terms provided in language young people understand to ensure they are involved in decisions about their care. Support young people to access other services they need outside of the hospital.
Staff training and upskilling	Deliver content to hospital staff (e.g. safeguarding Level 3), support CPD, run training sessions on youth violence prevention both internally and externally (e.g. across social care, probation)	Raise awareness and skills for staff to effectively work with traumatised young people and safeguarding referrals Identify those most at risk in the population of violence and exploitation.
Case management – internal and external to the hospital setting	Trained, trauma-informed youth workers support a caseload of young people with a tailored offer based on their needs, circumstances and preferences. This can be within ED, on hospital wards in outpatients, or continue within the community. The charity uses a case management log tool to record activity, with weekly case management meetings and fortnightly oversight meetings.	Establish a trusting relationship between a youth worker and a young person, initially within the hospital setting, or shortly after patient discharge, and support a young person’s engagement with other services in the community to achieve positive change.

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External engagement and collaboration with public agencies and other voluntary sector organisations	Local authorities (e.g. integrated gangs teams), social care, domestic and sexual violence services, child and adolescent mental health services, counselling services, education and training providers, employment organisations; courts; refugees groups; housing associations; victims support services.	Work with other agencies to support young people, raise awareness of those at high risk and safeguard young people within the community.
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Interviews with Redthread staff - both managers and youth workers - indicated that the service was underpinned by a strong commitment to a voluntary consent model. This was deemed to be significant because Redthread is not a statutory service and young people have a choice to use the service. Individual consent is therefore sought from young people because the charity's focus is on empowering young people and putting them at the centre of decision-making about the support they receive and their care in hospital. Redthread's distance from entities such as social care and the police was believed to be critical because young people often distrust "authoritative" bodies and situations where they sense they "have no choice about whether they can engage or not" (RED009). By being a voluntary service and charity, it was felt that young people could be more open about sharing personal (and relevant clinical or social) information with Redthread youth workers:

we're trying to make other organisations realise that young people will simply disengage, will be dishonest, if we come in authoritatively and we have to recognise their agency and have to empower them as opposed to force them through procedures that are now archaic.

(RED009)

Indeed, Redthread youth workers attributed high value to ensuring that young people consented to use their service, and that consent was obtained in a language that they would understand. "Staged consent" was a term used to describe the process of obtaining consent for different activities that youth workers undertook as part of their ongoing engagement and support, with one youth worker stressing the need for "continual negotiation of a young person's autonomy" in order to secure willing participation and, at the same time, recognising that young people could at any time withdraw their consent or disengage.

Redthread staff confirmed that interventions are based on assessment of the needs of an individual, therefore the duration of support provided to a young person could vary from a few days to a number of months. The case management aspect of the Redthread service was typically an intervention of six to 12 weeks, although longer support was sometimes needed to have "meaningful impact" depending on the specific circumstances and needs of a young person. Youth workers confirmed that trying to get a young person to engage could also take a lot of "persistence" before youth workers could begin to work meaningfully with an individual. Young people might initially decline support then later accept it following a subsequent traumatic incident and reattendance at hospital.

If a young person consents to receiving help from Redthread, youth workers begin by developing a 'Safety Plan' for the individual and understanding their support needs. Youth workers undertake different types of activities within the hospital setting such as explaining medical terms, liaising between the young person and health professionals, getting a young person food, and generally trying to improve their overall experience of the hospital setting, and allaying any fears and concerns they might have. Support activities are therefore far-ranging, for example: safety planning, completing safeguarding referrals, providing emotional support/containment, signposting young people - or their families - to statutory and non-statutory services (e.g. Victim Support, drug and alcohol services), organising safe transport home, providing food vouchers, helping with clothing, and assisting a young person with accessing follow-up medical treatment/prescriptions.

Two main modes of youth worker engagement were therefore apparent: short term crisis support and engaged, longer-term support. In the former category, a young person consents to talk with

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Redthread, such as when they are an inpatient on an adolescent ward or in ED, yet no further support work takes place following discharge from the hospital. For example, because the young person did not wish to work further with youth workers, was not eligible for the service, or was unable to make an informed decision about the service whilst in hospital (i.e. due to intoxication). Even if a young person declines initially, if they are eligible for additional support, they will be informed that they can contact Redthread at a later date should they wish to self-refer to the service. There is therefore a cohort of patients typically provided with short-term assistance in the hospital (e.g. access to food, safety planning, information about other services, help with onward travel) and recorded in the Redthread referral log as having received this type of intervention. Discussions with Redthread staff confirmed their observations that even short-term interactions with young people and lighter-touch modes of engagement could have a positive impact (e.g. by helping a young person to feel comfortable and assured in the unfamiliar hospital setting and better engage in their care).

The second more 'engaged' group become part of Redthread's formal case management work. This group of young people provide consent to work with a youth worker and a risk assessment is completed, along with a plan for tailored support. Youth workers engage with this cohort over a number of weeks, or even months, and enter information into the Redthread Lamplight system which records youth worker case notes and information regarding which other professionals are working with the young person (e.g. probation, social care). Indeed, Redthread staff emphasised the commitment of the charity to working closely with relevant hospital-based services, such as hospital social workers and safeguarding teams (Adult and Child), and external services – both statutory and non-statutory - to ensure continuing support was provided to a young person following hospital discharge. Indeed, part of the set-up phase for the service at each hospital involved scoping work to establish "key partners" and to ensure that Redthread avoided overlapping in ways unhelpful with other "jurisdictions" and voluntary organisations. This meant that Redthread could easily refer young people to other local services where appropriate.

Implementation at UCLH

Identifying and referring young people eligible for support from the Redthread service

A relevant finding of this evaluation was that the context for Redthread service adoption at UCLH went beyond a single ED to a cluster of specialised services for children, adolescents and young adults at UCLH, including outpatient departments, fracture clinic and adolescent wards. This has implications for how young people are identified and referred to the Redthread service.

Staff and youth workers discussed how young people present to the hospital with a range of clinical and psychological problems that trigger safeguarding concerns and can indicate that a young person is vulnerable within their community. Examples included young people assaulted with an implement or sharp object (e.g. glass or knife) which they might report as happening 'accidentally', substance mis-use, suicidal ideation and suicide attempts, sexual assault, and severe mental health crises requiring urgent treatment. A group of vulnerable young people are also reported to experience problems with managing a long-term condition, such as diabetes, asthma, or a rare condition sometimes requiring urgent care. Redthread youth workers were therefore actively engaged in multiple processes to identify eligible young people for the service at UCLH, and this went beyond victims of violent injuries from gun or knife attacks. Indeed, hospital staff noted that because the hospital was not a London MTC, knife injuries were less frequent:

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our major trauma centres, they get predominantly very violent assaults, whereas I think at local hospitals Redthread are known to receive a lot more varied referrals. (RED005)

young people who come in with mundane or seemingly mundane presentations around asthma during the course of their care will divulge that the trigger might have been them being chased for example by a gang which then makes them eligible for us or young people having seizures and then they divulge that it's stress-related because they're being targeted by certain groups. (RED009)

the demographic of patients that present to A&E at UCH [sic], there's very few knife crime directly related, but there tends to be more kind of either self-harm and that type of presentation, particularly in younger people 17 to 21, 23, 24. (Doctor, RED0022)

At UCLH, staff suggested there was a cohort of young people, particularly those aged 18-24, who present “with less physically traumatic injuries” (Redthread youth worker, RED009) and from “assaults without a weapon” (Redthread staff, RED0020). These young people are less likely to be admitted to hospital for longer periods of time, are often seen outside of daytime hours, and can be especially difficult to follow up due to different processes of consent for those aged under 18 and those aged over 18. For example, young adults aged over 18 might sometimes give a false name or contact number or leave without providing any contact details, in which case, Redthread engagement and consent cannot happen (“the pre-engagement stage”) within the hospital setting. Other young people were reported to engage more easily on site, particularly in the paediatrics ED, emphasising the importance of Redthread youth workers having high visibility across EDs:

If the young person is in the A&E and we have a chance to see them face-to-face we don't have to have consent per se to speak to them, but what we will ask the clinician to say is, 'I've got a youth worker here do you mind if they come and talk to you?', just so that they're not a professional walking in and they have no idea who we are.” (RED003)

Clinicians close to the service with direct experience of engaging with Redthread youth workers, or making a referral to the service, also recognised the importance of timely identification of young people eligible for support by Redthread, especially once aged 18 and over and beyond child safeguarding protections:

once they cross that magic line of age, if they are not consented in real time, it's very hard to reach them if they don't want to be reached, or if they are difficult to reach, which they often are. (UCLH Clinician 1)

There were different referral processes that Redthread instigated at UCLH to ensure that no young person eligible for their service was missed (see *Chapter 5*). One important activity in this regard for Redthread was screening the electronic hospital electronic record (EPIC) for admissions amongst 18-24 year olds in the last seven days (e.g. from violent or sexual assault) since this group was most likely to be missed. In addition, youth workers attended MDT meetings (e.g. safeguarding) to identify young people and received direct referrals from staff. Youth workers also monitored patient admissions in real time (e.g. ED ‘track boards’) to identify young people that they could approach *before* they were discharged and who might respond to a ‘teachable moment’.

Redthread staff observed that whilst most referrals they received were from the paediatrics ED, their proactive screening of EPIC suggested there was an equal proportion of patients eligible for the

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service across paediatrics *and* adult EDs, and that the “missed referrals are almost entirely concentrated in people aged 18 and over” (Redthread staff, RED0020).

Interviews confirmed that the weekly paediatric ED safeguarding meetings at UCLH had become a central point of referral to the service with youth workers now fully embedded within them. This had been especially useful for the identification of young people prior to the integration of a Redthread referral form into EPIC enabling clinicians to make direct referrals via the hospital system. Redthread staff spoke of the need to “diversify referral pathways” during early implementation of the service at UCLH due to impact of COVID-19 and the re-direction of UCLH patients to other hospital sites (i.e. the Whittington and Great Ormond Street Children’s Hospital). This had resulted in both the closure of the paediatric ED, and led to discussions with outpatient and other specialist departments (e.g. rheumatology, diabetes) about staff referring young people to Redthread as an additional route. As one youth worker observed, “that left a legacy for our service” and “represented a bit of a pivot” in the type of patients they were now engaging with.

Use of data and service monitoring

To work optimally in the hospital setting, youth workers required an honorary contract to access EPIC. Access to this system was introduced early into implementation of the service and enabled Redthread staff to proactively search for young people eligible for youth worker support who may have been missed, and to log youth worker interactions with young people (e.g. at bedside) in the electronic health record. EPIC further enabled direct staff referrals to the service through an integrated form. Youth workers would then liaise with clinical staff responsible for the young person’s care, and the clinician who had made the referral, and confirm whether it was appropriate to engage and offer this patient the Redthread service:

“We had a young person who was stabbed with a bottle last week and they absconded before they were seen. They attended with police, I don’t know how they managed to slip away So that’s why having access to the [EPIC] [hospital electronic health record] system is good because you can see if there are any follow-up appointments and we’ll put it in our calendar and visit the hospital on that day because we know that if we see them in person it increases the likelihood of engagement.” (RED009)

Staff involved with safeguarding and monitoring patient records appeared most likely to make referrals via the Redthread referral form integrated with EPIC. This was also the case for clinicians providing overnight care when youth workers were not available on-site.

Redthread staff use a referral log template to capture information about young people referred to the service at UCLH, including who is not eligible for – or declines – support. This log (which is only available to view by Redthread staff) contains details such as the name of patient, their hospital number, sociodemographic details (e.g. age, gender and ethnicity), the arrival date and time, referral type, reason for hospital presentation and, where applicable, notes about the incident and any previous attendances for assault. The log is used to record who has made the referral (e.g. clinical staff) and whether there is consent for Redthread to contact the young person. Finally, the log details the type of support engaged and consented young people receive.

Data is only transferred to Redthread’s ‘Lamplight’ system – which researchers/evaluators do not have permission to access or use – if a person is engaged for longer-term support and risk assessed.

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This system allows for the recording of more person-level sensitive information, such as case notes and the names of key statutory professionals in the young person's network. The case management tool is used to record and monitor the allocation of young people to youth workers, ongoing contact, the duration of the support provided and date of case closure.

Redthread staff described a number of issues regarding data capture, flows and processes in interviews:

- Missing useful information in EPIC, the hospital record system, to flag when a young person is eligible for support, meaning young people can be missed (e.g. clinicians too busy to provide detail in the electronic health record, or unsure about the type of information that would be most useful to record, e.g. risk indicators).
- The Redthread referral form within the EPIC form being under-utilised (as mentioned, staff tended to make referral to Redthread directly via in-person contact, phone or email).
- On the other hand, youth workers entering too much detail in the hospital record that could potentially lead to changes in how the individual is perceived and/or treated by clinicians (e.g. if the young person is involved in gang violence or has been a victim of sexual exploitation). Youth workers were especially concerned about notes by social care services and the language used to describe a young person and their needs.
- A lack of information-sharing between hospitals in order to see where young people have been admitted before for violent injury or assault.

As one member of Redthread staff observed:

it would also just be incredibly helpful if there was essentially a button when anybody was logging a patient if they could just say this person is eligible for Redthread. (Redthread staff, RED0020)

The Health Information Exchange (HIE) portal was deemed to be useful because youth workers could review discharge summaries from other participating NHS trusts, and UCLH's own EPIC system was therefore found to be useful by staff for flagging the number of times a person had attended the hospital within a given time period.

Overall, however, issues remained during the evaluation regarding the lack of formal and systematic recording of Redthread referrals and markers in EPIC to flag young people potentially eligible for the service. For more information about data processes and flows, please see *Chapter 5*.

Impact of COVID 19 and redirection of services COVID-19 service-level impacts Early implementation (February 2020 – March 2021)

The Redthread service was introduced to UCLH in January 2020, shortly before the COVID-19 pandemic started and severely affected health systems and societies internationally. This led to the four main impacts in terms of implementing the Redthread service at UCLH, as outlined below:

1. Paediatric patients of UCLH were temporarily re-directed to the Whittington Hospital (a provisional arrangement until March 2021) and referral processes were regularly reviewed by UCLH and neighbouring NHS trusts.
2. Redthread youth workers adapted to provide a virtual youth work service offer during the height of the pandemic and were not physically back 'on-site' at UCLH until August 2020, and worked remotely for an interim period. Youth workers returned to fully working on-site

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in April 2021. The service therefore continued to operate as usual, but for certain periods in a remote capacity. Youth workers received referrals from UCLH staff, including live referrals presenting within ED. Redthread youth workers also continued to work with young people once they were discharged from hospital.

3. Clinical presentations: UCLH staff observed that there were fewer cases of violent injury during lockdowns, yet more severe mental health and other types of safeguarding concerns presenting amongst young people during the pandemic (e.g. domestic violence and sexual assault).
4. There was significant disruption of Redthread's launch and staff-awareness activities because youth workers and paediatric services were not on-site and many staff at UCLH were focused on treating COVID-19 patients.

Interview respondents – both Redthread and UCLH staff – highlighted that the pandemic had not only influenced the types of clinical cases presenting at UCLH, it had severely disrupted the service offer. Nevertheless, youth workers perceived that a remote support offer had been well received by many young people who were comfortable interacting via mobile phones.

we've probably engaged some young people that wouldn't have engaged at bedside because remote conversation is better for them. (Redthread staff, RED003)

Staff awareness and perceptions of the Redthread intervention

Several clinical staff interviewed had prior awareness of the Redthread service from its implementation at other London hospitals and MTCs. Staff viewed the charity as a youth violence service targeting young people caught up in gangs.

Staff spoke of Redthread youth workers as having a complementary and beneficial presence for both clinicians and young people, especially when young people were suddenly confronted with an unfamiliar and daunting hospital environment. The service was seen to align well with UCLH's specialist services (e.g. adolescent wards and paediatric ED), with the result that youth workers had been enthusiastically welcomed and staff reported being "excited" and "passionate" about Redthread. The quotes below illustrate the value respondents placed on the service locally. In particular, staff praised the comforting and neutral presence of youth workers when working with young people and their ability to provide support to young people following their discharge from hospital:

I think it's reassuring for the nursing staff if you've got a young person that's obviously really unhappy and they can have somebody that's there that can chat with them on their level. (RED0012)

In terms of the intervention that they've been able to provide through our young people, it's been absolutely invaluable. I think they essentially deliver a very assertive youth working intervention. They will meet young people on the ward, they will follow them up into the community... They tend to be very good at engaging young people who, which traditional services such as CAMHS or social care, often find it quite hard to reach. (Consultant, RED0021)

that one kind of familiar face is very worthwhile. (Doctor, RED0022)

it's massively strengthened our offer of holistic care to young people I think it has been a really instrumental part of facilitating that care. Particularly in those presenting in the greatest distress. (Consultant, RED0015)

it's helpful to share the burden around ensuring the safe plan for when young people are discharged. I think the team, they're really positive to have around. (RED0011)

Hospital consultant specialists (e.g. paediatric, adolescent, psychiatry) were particularly clear about Redthread youth workers filling a 'gap' as a non-statutory organisation able to connect with internal and external services to assist a young person, as well as hospital safeguarding processes:

the potential safeguarding connections and networking and linking in around trying to prevent someone at risk of violence, let alone someone who's actually already experienced violence, I think puts Redthread in this meta position. (RED0014, Consultant)

I would quite happily have a youth worker for every young person we saw in the Trust, quite frankly. (UCLH Clinician 2)

Staff were eager to refer young people to the Redthread service and would usually do so during the day via telephone, email or by approaching youth workers directly. Within paediatrics and adolescent services, attempts had been made to embed Redthread youth workers as part of different MDTs, rather than simply have the charity 'co-located' without proper involvement with standard care processes. Respondents were, however, aware that the UCLH's dedicated adolescent services were unique and that staff are very "adolescent focused" and receptive to youth workers, meaning the paediatrics ED was a highly conducive context for the Redthread service as a whole. By contrast, it was observed by both clinical staff and Redthread youth workers that embedding the service in *adult* emergency services covering the 18-24 cohort had proven far more challenging:

the adult A&E is really very separate. That's not to say that there aren't fantastic medics and nurses around there, but I would say that as a paediatrician, I've got quite limited influence over them. I'm not really sure how much they know about it, how much they engage with it. (Consultant, RED0015)

I think if you were predominantly interested in adult A&E I think it's probably a service that wouldn't come to mind. (Doctor, RED0022)

those of us who work in children and adolescents we got it much earlier on that it was a really good preventative way of working with young people. (RED0010)

Staff also struggled to say whether Redthread had resulted in specific clinical or quantifiable outcomes and questioned whether hospital reattendances were an appropriate measure of the impact of the Redthread service. Staff discussed general positive benefits and impacts based on their observations of youth worker interactions with individuals and youth worker involvement within a multidisciplinary approach towards caring for adolescents and young people at risk of exploitation, gang crime and the most vulnerable within their local communities (see anonymised clinical case vignettes (Box 2 and Box 3) below for examples).

A young person presents at UCLH with suicidal ideation. Staff become aware, through clinical assessment, that the young person is vulnerable because the family is "in crisis" with aggression occurring in the home which is affecting the young person's mental health. The young person is however "very suspicious" of mental health services (i.e. CAMHS). Redthread youth workers visit the young person on the ward and interact with the family, and then continue to support the young person in the community by engaging with other public agencies.

UCLH staff perspective on the case: "So they [Redthread] are incredibly valuable, incredibly useful in reaching out and engaging that young person to make sure they got the right support they need to keep them safe."

Box 2. Anonymised clinical vignette 1.

A young person is admitted to UCLH having been raped in a particularly violent incident. A large part of the youth worker role is ensuring that the patient can access statutory and support services within the area where the young person resides, with the youth worker liaising across service boundaries, and helping the young person to re-engage in education. They ensure the young person can access appropriate local support given the level of trauma experienced.

Redthread youth worker perspective: despite feeling frustration because they were limited in what they could do with, “So many emails flying between different services,” they were able to mediate across services and provide emotional support to the young person and their family, “just offering a contained space for [the young person] to share [their] emotional experiences of those events.”

Box 3. Anonymised clinical vignette 2.

Some UCLH staff wanted to receive more feedback from Redthread about what happened to supported young people given that reattendance for knife injury, for example, was not necessarily a useful indicator about their impact:

I want to hear some narratives about how the work had shifted something for a young person. To hear their story and what they're doing differently, because I think that can be much more powerful. The readmission might be a good thing, you see. It isn't necessarily a bad thing. (RED0014, Consultant)

Enablers and barriers

The qualitative data were used to identify the organisational factors, processes, resources, and staff training necessary for the successful implementation and delivery of the Redthread service. Table 5 below lists the enablers and barriers that were raised in interviews with both Redthread youth workers and UCLH staff with regards to service implementation.

Table 5. Enablers and barriers.

Organisational enablers	Example(s)	Presence at UCLH (Y/N)
'Invested' clinical champions and service advocates with influence amongst colleagues	Senior doctors act as brokers for hospital-based youth workers, supporting their attendance at MDT meetings, encouraging direct staff referrals, and liaising between hospital management and the charity. This is particularly important during early service implementation	Yes
Physical space for youth workers near EDs, office space	Rooms for having confidential conversations with young people, integration of youth workers as part of hospital staff – space to work	No
Endorsement and support from hospital managers – specifically, heads of EDs	Spread information about the service to EDs' staff, encourage referrals	Mixed – yes within the paediatric ED; less evidence of engagement and awareness in the adult ED
Electronic Health Care Record integration	Form - and potential reminder/prompt - can encourage referrals amongst eligible population; supports timely information sharing about a young person at risk across professional groups (e.g. doctors, nurses, psychiatry, outpatients, social workers)	Yes – although tendency for referrals to come through via the telephone
Clear standard operating procedures (SOP) agreed between hospital and Redthread	Sets out expectations for how the service will operate in practice, including the support and facilities needed to promote the service to staff; enables governance	Yes – although ongoing discussions about eligibility criteria for the service
Funding, dedicated resources	Fund longer-term involvement to allow time for youth workers to embed within a hospital	Yes
Staff training integration	Youth workers present at safeguarding training (e.g. Level 3), hospital inductions and staff away days (e.g. for specialist nurses)	Mixed – whilst Redthread have provided a lot of training, staff observed further opportunities to raise awareness across the Trust
Organisational barriers	Example(s)	Presence at UCLH (Y/N)
Service disruptions	COVID-19 redirecting patients to neighbouring hospitals, youth workers unable to work on hospital site	Yes – until March 2021

Low staff awareness and/or engagement	Less awareness of the Redthread service in adult ED, consequences for missing eligible young people aged 18-24, missed opportunities to consent young people before discharged to the community	Mixed – high awareness in adolescent and paediatric departments; lower awareness and engagement in adult ED
Missing or inaccurate information in electronic health records	Changes in EPIC or lack of information / human errors can make it more difficult to find out a young person's reason for presentation or other factors psycho-socially that might make them eligible for support	Mixed – EPIC integration achieved, although limited integration with other London trusts
High staff turnover	Requires regularly staff re-training by Redthread to ensure all staff are aware of the service and know how to refer young people to it (includes junior doctor rotations)	Yes
Pressures on clinical staff in EDs	Lack of time for clinicians to complete EPIC referrals, send Redthread email or obtain consent and discuss Redthread with a young person if 'hectic' in ED. Over 18s may be missed	Yes – reported to be difficult to gain traction within adult ED

Discussion

Drawing on Nolte's (2018) description of the 'determinants of the adoption, implementation and sustaining of innovation in health service delivery and organization',⁸⁹ the Redthread service at UCLH can be viewed as having high compatibility with the local context and this supported adoption of the service. In particular, the ethos of a YVIP and Redthread's 'contextual safeguarding' approach tailored to the vulnerable young person fitted with a multi-disciplinary and holistic approach to care found in adolescent and paediatric services at UCLH.

Local clinical and non-clinical staff also perceived a need for youth workers, rather than duplicating other professional roles at the Trust, such as social workers, or child safeguarding or play worker roles. Youth workers were viewed as complementing existing services, assisting with clinical care, and providing essential reassurance to young people on the wards and in EDs. Redthread's independent status was viewed as encouraging young people to speak openly with youth workers, this in-turn providing clinicians with important social and contextual information about a young person in the hospital which could facilitate their care planning and treatment. Within paediatrics and adolescent services at UCLH specifically, staff were motivated to engage with Redthread youth workers and discuss cases with them, resulting in a receptive local context for the service. The service was also deemed to be feasible to implement once staff knew enough about how Redthread functioned, how to refer to youth workers, and the types of support the charity could provide.

UCLH had the resources available to implement the service and had already recognised a service 'gap' that youth workers might fill within the hospital environment, prior to implementation. Whilst it was not clear during this evaluation what type of youth-violence prevention or youth-worker model was ultimately the most appropriate for the long-term - especially given the Trust's transient patient population - clinicians nevertheless remained convinced of the value of youth workers being embedded within young people's services at UCLH. Senior consultants played a critical role in advocating for youth worker service integration and presence at the Trust, making the case for Redthread service adoption and finding the resources to both fund and evaluate the intervention locally (i.e. making links with the NIHR RSET evaluation team prior to full service implementation). In addition, the wider public health and community context in Camden – namely, a high number of incidences leading to the premature deaths of young people in the local area – had made a youth violence intervention a timely service offer for UCLH. Clinicians were concerned that, whilst they could fix medical concerns and issues for young people, there was often little they could do once young people were discharged from their care.

Nevertheless, implementation challenges were reported and the Redthread service was yet to become more integrated in the adult ED. UCLH staff and youth workers were also poignantly aware that young people might not perceive themselves as at risk or vulnerable within their community and therefore choose not to engage with the Redthread service, especially if aged over 18 and briefly visiting the adult ED department. Recommendations for the future were that Redthread increase their promotional activities across the Trust, such as by having presence at hospital inductions, more staff training events and nursing away days. This was deemed to be especially valuable given doctor rotations and changes in emergency staff.

Overall, there remain questions about the most appropriate youth worker service model for UCLH given that young people present for a variety of reasons – violence in the community, but also other types of risk such as those resulting in criminal and sexual exploitation, and domestic violence - and

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these can all have physical and mental health consequences for a young person. Different from many other EDs at other NHS trusts, at UCLH, specialist paediatric and adolescent services exist alongside an adult ED department.

Staff therefore wondered how to place the Redthread service on a sustainable footing given limited resources, especially if referrals to youth workers increased (i.e. on account of more staff awareness-raising activities). The youth violence prevention approach in the Trust also appeared to have wider repercussions for the management of long-term conditions amongst vulnerable young people presenting at UCLH, thus extending the charity's reach beyond the 'teachable moment' in emergency departments to youth workers helping young people to positively engage in self-care management of long-term conditions (in cases where clinicians were concerned about safety risks to these patients, e.g. from exploitation or violence).

For the reasons outlined in this chapter, the service was going beyond a 'teachable moment' in adult EDs. Redthread has traditionally operated in MTCs via a service model highly dependent on youth workers' physical presence in EDs and this approach was hugely disrupted during COVID-19, resulting in adaptations at UCLH. There was a virtual support offer to young people and more diverse referral pathways opened up involving direct staff referrals via outpatients' departments, fracture clinics and MDT meetings. Later data collection (i.e. autumn/winter 2021 - 2022) confirmed that the service had become well embedded in paediatric ED and adolescent services as a result (including on specialist wards). It was nevertheless still reported by staff and youth workers to be a struggle to embed Redthread in adult ED.

To conclude, at UCLH, the Redthread service had been welcomed by staff working in UCLH paediatrics ED and adolescent wards; with some clinicians functioning as Redthread service advocates. Amongst UCLH staff interviewees, there was a perceived need for youth workers within the hospital setting to support clinical care and safeguarding functions. Overall, Redthread was viewed positively, not as duplicating other services or roles at UCLH (e.g. that of the hospital social worker).

Limitations

The team wanted to capture the views of young people that had received support from the charity and ask them about the impact Redthread had made on them and their lives as service users. However, as the study progressed, a number of barriers to engaging with young people who had used the Redthread service at UCLH and during the time period of the evaluation became evident, which we describe below.

Firstly, interviews with staff revealed that there were a number of sensitivities and ethical issues given the types of complex cases presenting at UCLH (e.g. young victims of sexual exploitation, family abuse, mental health problems) as illustrated in this chapter. Indeed, a number of clinical cases where Redthread were supporting young people were associated with child and adolescent safeguarding processes in the hospital. Secondly, some of the young people who were likely to be benefitting from youth worker support would find it very difficult to discuss their recent experiences and reasons for attending UCLH with an unfamiliar outside researcher. Thirdly, young people were often still receiving active support from youth workers and UCLH services (e.g. as outpatients), as well as other support agencies, and there issues around breaching patient confidentiality to identify and approach them. It was therefore agreed with Redthread that because of confidentiality and

anonymity issues, it would be better to talk to young people who had worked with the charity for some time, and where personal risks to them had since decreased. From an evaluation perspective, it was also felt that in order to conduct meaningful interviews - where the young person felt comfortable - a decent amount of time would be required following hospital discharge, plus a carefully coordinated process of 'high risk' ethical review, additional researcher education and training with Redthread and clinicians (e.g. about the specific cases and any safeguarding issues they raised), and that this was not feasible within the timeline of a rapid evaluation.

Due to these practical and ethical challenges, discussions were instigated between the lead qualitative researcher and Redthread managers about the possibility of conducting interviews or a focus group with up to five Redthread Youth Ambassadors with the support of the charity and using a co-designed topic guide. Ambassadors are young people who share their experience of receiving Redthread support and how it has impacted upon them. Whilst the charity were supportive of this, further discussions revealed that the group were at risk of being 'over researched' at the time given a number of other evaluations teams / researchers also engaging with them, and this might induce some reluctant to engage. Furthermore, the group were based in the Midlands and Redthread staff suggested their perspective would be quite different from young people living in London. Given the absence – at the time of the evaluation – of a less 'over-researched' group of Youth Ambassadors based in London, it was decided that this avenue would not be pursued.

In addition, data collection was performed remotely (using MS Teams) due to COVID-19, therefore no clinical-patient interactions were able to be observed (e.g. in A&E) to minimise the risks of spreading disease. When taken together, these factors meant that at the particular time point of this rapid evaluation, it was very difficult to engage with Redthread service users at UCLH or from across other London NHS Trusts during this evaluation, or to directly observe youth workers engaging with young people in A&E.

The findings in this chapter also represent staff that were supporters of the service and volunteered to be interviewed about the Redthread service. Engagement with staff from adult ED was difficult and some staff from adult ED felt they did not know enough about Redthread to take part in an interview. This confirmed the case study findings: that Redthread's awareness-raising activities had been significantly disrupted by COVID-19 and the service was not yet fully embedded within UCLH's adult ED. Finally, we did not take a theory-based approach (e.g. realist evaluation) or attempt to develop or revise Redthread's own programme theory, although we noted that the charity updates and refines its own 'theory of change' and logic models described in this chapter. We were however in ongoing discussions with Redthread and clinical collaborators to ensure that the findings were accurate findings and could inform future implementation of the service at UCLH and the charity's service offer across other local EDs which have different case presentations when compared to large major trauma centres.

Chapter 5: Description and review of data used to manage the Redthread service at UCLH

What this chapter adds

- Between February 2020 and December 2021, 397 young people were referred to the Redthread service. Of these, 59 (15%) engaged with the full longer-term programme and 110 (28%) received shorter-term crisis support.
- 59% (124/210) of 11 to 17-year-olds who were referred to the service, engaged with it, compared to 23% (42/181) of 18 to 24-year-olds. This difference would have been influenced by the safeguarding mechanisms in place for children, with it being more difficult to follow up 18 to 24-year-olds in the community.
- Individuals eligible for Redthread may be identified by clinicians in the emergency department, on the wards or within outpatient clinics. They may also be identified by Redthread staff themselves within ED or by searching through patient notes.
- Data on individuals referred to and engaging with the service is recorded in different systems depending on its purpose.
- These databases are not formally linked to routine hospital data and this can limit the ability of Redthread to view attendance histories of their service users and of UCLH staff to identify who has been referred to and is using the service. It also influences the chances of carrying out a robust quantitative evaluation of impact.
- The absence of data linkage and the challenges of collecting service user consent retrospectively in order to analyse individual-level data has limited what we have been able to find out about the levels of engagement among different population groups because, in particular, we were not able to analyse the data by multiple characteristics at the same time.
- We recommend that:
 - UCLH Integrate the mandatory data collection Information Sharing to Tackle Violence with the Emergency Care Dataset or reporting a routine clinical code indicating a referral to a violence intervention scheme. This would help accurate identification of this cohort within routine data.
 - UCLH and Redthread populate key performance indicators developed by NHS England and NHS Improvement for effective implementation of in-hospital violence reduction programmes.

Introduction

In this chapter we describe the data flows and data collected to manage Redthread's service at UCLH to provide context for the subsequent chapter on the feasibility of quantitative evaluation. We describe what we have learned from the available data about the people who were referred to and engaged with the service, and provide recommendations for improving data flows to help understand and monitor the impact of Redthread on hospital activity.

Use, collection and flow of data to manage referrals to Redthread's Youth Violence Intervention Programme

The process of identifying young people eligible for Redthread's YVIP in UCLH comes from two main data sources (see *Figure 5*). This is either from a referral from a clinician who has seen an individual

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face-to-face (either from an emergency admission, an emergency attendance or an outpatient appointment), or through a Redthread member of staff screening hospital data for those that are potentially eligible to receive Redthread services.

As well as clinicians making in-person referrals to Redthread services, a Redthread member of staff may occasionally be involved in ED through using the Live Track Board within the department. This enables them to see all young people in the department at that time, checking the age and reason for presentation as well as free text comments when a young person presenting in ED appears to be eligible for Redthread services. After gaining approval from a clinician, Redthread staff may approach the young person to offer their support.

The latter process is carried out by Redthread on-site at UCLH, where the Redthread team monitor UCLH's referral email inbox. Redthread also implemented an additional process for referrals that entailed screening the hospital's patient administration system, EPIC, for those who attended ED in the last seven days. This involves a detailed search of clinical notes, where a young person may appear eligible based on the details of their previous hospital attendance, such as whether they are victims of physical assault. However, this approach has its limitations. Since this is looking at previous hospital attendance, there is less clarity about the nature of the presentation due to limited information recorded on the system, whereas attendances happening at that moment would enable staff to pick up additional observations made by the responsible clinician.

Referrals can be received by Redthread via in-person conversations with a clinician, email, telephone, through the hospital database or through safeguarding meetings involving clinicians at UCLH. During the peaks of the COVID-19 pandemic, the vast majority of referrals were handled remotely, which differed from Redthread's typical set-up of being based on-site in a hospital's ED. As lockdown restrictions eased, this enabled more in-person referrals to be made.

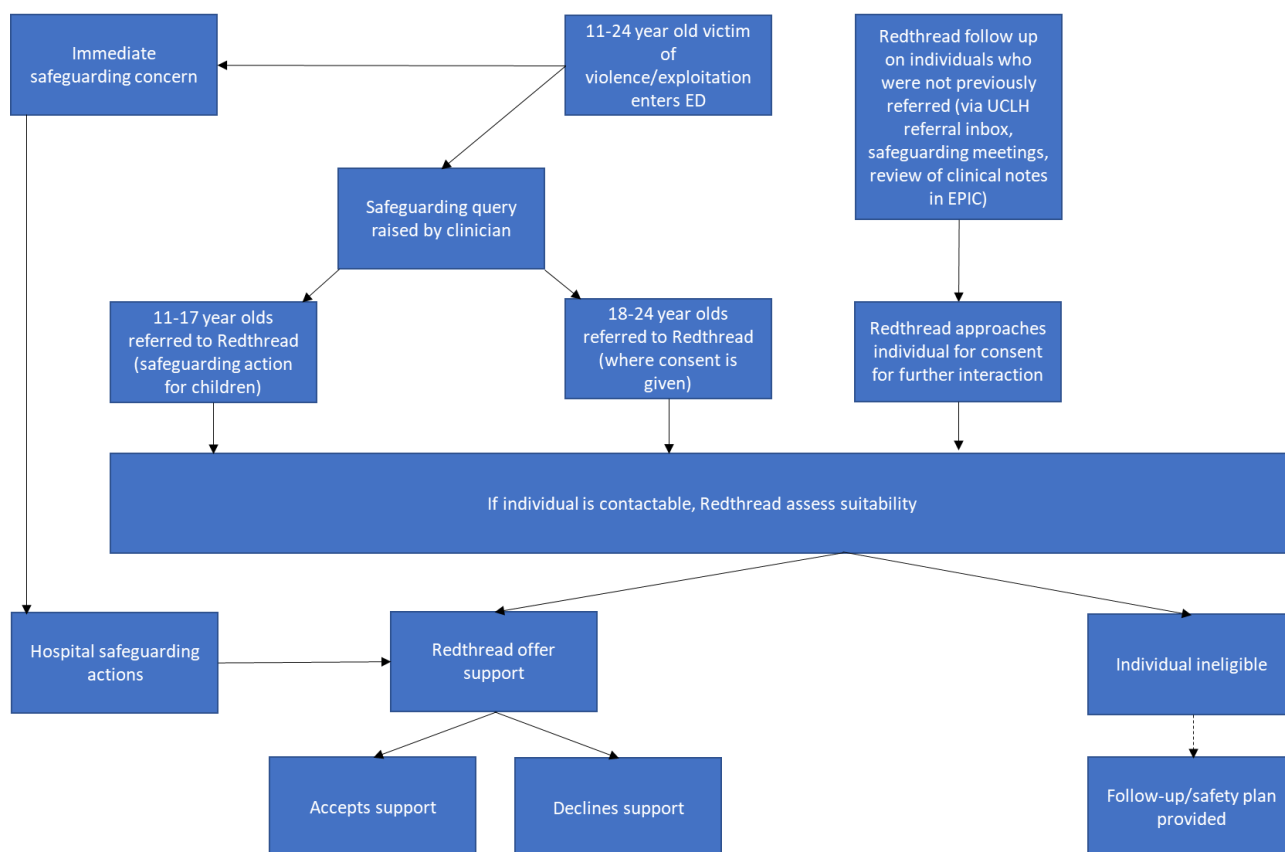


Figure 5. Process to identify young people eligible for Redthread services attending UCLH.

Once a referral is made by a clinician, Redthread then assess the eligibility of the referred young person for the service. A young person is considered eligible if they are within the target age range, if they present at UCLH and they are a victim or at risk of violence and exploitation. However, even if an individual is ineligible, Redthread can draw up a safety plan if they consent to receiving support.

When referrals are received by Redthread, details of referrals, data on the initial hospital presentation and attempts to contact individuals are recorded in Redthread’s referral log. Consent is also collected from young people referred to Redthread if they agree to receive support from the service, which can include consent to gather and store information on the individual to draw up a safety plan to provide short-term crisis support, or can involve a young person consenting to engage longer-term with the programme. Young people are also reassured prior to consenting that appropriate measures are in place to uphold individuals’ confidentiality. This information is also captured in the referral log, which is maintained by and only accessible to Redthread (see Table 6 for a breakdown of information collected across the different systems).

If a young person has consented to longer-term engagement with the service, Redthread uses a more in-depth case management database, Lamplight, that enables the team to track all interactions with youth workers, the status of engagement and stores the safety plan, young person’s risk assessment and end assessment following completion of the intervention. All interactions and work

done with young people is stored on this system for both record-keeping and safeguarding purposes.

A summary of all ongoing, open and closed cases is logged by Redthread in their Case Management Tool. This provides an overview of the status of each referral that they receive, and it is updated weekly for use in case management meetings. Information on the number of referrals and young people engaged in long-term or short-term support with Redthread is also used in their newsletter, which is published quarterly. Redthread are seeking to implement a new case management tool, and will be evaluating their risk assessment framework in the near future.

Reattendance data for violence-related reasons are collected by Redthread, though this only includes attendances at UCLH, rather than hospital activity elsewhere. This is done through matching the young person’s medical record number (MRN) in EPIC (an identifier specific to UCLH) to the one held in Redthread data.

Table 6. Overview of data systems involved in recording Redthread referrals.

Redthread data collection	Includes information on	Key data fields
Referral log	All referrals	Details of hospital attendance (arrival date/day/time/reason for presentation/mode of arrival), discharge outcome, location of incident, name, date of birth, address, details of referral (method/date/time), age, consent for Redthread to contact (if given), signposted to other services, other support given (emotional, transport, food, clothing, prescription or further treatment)
Case Management Tool	All referrals Ongoing cases Open cases Closed cases	Name, date of birth, gender, initial hospital attendance and referral, reason for referral, responsible borough Total referrals made, contact attempts (individual and professional network), case allocated to youth worker, contact successful/unsuccessful, ongoing/upcoming actions, risk level Ongoing actions/engagement with the young person (support plan, risk assessment, action plan and end assessment) Contact attempts (individual and professional network), six-month follow-up, review status against initial risk assessment

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Lamplight	Long-term engaged young people	Age, MRN, gender, ethnicity, address, main language, referral route into Redthread, first contact point, 6-month follow-up completed, risk assessment, date of consent, contact details, preferred method of contact, family circumstances, accommodation, known to statutory services
UCLH data management system (EPIC)	Clinical notes for all patients attending UCLH	MRN, free text (may include Redthread mentions or interactions Redthread workers had with the young people in hospital)
UCLH Live Track Board	Live tracking of all patients in the ED attending UCLH	Age, reason for presentation

While there is a wealth of information collected by Redthread, much of it is not linked to hospital record systems, even though linkage is technically possible as MRNs are held both by Redthread and UCLH. However, retrospective consent from Redthread service users would be needed in order to use individual-level data for the evaluation, and this is challenging to obtain. Acquiring consent from a young person in the first place can require building a trusted relationship with the individual, so the need to put appropriate confidentiality agreements in place aligns with the basic principle of the service: supporting and empowering the young person and ensuring that they feel safe to open up and work with Redthread. While this poses a challenge for the purposes of quantitative evaluation, the consent model for this service is an appropriate one due to the sensitivity of the information that Redthread hold on service users.

In addition, linking Redthread data to hospital data may mean that Redthread could get sight of additional hospital attendances that a young person has not disclosed to them, which could be particularly sensitive. There were also limitations to the data collected by UCLH, namely, an absence of codes specifying whether an individual was referred to or approached by Redthread. Rather, much of this information appeared in free text fields, if indeed it was recorded at all. This made it difficult to establish how many young people who were eligible to receive Redthread services were passing through UCLH. More reliable identification could be achieved, by, for example, using a clinical code indicating a referral to violence reduction services has been made (see *Chapter 7*).

One of our options for data analysis was to link data held by Redthread to routine hospital data. This would have allowed us to make a comprehensive assessment of past hospital attendances for Redthread service users, and enable us to use matched controls to understand whether engagement with the service had any influence on hospital reattendance. However, UCLH do not record injury intent in emergency care records, which would have indicated whether the attendance was as a result of assault or self-harm. Integrating the mandatory data collection Information Sharing to Tackle Violence with ECDS,⁹⁰ or reporting of a routine clinical code indicating a referral to a violence intervention scheme, would help with more accurate identification of this cohort from routine data. It should be noted that this still may not pick up instances where it is not immediately obvious that a young person is at-risk, as they may be reluctant to reveal their real reason for requiring hospital

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treatment. In addition, the initial reason for hospital attendance may not always be the reason that a young person is referred, so this approach would also miss out these instances.

A guide for effective implementation of in-hospital violence reduction programmes, developed by NHS England and NHS Improvement, highlights key performance indicators and how they would be measured. This includes capturing data on exact numbers of eligible young people attending ED, and establishing a baseline of how many young people were referred and engaged compared to total numbers.¹⁸ Quantitative data requirements for evaluation should be established at the outset, so that sufficient information is collected at the start of the study period for robust data analysis to take place.

Descriptive information about young people referred to Redthread's Youth Violence Intervention Programme

Redthread shared aggregated information on age, gender, reason for hospital presentation, reason for referral, and who it was that made the referral, split by those who received short-term crisis support, longer-term support and by those who were not supported by Redthread services. Additional data on ethnicity was shared, but this was only collected for those who were engaged in long-term support from the Redthread programme.

Since the introduction of Redthread to UCLH in February 2020 to the end of the study period (December 2021), 397 eligible referrals were made to Redthread. Of these, 169 (43%) young people received some form of support from the service. This compares with engagement rates from previous studies ranging between 28% and 54%,⁹¹⁻⁹³ though it was not clear how much the level of support young people were receiving in these studies differed with the support received for this research. It should also be noted that a significant part of the study period was impacted by the COVID-19 pandemic, which may have impacted uptake.

In the first few months, the number of referrals to Redthread were low (Figure 6), coinciding with the first COVID-19 lockdown, where the overall number of hospital attendances decreased.⁹⁴ In addition, alternative methods to referring young people in-person, such as via telephone, may have been less successful at reaching those who were being targeted to receive an offer of the service. However, the low referral numbers can also be attributed to paediatric services being redirected to the Whittington Hospital during the lockdown periods, with normal services for paediatrics in UCLH resuming in April 2021. Conversely, increases in the number of referrals nearer the end of the reporting period were largely due to the Redthread team being able to have more of a presence in ED.

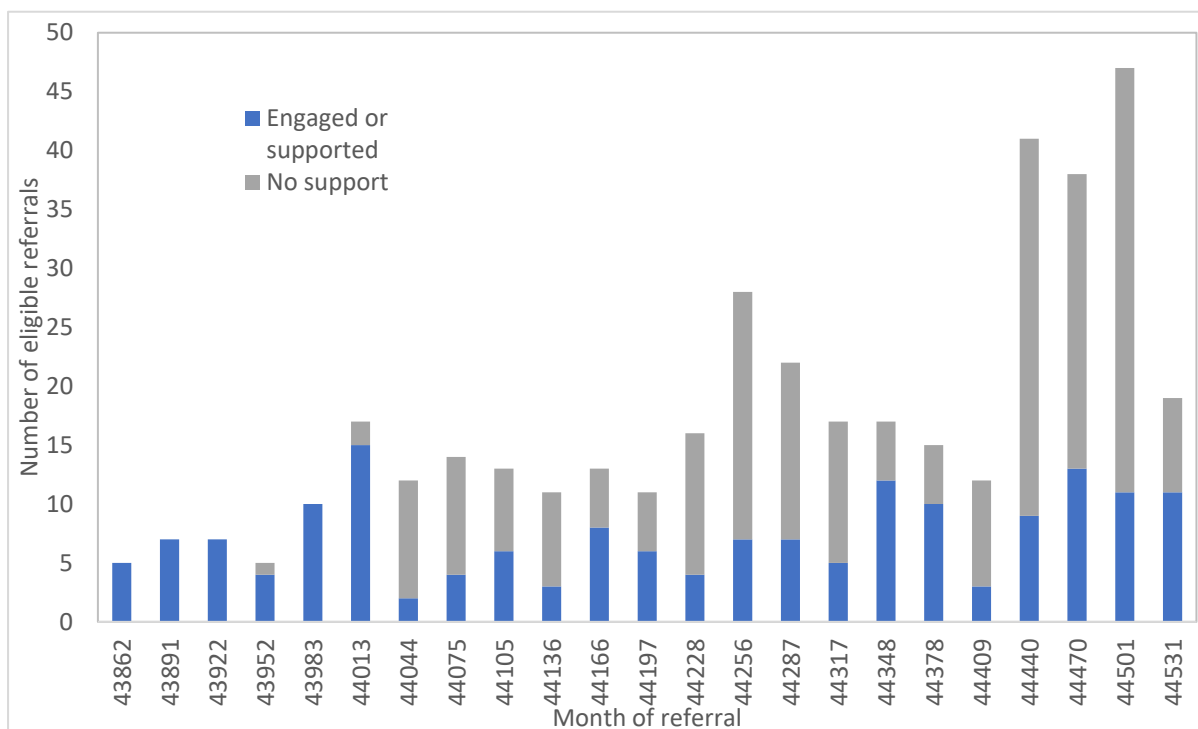


Figure 6. Number of eligible referrals to Redthread by level of engagement and by month.

There were differences in the characteristics of young people who were supported by the service compared to those who were not supported (Table 7). For example, over three in four (77%) young people aged 18-24 did not receive any support from Redthread services compared with 41% with no support in the 11-17 age group. The lower proportion of engaged over-18s may partly be because hospital attendances that are retrospectively followed up as a referral cannot be done without consent for this age group. However, action can be taken for those aged under 18 due to safeguarding reasons, and the referral process within paediatrics has been reported to be more embedded than the process in place for young adults (see *Chapter 4*).

Sixty-one per cent of referrals to Redthread were male. This proportion was lower than previous studies evaluating violence intervention programmes,⁵⁶ though the Redthread service at UCLH includes young people supported for other reasons, such as mental health or substance abuse, which was not always the case in the existing literature. Looking at engagement by gender, a higher proportion of females engaged with Redthread compared with males (45% and 41% respectively).

Ethnicity data were only available for those who consented to longer-term engagement with the Redthread service, therefore it was not clear if there were differences in the likelihood of uptake between different ethnic groups. Of those who received longer-term support, nearly one-third (31%) were white; the second largest group were of black ethnicity (27%).

Table 7. Number of referrals to Redthread by patient characteristic and level of engagement, February 2020 – December 2021.

Characteristic	Referrals by characteristic	Number of referrals*	Longer-term engagement (%)	Short-term crisis support (%)	No support (%)
Total		397	59 (15%)	110 (28%)	228 (57%)
Age	11-17	210	40 (19%)	84 (40%)	86 (41%)
	18-24	181	17 (9%)	25 (14%)	139 (77%)
Gender	Female	152	29 (19%)	39 (26%)	84 (55%)
	Male	244	30 (12%)	71 (29%)	143 (59%)
Ethnicity**	Asian		11 (19%)		
	Black		16 (27%)		
	Mixed/Other		8 (14%)		
	White		18 (31%)		
	Unknown		6 (10%)		

* Sub-totals may not add up to total numbers due to missing data.

**The ethnicity variable shows the percentage breakdown within the longer-term engaged group only, as ethnicity is not recorded for all referrals.

We also looked at the data by reason for referral and by reason for hospital presentation (Table 8). When breaking the data down by reason for hospital attendance, the group that had the highest engagement rate (60%) were those who attended hospital due to “illness”, but it was not clear what sort of illness this category referred to. The most common reason for hospital presentation of those referred was assault (44%). This was partly because referrals followed up retrospectively were identified through EPIC, which were limited in detail, but those that had an assault recorded in their hospital record were likely to be eligible for Redthread. However, this group had an engagement rate of 34%, which was lower than other reasons given for hospital attendance.

As with reasons for hospital presentation, assault (or history of assault) made up a large proportion of referral reasons. Rates of uptake were similar, with around one in three (32%) receiving longer-term or short-term support from Redthread. However, while there may be overlap with reasons for referral and reasons for hospital attendance, initial presentations to hospital may not record the underlying reason for a Redthread referral. Support from Redthread was also received by 45% of those who were referred due to risk of harm. While we are unable to conclude why the rates of uptake vary between different reasons for referral, there could be cases where certain presentations to hospital that are followed up retrospectively in hospital data (such as assault) are less ambiguous in whether the young person would be eligible for Redthread. These retrospective cases would be followed up remotely, which may have impacted on the likelihood of engaging.

Table 8. Number of referrals to Redthread by reason and level of engagement, February 2020 – December 2021.

Reason for hospital presentation or referral	Referrals by reason	Number of referrals	Longer-term engagement (%)	Short-term crisis support (%)	No support (%)
Reason for hospital presentation	Accident	59	* (*)	17 (29%)	39 (66%)
	Assault	175	22 (13%)	36 (21%)	117 (67%)
	Mental health/substance abuse	102	18 (18%)	34 (33%)	50 (49%)
	Illness	38	10 (26%)	13 (34%)	15 (39%)
	Other	23	6 (26%)	10 (43%)	7 (30%)
Reason for referral**	Risk of harm	177	22 (12%)	58 (33%)	97 (55%)
	Assault or history of assault	173	21 (12%)	35 (20%)	117 (68%)
	Domestic or sexual violence	42	7 (17%)	10 (24%)	25 (60%)
	Child criminal exploitation or child sexual exploitation	18	* (*)	8 (44%)	7 (39%)
	Other	14	6 (43%)	* (*)	* (*)

*Numbers between 1 and 5 have been suppressed. Sub-totals may not add up to total numbers due to missing data.

**The total number of referrals broken down by 'Reason for referral' is 424, which is higher than the total of 397 referrals for other breakdowns. This is due to receiving reasons for referral data separately, which may have counted additional referrals that were previously not recorded.

Key findings

- 59% of referred young people aged 11-17 engaged with the service, compared to 23% of those aged 18-24. This will, in part, have been influenced by the safeguarding mechanisms in place for children, with more challenges in following up 18-24-year-olds in the community
- Looking at engagement by gender, a higher proportion of females engaged with Redthread compared with males (45% and 41% respectively), though this difference was not statistically significant. Previous literature typically focussed on violence-related injury, where the proportion of males sustaining such injuries were typically higher.
- There are limitations to what we can feasibly analyse and conclude from Redthread's data in isolation without linkage to routine health data, given that Redthread's consent model does

not allow individual-level information to be shared outside their organisation. These limitations include:

- Data that are captured on hospital activity relate to UCLH only, rather than hospital activity more widely.
- We were not able to analyse levels of engagement by multiple characteristics, and so cannot reflect on whether there are combinations of age, gender and ethnic groups that are less likely to engage with the service.
- There are also drawbacks to simply using data from UCLH's patient administration system, as Redthread referrals are not consistently flagged. Where referrals are recorded, they are only done so in free text rather than within a dedicated coded data field, and there is no information beyond indicating that an initial referral has been made. Recording referrals consistently in a dedicated data field would help to readily draw more information out (such as demographics and retrospective hospital attendance) on those who were referred.
- We found that UCLH did not make use of the injury intent field in their emergency care data systems. Completing this field would help more accurately identify whether an attendance was due to an assault or because of self-harm, which may be a helpful indicator of young people who are eligible for Redthread services.
- Being able to link Redthread data to national routine datasets, such as HES and ECDS, would provide richer information pertaining to demographics, as well as an indication of retrospective hospital use and the reason for attendance where a referral to Redthread was given. This would allow for establishing what the impact of Redthread on hospital services would be, but sufficient time prior to service roll-out must be given to setting out data requirements and ascertaining the feasibility of each option.

Chapter 6. Cost-consequence analysis of Redthread Youth Violence Intervention Project at UCLH

What was already known?

- The YVIP has helped in reducing hospital re-attendance rates from 4.8% to 2.9% for at-risk young people attending St Mary's hospital during a three-year period.
- A comprehensive cost-benefit analysis evaluating Redthread's Youth Violence Intervention Programme found a £4.90 economic and social benefit per each £1 spent on the programme.

What this chapter adds

- The mean Redthread cost per person engaging with the programme was estimated to be £1,865.
- The mean NHS cost for an 'artificial' group fulfilling eligibility criteria of Redthread and treated at UCLH was estimated to be £ 5,789 for an emergency inpatient admission and £203 per attendance at A&E.
- The costs of the Redthread service at UCLH would be offset by savings if around a third of the engagements with Redthread led to at least one avoided emergency inpatient admission.
- Assessed risks for young people engaging with the Redthread programme decreased after the intervention for the risk of *experiencing further harm* and for *not maintaining positive relationships with family*. No statistically significant change was found for eight further aspects of risk and three overall measures of risk (*harm from others, harm to others and harm to self*).

Background

Knife-related incidents are a significant public and political concern in the UK. It has been estimated that violence-related care constitutes around 12.9% of trauma teams' workload⁹⁵ and that it costs the NHS £2.9 billion a year.^{96,97} Violence-related trauma primarily affects young men and incurs substantial costs, not only in terms of the direct costs of medical care, but also the societal losses related directly to permanent disability and premature death.⁹⁸ Indirect costs, though not often quantified in the literature, can be much higher, including loss of psychological and social function to the individual, diminished community cohesion and loss of economic productivity.

The initial aim of the economic analysis was to conduct a cost-effectiveness analysis of the Redthread YVIP at UCLH from the perspective of the NHS and personal social services, answering the research question: How cost-effective is the implementation of the Redthread service at UCLH?²¹ However, for reasons described in *Chapter 7*, we established that it was not going to be feasible to evaluate the quantitative impact of the service within the timeframe of the project so we focused on a Cost-Consequence Analysis approach (CCA).

The aim of the CCA approach was to quantify the costs and consequences (or effects) of implementing the Redthread YVIP programme at UCLH. The analysis of costs comprised the costs of (i) implementing and running the Redthread YVIP programme at UCLH, and (ii) treating patients in

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the ED and/or inpatient settings at UCLH. The measures of consequences were based on the risk assessment outcomes of the young people engaging with the Redthread YVIP.

The specific research questions that this analysis aimed to address were:

1. What were the mean per person costs of engaging with the Redthread YVIP during the period February 2020 – December 2021, considering both the implementation costs for Redthread and the treatment costs at UCLH?
2. How do the mean costs per young person under the YVIP programme compare with the main consequences as identified in the individual risk assessment for those engaging with the Redthread YVIP?

Methods

CCA is a type of economic evaluation in which all costs, both direct and indirect, and a catalogue of different consequences of all alternatives are computed and listed separately without aggregating these results into a cost-effectiveness ratio.^{99,100} This approach allows quantification of findings and process measures and compares them to the costs of particular interventions. This form of economic evaluation is distinct from both cost-effectiveness analysis (CEA) and cost-benefit analysis (CBA), which tend to focus on a single outcome measure and aggregate costs and the outcome into a single summary measure.^{101,102} CCA is the appropriate form of economic analysis to use in the present study given the range of possible outcome measures for the Redthread intervention.

Measuring Consequences based on the Redthread Risk Assessment

In total 14 quantifiable measures of the consequences of the Redthread intervention were included. These were derived from Redthread's own risk assessment tool which is completed by Redthread staff before young people were engaged with the intervention and reviewed when a case closes and again on a 6-month follow up. Data from these risk assessments covered the period April 2020 to November 2021 for 36 young people engaged with the Redthread programme. The risk assessment process is a specifically designed tool used by the Redthread youth workers to capture information on key outcomes and provides an overview of the risks faced by young people. The risk assessment is carried out by youth workers using their professional judgement and interpretation on what the young people using the YVIP service say and think (eg, about their safety score on the safety plan).

Thirteen out of the 14 risk dimensions used were based on an exclusive risk indicator varying from 1-3 (measuring low, medium or high risk) for engaging or experiencing: further harm, exploitation, engaging in criminal behaviour, risky lifestyle, not engaging in education, employment, not maintaining positive relationships with family, not engaging with other (provided) services and the risk of not being able to identify an escalating problem. While three of these were based on an overall risk assessment (*risk of harm to others; risk of harm from others; risk of harm to self*). The last referred to the level of safety perceived by the young people using a 10-point Likert scale where 1 equalled 'very unsafe' and 10, 'very safe' (see *Appendix 5, Table 13* for the full list of risk indicators).

Statistical Analysis

The mean score for each risk dimension was reported separately and statistical tests of the differences in risks 'before' and 'after/during' the follow-up were carried out using McNemar-Bowker and paired Student t-test. McNemar-Bowker tests were then conducted within-subject to look at young people's feelings of safety at the initial risk assessment compared with the 'after' risk

assessment. Paired samples t-test were conducted to identify if there was any statistically significant change in safety ratings pre- and post-intervention.

Measuring Costs

The analysis of costs focused on the cost of Redthread YVIP programme and the cost of the young people treated at UCLH. The costs of the Redthread intervention were analysed from the perspective of: (i) the Redthread YVIP programme and (ii) the health care provider (accounting for costs of UCLH hospital treatment). The YVIP programme costs were calculated as mean costs per young person for the study period (February 2020 – December 2021).

The information provided by Redthread covered expenditures for the fiscal year April 2020 – March 2021 and the budgeted expenditures for the fiscal year April 2021 – March 2022. Our period of analysis was limited to the 21 months (April 2020 – December 2021) for which we were provided with information on the numbers of young people receiving support. We assumed a constant rate of the expenditures over these months.

The main activities provided by Redthread team consisted of: (i) the frontline work, (ii) programme development, (iii) training provided to the medical staff, and (iv) administrative work (Box 4). The information used to calculate the mean cost per young people included: (i) costs of staff that were involved in running the service (one team leader, two youth workers and one programme co-ordinator), (ii) the operating costs, and (iii) other administrative costs. No distinction was made between the mean costs per fully engaged versus lighter-touch supported young people due to the lack of disaggregated information on the time and resources used for each category by the Redthread.

Box 4. The main activities provided by Redthread team.

Frontline Work included all work undertaken for young people whether they are fully engaged or lighter-touch supported and included all bedside work and interventions, liaising with professional networks, any and all intervention work with young people, referrals and signposting for young people. Besides this, the frontline work also included any work that contributes to receiving referrals and engagement such as attending hospital-based safeguarding meetings or MDT meetings, screening the hospital system for referrals, attending handovers on-site in ED and managing the referral phone and referral inbox.

Programme Development have covered any work done to support the delivery, evaluation, reporting or growth of the service. This has included quarterly operations meetings, attending quarterly Safeguarding Committee to provide updates on service delivery, partnership working as well as all the data collection and information logging done by the PC. Partnership meetings are held across the team and these are important in creating referral pathways through the service.

Training has been related to the delivery of training sessions to clinical team, external partners, national conferences and clinical champions.

Administrative Work has covered anything that is supportive for the individual worker. This included clinical supervision spaces, supervision with manager, appraisals, case management meetings, individual case management oversight and continued professional development.

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Source: Redthread, personal communication.

As the information collected by Redthread was not linked, or easily linkable, to UCLH's patient administrative system (see *Chapter 7*), it was not possible to directly measure the cost of hospital treatment for young people using Redthread services. An 'artificial' treatment group was therefore created from HES APC data. This group was defined with reference to Redthread's eligibility criteria: aged 11-24-years-old, admitted to UCLH as an emergency between February 2020 to November 2021, with recorded diagnosis codes that broadly matched reasons for referral to Redthread YVIP (for more information see *Chapter 7* and/or *Appendix 3*). All the relevant Healthcare Resource Group (HRG) codes were then identified for each relevant admission spell using this artificial treatment group. UCLH provided all the HRGs for all the 11-24-year-olds admitted to the hospital through the A&E for the three-year period 2018-2021. For each relevant admission spell, the relevant HRG code was selected to extract UCLH cost information for each of the admitted patients for the three year period. The mean cost per inpatient and for those attending A&E were averaged over the three years given variations between years. All prices were inflated to 2020 prices.

Results

Consequences

The information on the initial – before – risk assessment for young people using YVIP for the period April 2020 – November 2021 is shown in Figure 7 (and in *Appendix 5, Table 13*). Young people were identified as facing a number of potential risks, particularly in relation to: *experiencing and participating in further harm, experiencing and participating in criminal behaviour, engaging in education, employment or training, not willing to engage with other services and not maintaining positive relationships with family*.

Figure 7 shows that, among all the assessed risks, the higher proportions of young people were identified as 'high risk' for (i) *not maintaining positive relationships with family* (22%) and, (ii) *not engaging in education, training or employment* (19%).

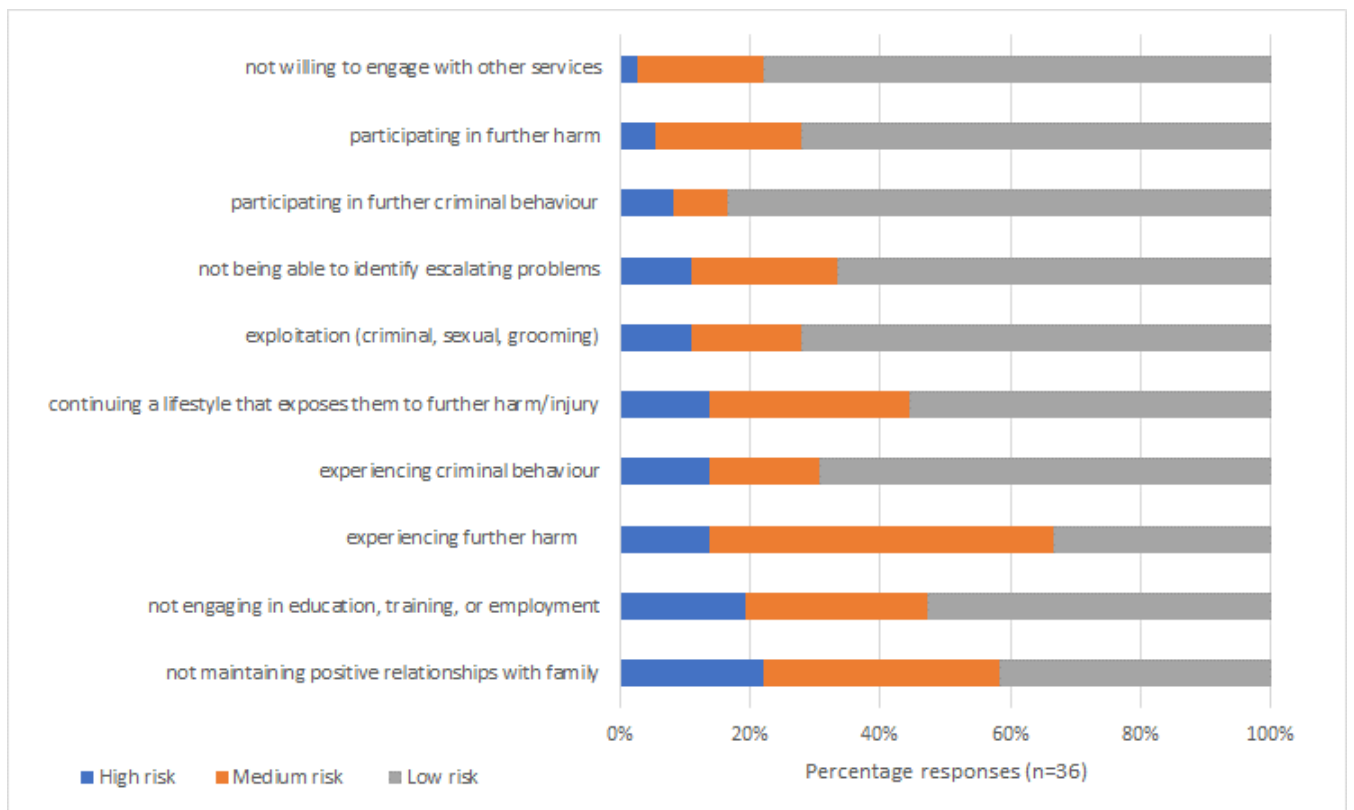


Figure 7. Risk factors in the initial risk assessment for young Redthread young people who used the service in the period April 2020 – November 2021.

Source: Redthread Risk Assessment Data.

Figure 8 shows the range of assessed risks post-engagement. Broadly, the proportion of young people assessed to be facing high risks decreased or remained the same for all categories except for the risk of *not willing to engage with other services*, which rose from 2.8% to 5.6%.

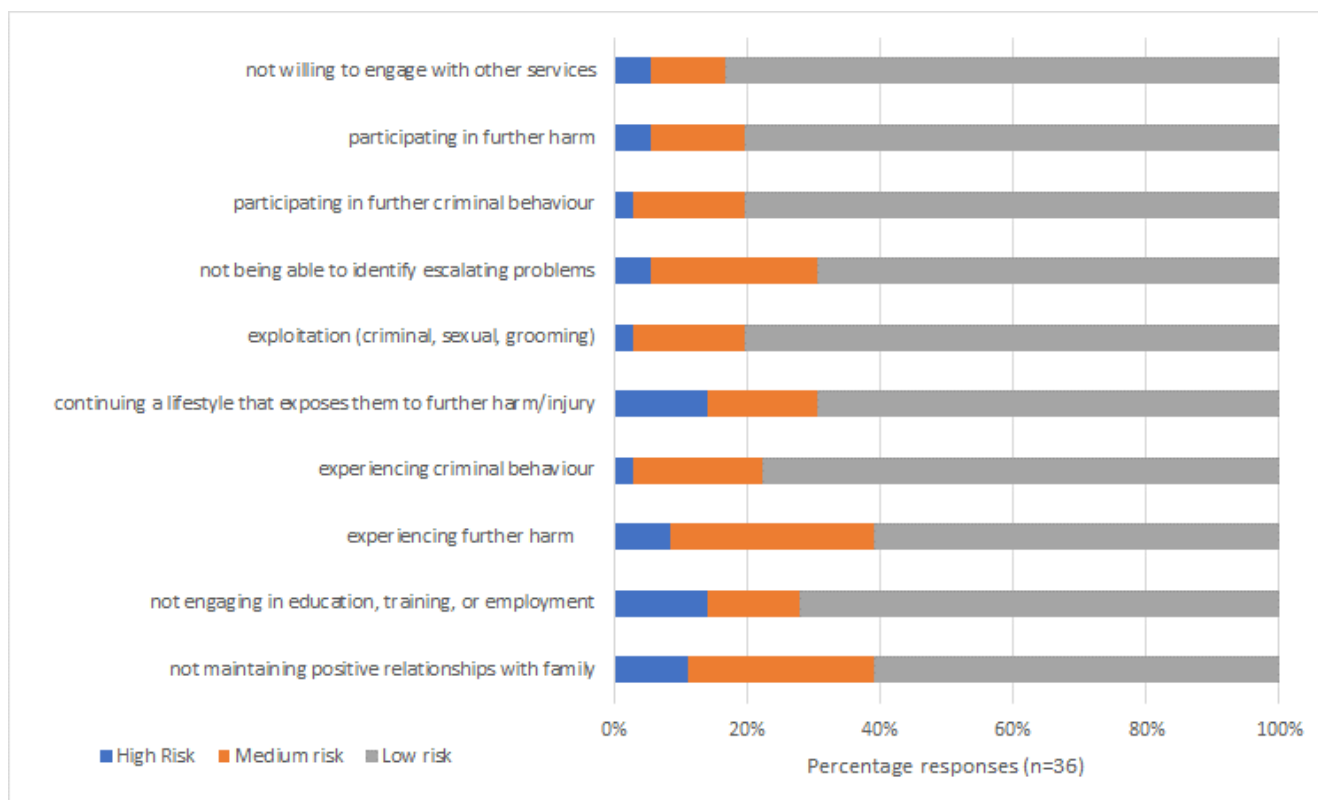


Figure 8. Risk factors in the end risk assessment for young Redthread beneficiaries who used the service in the period April 2020 – November 2021.

McNemar-Bowker tests of symmetry were then carried out to identify whether there were significant changes in risk factor ratings from the initial assessment to the end assessment (Table 9). The test revealed that the reduction in risks pre- and post-intervention were statistically significant for just two of the risk categories: *risk of experiencing further harm* ($\chi^2(3)=8.40$, $p=0.0384$) as well as for risk of young people *not maintaining positive relationships with family* ($\chi^2(3)=5.77$, $p=0.050$). The results show that the majority of the young people remained in the low-risk category and the changes from high-risk to medium-risk were more usual than remaining at the high-risk category.

A paired samples t-test was also conducted to identify whether there was a significant change in the overall score on how safe the young person felt right now. While there was a slight improvement on this overall measure (Before: $M=7.11$, $SD=2.18$; after: $M=7.77$, $SD=1.90$) this change was not statistically significant.

Table 9. Comparison of initial (pre) and end (post) risk assessments

Initial risk assessment	End assessment				χ^2	p-value
	Low risk	Medium risk	High risk	Total		
Risk of young person of experiencing further harm						
Low risk	11	1	0	12	8.40	0.0384
Medium risk	9	8	2	19		
High risk	2	2	1	5		
Total	22	11	3	36		

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Risk of young person participating in further harm						
Low risk	24	2	0	26	2.67	0.4459
Medium risk	4	3	1	8		
High risk	1	0	1	2		
Total	29	5	2	36		
Risk of exploitation (criminal, sexual, grooming)						
Low risk	25	1	0	26	4.00	0.2615
Medium risk	3	3	0	6		
High risk	1	2	1	4		
Total	29	6	1	36		
Risk of young person experiencing criminal behaviour						
Low risk	22	3	0	25	4.5	0.2123
Medium risk	5	1	0	6		
High risk	1	3	1	5		
Total	28	7	1	36		
Risk of young person participating in further criminal behaviour						
Low risk	28	2	0	30	1.33	0.5134
Medium risk	1	1	1	3		
High risk	0	3	0	3		
Total	29	6	1	36		
Risk of young person continuing a lifestyle that exposes them to further harm/injury						
Low risk	17	2	1	20	2.67	0.4459
Medium risk	6	3	2	11		
High risk	2	1	2	5		
Total	25	6	5	36		
Risk of young person not engaging in education, training, or employment						
Low risk	16	1	2	19	5.03	0.1694
Medium risk	7	2	1	10		
High risk	3	2	2	7		
Total	26	5	5	36		
Risk of young person not maintaining positive relationships with family						
Low risk	13	2	0	15	5.77	0.050
Medium risk	7	5	1	13		
High risk	2	3	3	8		
Total	22	10	4	36		
Risk of young person not willing to engage with other services						
Low risk	24	4	0	28	3.11	0.3748
Medium risk	5	0	2	7		
High risk	1	0	0	1		
Total	30	4	2	36		
Risk of young person not being able to identify escalating problems						
Low risk	20	4	0	24	2.11	0.3480
Medium risk	5	3	0	8		
High risk	0	2	2	4		
Total	25	9	2	36		
Overall Scoring: Risk of harm to others*						
Low risk	28	3	0	31	3.3101	0.069
Medium risk	3	2	0	5		
High risk	0	0	0	0		
Total	31	5	0	36		
Overall Scoring: Risk of harm from others						
Low risk	16	1	0	17	5.90	0.1163

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Medium risk	6	7	2	15		
High risk	2	1	1	4		
Total	24	9	3	36		
Overall Scoring: Risk of harm to self						
Low risk	20	1	0	21	4.57	0.2060
Medium risk	6	4	1	11		
High risk	1	1	2	4		
Total	27	6	3	36		

Source: Based on the data provided by Redthread.

Costs

Table 10 provides information on the mean costs for those engaging with the Redthread programme the fully engaged and lighter-touch supported young people combined and the mean costs per finished consultant episode (FCE) for a group of patients matched to two characteristics of potential Redthread users: age (11 – 24 years) and HRGs for inpatient stays selected on the basis of a range of possible treatments actual Redthread users may undergo at UCLH. ED costs were based on those reported by UCLH for 11-24-year-olds across all 12 HRGs collected for EDs.

The mean costs per young person (n=169) for the Redthread intervention were calculated using information provided by Redthread for the 21-month period, April 2020 – December 2021. CPI inflation rate for 2020-2021 was applied to 2020 prices.¹⁰³ All the resources used by Redthread were assumed to be spent on delivering the YVIP services for all of the four activities (front line, service development, training to the medical staff and administration). All the costs are reported separately between these activities based on time Redthread staff spent on each activity (provided by Redthread).

Table 10 shows that the main cost for the Redthread service was for front-line services (50% of total costs), followed by service development (26%) administration (14%) and training activities (10%). The total mean cost per supported young person was £1,865.

Table 10 also provides the mean costs for the constructed group of actual patients treated at UCLH. For the inpatient costs, based on a set of diagnosis codes relevant to Redthread referral reasons (see Appendix 3, Table 12), between February 2020 and August 2021, 161 11-24 year olds were anonymously identified as having a non-elective admission at UCLH. UCLH's patient level information and costing system (PLICS) data were used to specific unit costs which were then applied to each of the 161 patient spells via the spell HRG. In practice, this reduced the sample to 119 as 42 had a 'null/unknown' HRG code. Based on this sample, the mean cost per patient was £5,789 [range: £473 - £73,837]. The mean cost for an A&E attendance was £203 [range: £82 - £455] and was based on an average number of attendances of patients aged 11-24 of 19,501 per year across all types of coded attendance.

Table 10. Mean cost per Redthread case and mean cost of patients treated at UCLH.

Cost item	Total costs	Mean cost	Sample size
Redthread YVIP costs (for the period April 2020 – December 2021)			
Front line activity (50% of the total budget/ expenditure)	£157,599	£933	

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Service development (26%)	£81,951	£485	169
Administration (14%)	£44,128	£261	
Training activity to medical staff (10%)	£31,520	£187	
Total Redthread YVIP costs	£315,197	£1,865	
UCLH costs for inpatients and A&E attendances			
Inpatient (FCE)	£ 688,934	£ 5,789	119
A&E (attendance)	£3,364,863	£203	19,501

Source: Author's calculations based on Redthread budget data and expenditures for period April 2020 – December 2021 and UCLH costs for patients aged 11-24 inclusive for inpatients and A&E for period 2020 - 2021.

Discussion

Principal findings

The analysis of assessed risks for young people engaged with the Redthread YVIP for the period April 2020 – November 2021 showed that the only risks for which we observed a statistically significant decrease after the intervention were the risk of '*experiencing further harm*' and the risk of '*not maintaining positive relationships with family*'. Our results may be on the conservative side if compared to other studies evaluating YVIP in London. For example, one has reported that improvements in six out of the 13 risk factors were statistically significant.¹⁰⁴

The average Redthread costs for Redthread cases was estimated to be £1,865. However, following the reasons described in *Chapters 5 and 7*, it was not readily possible to link Redthread cases with their corresponding hospital records in order to track activity and hence their actual hospital costs. Therefore, the costs of hospital treatment were based on an artificial group that mirrored as best as possible Redthread cases in terms of age and diagnosis groups.

The mean cost for the emergency inpatient treatment of an artificially constructed group, similar to those likely to be referred to Redthread in UCLH, were as estimated to be £5,789 while the mean cost per attendance at A&E was £203. The estimated average costs of Redthread YVIP programme are around a third of the costs of inpatient treatment for a similar group and around nine times larger than the mean A&E attendance cost. Based on the 169 young people involved in Redthread as part of this analysis, and total Redthread costs of £315,197, this suggests that the Redthread programme would breakeven if, for every three people engaging with the service, at least one emergency inpatient admission was avoided.

Another important economic aspect related to programmes targeting youth violence is that some – and possibly the most significant part – of the costs and benefits materialise outside of health and social care. These include costs associated with the criminal justice system, as well as education, the welfare system in general and costs associated with disability or lost productivity as opposed to the generation of income from employment and tax. Other studies that have tried to quantify the costs

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of crime have estimated that the total unit costs from homicide amount to more than £3.2 million, for violence with injury £14,100, rape £39,400 and other sexual offences £6,500.¹⁰⁵ Healthcare services have been estimated to be only a small fraction of the total costs (especially in relation to life-time effects of physical and emotional harm) amounting to just 0.03% of total costs for homicide or from 3 to 6% for crimes with injuries, rape or sexual offences.¹⁰⁵

Overall, our evaluation showed that the Redthread YVIP intervention has the potential to reduce some risks of harm for young people and to be potentially self-financing if the intervention could avoid future use of healthcare. However, our research was limited by the small sample of patients, lack of a control group, inability to evaluate effectiveness and the subjective assessment of risks based on Redthread personnel (see also the limitations of the study).

Comparison with other studies

Global research on violence has identified the burden and costs that violence places on health and social prospects across the life course.¹⁰⁶ Violence affects not only health outcomes, quality of life and social choices that people make, but also has wider consequences on families, communities and society.¹⁰⁷ The acute treatment costs of penetrating trauma injury in England and Wales vary by patient, cause and body region of injury and treatment characteristics. The reported median cost of index admission for 532 patients aged 16+ years admitted to a MTC following knife-related injuries in a major UK city in 2018 was £4,375.⁹⁵ This was lower than the costs reported previously for England and Wales, which were estimated at £7,983 in 2008 by a Trauma Audit Research Network (TARN)-based study which focused on more severely injured patients and also included cost of prehospital care.¹⁰⁸ An earlier study, reviewing the cost of 187 gunshot injuries treated at a teaching hospital in Manchester, reported a mean cost of £2,698 for patients admitted for inpatient care.¹⁰⁹ A study by Christensen *et al.* (2008)¹⁰⁸, which examined the acute treatment costs of penetrating trauma injury in England and Wales, estimated average hospital costs of £7,196 per penetrating injury due to stabbing.¹⁰⁸ In most of the studies, the A&E costs are not identified separately from the total healthcare costs. A study conducted in South Wales estimated that about 30.0% of assaults resulted in a visit to A&E at a cost of £200 per attendance in 2019.¹⁰⁷

Our findings are consistent with other studies in England and Wales showing that inpatient healthcare costs are considerable and much higher than the costs of youth violence interventions. In fact, a recent study of the service that looked at both health and social costs and benefits of Redthread's YVIP¹¹⁰ as concluded that the programme may have a positive net economic and social benefit that was calculated at up to £4.90 economic and social benefit per £1 spent.

Strengths and limitations

While this study provides some insights on the main costs and risk reductions resulting from Redthread YVIP, it also has limitations which need to be taken into account. One limitation was that the information on costs from Redthread could not be directly linked with hospital data, and therefore we had to rely on an artificially-constructed group of potentially similar patients to provide indicative, plausible inpatient costs for Redthread young people. A second limitation was that findings from our analysis were based on a relatively small group of individuals (an impact of COVID-19 on hospital services) and were also limited from the lack of a comparable group with assault-related injuries.

The analysis of consequences was based on Redthread's own risk assessment process. The answers to the risk assessment involved professional judgments of youth workers and their interpretation and therefore should be considered in this context.

Implications

Our analysis showed that young people attending Redthread YVIP programme report lower risk of experiencing further harm and a lower risk of not maintaining positive relationships with their family after completing the intervention programme. The cost of delivering the Redthread intervention per young person is considerably lower than the estimated inpatient costs for a comparable group.

Future studies need to collect detailed information on the costs of intervention, costs of the healthcare treatment as well as the wider cost for society. Linking the data gathered on the young people attending the Redthread YVIP with hospital data and identifying a suitable control group will help to complete a full economic evaluation of the Redthread YVIP.

Chapter 7. Evaluating the quantitative impact of Redthread's Youth Violence Intervention Programme: a feasibility assessment

What this chapter adds

- For evaluating the benefits of the Redthread service, the impact on hospital reattendance rates are probably the easiest to quantify because of data availability.
- After investigating a range of options for evaluating such impact, we found that none would be feasible within the timeframe of the project due to combinations of:
 - Our inability to access individual person-level data for Redthread users due to lack of consent.
 - Relatively small numbers of young people who had so far engaged in the full longer-term programme with Redthread at UCLH, leading to likely insufficiently powered analyses of the impact of that particular programme over the period of the research project.
 - A difficulty in finding a representative control group from routine hospital data to match people engaging with Redthread.
 - Our inability to link national hospital inpatient and emergency care records due to the lack of linkable patient identifiers across the datasets.
 - The difficulty in detecting the impact of the service among wider cohorts, such as people attending EDs with potentially eligible presentations.
 - A lack of sufficient information in the ED data recorded by UCLH.
- To enable the service to be evaluable, we recommend the following:
 - For Redthread to consider how to enable appropriate sharing of individual-level data on people who choose to engage and who choose not to engage with the service.
 - For analysts to maintain reattendance as one measure of impact and work with clinicians and Redthread to develop criteria from routine hospital records that can be used to identify which attendances are potentially avoidable.
 - Similarly, if option 1 (see below) is the preferred evaluation model, then to develop criteria for identifying groups of patients attending other hospitals from which control groups can be selected.
 - For clinicians to routinely record when a Redthread referral has been made by using the relevant code, rather than relying on free text.
 - For UCLH to improve the coding of injury intent within their Emergency Care data, particularly of the 'chief complaint'.
 - That suitable geographical areas are decided upon between Redthread and UCLH, making it feasible to test an area-level approach (option 3).

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Introduction

When we were scoping the project, it was unclear as to the extent to which we were going to be able to quantitatively evaluate the impact of the Redthread service. We therefore planned Phase 1 as an investigation into the feasibility of such an evaluation: exploring the available data, how they could be used and assessing different evaluation methodologies. If a quantitative evaluation appeared feasible over the remaining time of the project, then this would be included in Phase 2.

There are several potential benefits of hospital-based violence reduction services. For example, a report by NHS London recommends the following metrics:¹⁸

- Hospital reattendance rates
- The number of people who receive an intervention or are offered support compared to the total number of young people attending hospital due to extra-familial harm
- The number of young people completing goals within their personalised support plan
- Psychosocial or health and well-being questionnaires presented before and after a support programme

For our evaluation, we focused on the impact on the use of hospital services as there was potential for these to be more measurable over the duration of the project, and the data were more likely to be available. However, this does need to be balanced against the fact that a positive consequence of engaging with Redthread may be an increase in their engagement with healthcare services and hence their likelihood to reattend hospital, even for harm-related incidents. Also, the influence of Redthread may not be limited to subsequent hospital attendance for just those who engage with the service, since any reduction in their likelihood of causing harm to others could reduce hospital attendances among the wider community.

In the rest of this chapter we describe the options we proposed for analysis within Phase 1, how each of them was assessed and then our findings as to their relative feasibility. Although none of the options could be taken forward into Phase 2, we conclude this chapter with recommendations for capture and processing of information that would allow the service to be evaluable in the future.

Methods

We considered three options for evaluating impact each reflecting a different perspective:

1. The impact on future use of hospital services for people:
 - a. engaging with the Redthread programme
 - b. referred to the programme
 - c. potentially eligible for the programme.
2. The impact on the use of emergency services at UCLH.
3. The impact on the use of hospital services among broader communities within which people engaging with Redthread live.

We assessed the feasibility of these options by:

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- presenting them to Redthread, UCLH and our expert advisors in order to gain their feedback as to which better match their own expectations of impact
- performing our own investigation into each option's data requirements, including any access to individual person-level data, the linking of their records, the identification of comparators and the likelihood of detecting an impact
- identifying the possible barriers to accessing the necessary data such as patient consent, information governance approvals and time.

Our measure of the future use of hospital services was attendance at ED and emergency admissions, where patients present with conditions or diagnoses that relate to activity that may be reduced as a consequence of the Redthread intervention, e.g. violence-related injury, self-harm, substance abuse. Our reasons for choosing this measure were because we anticipated that data would be easier to obtain within the rapid context of the study, some of which we might already hold and have permission to use, and it has been used more widely in studies of similar services.

Since different young people have different levels of engagement with Redthread, it is important to establish which level of intervention is to be evaluated. For this report we focus on assessments of the impact on individuals who engage with the full programme rather than shorter-term crisis support. The reason for this is that it is likely to reveal greater benefits and is a more consistent intervention. Other evaluations have also taken this approach.⁹³ However, the options described in this section and our assessments of each would also be relevant to evaluations using a wider definition of intervention.

General findings affecting the feasibility of an evaluation

Period of evaluation

The first year of data collection coincided with the COVID-19 lockdown and the service provided by Redthread was different in nature to the service that was implemented from April 2021 (see *Chapter 1*), and not one that they considered to be a model for an ongoing service. From an evaluation perspective, if we chose to focus on the more consistent service from April 2021, the numbers would be too few to observe any impact. If we included data from the previous year then there would be a question about the consistency of the service being evaluated.

Limitations of the Emergency Care Dataset

The HES and ECDS we had access to over the evaluation period could not be linked because the ECDS had no individual patient identifiers. This also meant that multiple attendances at ED for the same individual could not be identified.

Defining an appropriate measure of hospital attendance

Whichever option is chosen, identifying appropriate hospital attendances from the routine data is important, whether for measuring outcomes, past attendance histories or, in some options, selecting cases and controls. Ideally, relevant attendances would include those that are related to a person's eligibility for YVIPs and which are potentially avoidable.¹¹¹ Although we can establish a list of codes for identifying relevant activity from routine hospital data, this can only be an approximation and, historically, UCLH have not been coding 'injury intent' within the 'chief complaint' field in their ECDS. This indicates that an injury was sustained from an adverse event (as opposed to an accident) and is important for young people who are more likely to be exposed to violence and abuse. The completeness of this field is being addressed within the hospital.

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One UK study of routine hospital inpatient data found that recurrent admissions were more common in young people with adversity-related injury than those with accidental injuries.¹¹² Whilst it would be possible to identify these in many cases within the admitted patient HES data, the available information in ECDS would make it harder for this distinction to be made. Also, the chances of detecting an impact will depend on adequate specificity (i.e. the chances that unavoidable reattendances are not selected). Possible codes that can be used to identify such activity within HES inpatient data and ECDS are shown in *Appendix 3, Table 12*.

Option 1a – Targeted follow-up of patients engaged with the Redthread service

The aim of Option 1a would be to assess the impact of engagement with Redthread on future hospital attendance (Figure 9). People engaging with the service (the ‘cases’) would be matched to a comparator cohort of patients (‘controls’) attending other hospitals without a similar youth violence prevention programme. Relevant future attendances would be those that corresponded to a specified range of conditions or reasons for attendance that could be potentially influenced by the service.

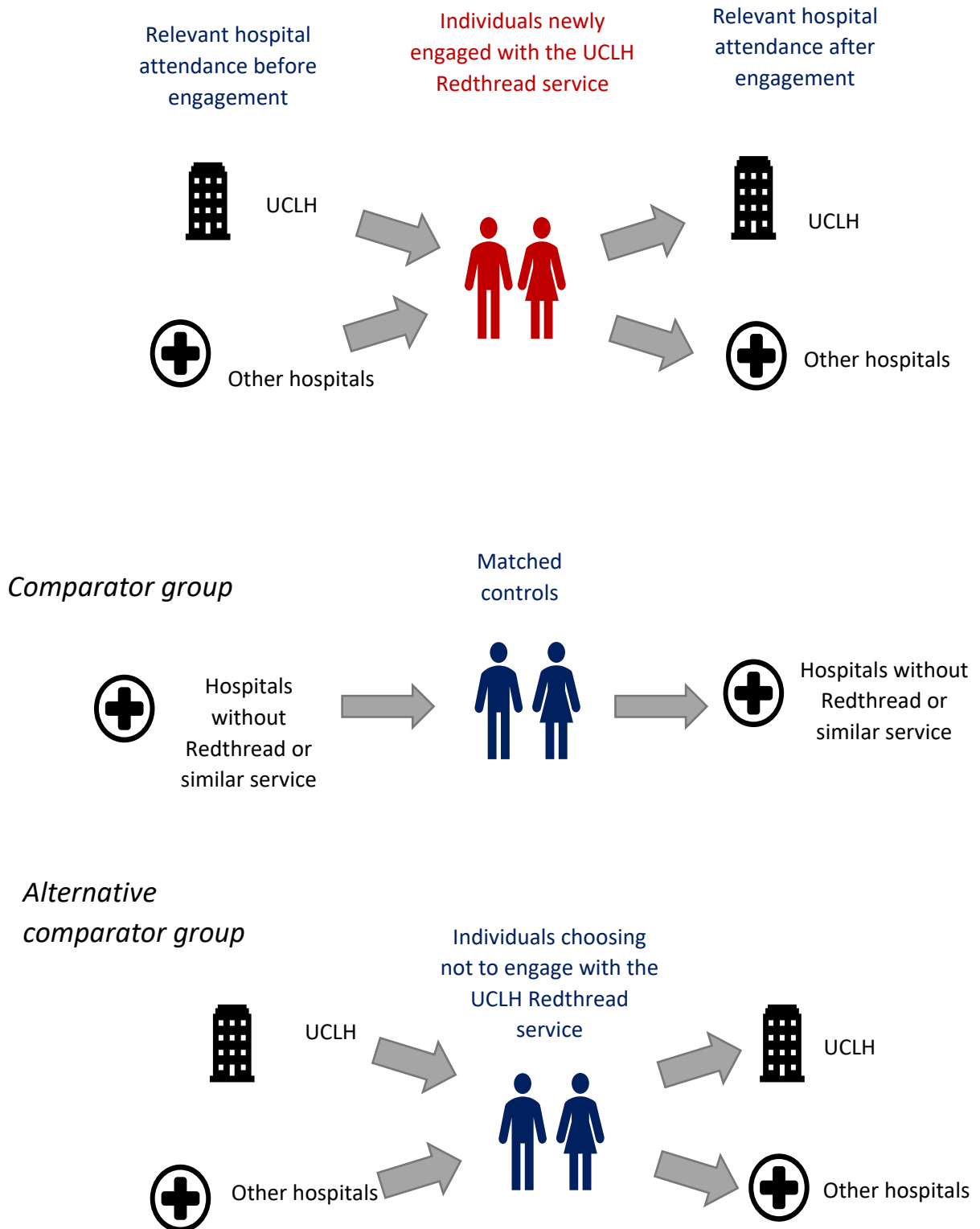


Figure 9. Overview of option 1a.

Data requirements

Cases would be identified from Redthread's database, and their records linked to routine hospital data. Reattendances would be extracted from links to national inpatient and emergency care data sets, namely HES and the ECDS for ED. Identifying reattendances at other hospitals would be particularly important for UCLH services, where we estimate that of people aged 11 to 24 who attend their ED, nearly half (47%) of their subsequent visits to ED (where they have one) will be at another hospital (see *Appendix 2, Figure 12*). A link to national hospital data would also be important to enable us to assess past attendance histories, which, again, could be at other hospitals, and is likely to be an important matching variable. Linkage to HES and ECDS would need to be approved and carried out by NHS Digital.

Redthread do collect their own data on reattendances up to two years after someone starts engaging with the programme. They gather these data retrospectively each month by identifying anyone who became engaged with Redthread in the same month one or two years previously and then searching the hospital records for any reattendances since. These reattendances are classified by Redthread as adversity or non-adversity-related, but are only picked up if they occur at UCLH.

An alternative means of collecting data might be to ask consenting individuals to report their own data although this would rely on sufficient numbers consenting and maintaining reliable data returns.

Consent

Redthread's typical consent process with the service user does not include sharing personal information beyond their own organisation (even if it is anonymised or pseudonymised). Therefore, sharing of individual user records from Redthread would not be possible, unless Redthread collect retrospective consent from young people, which is unlikely to get a high response rate, or we apply to use Section 251 of the NHS Act 2006. Section 251 involves the use of confidential patient information without the need for patient consent, subject to the approval of the Confidentiality Advisory Group (CAG), and this would take several months. In addition, Redthread do not hold NHS numbers on their records, and this is a required identifier used by NHS Digital to carry out linkage.

Controls or comparators

The comparator group could be a cohort of patients attending hospitals in London without a similar violence-prevention scheme, whose characteristics suggest that they might be eligible for, and likely to engage with, Redthread services. These would need to be identified from routine administrative hospital data. Although we could match on patient characteristics and reasons for hospital attendance, there are several non-coded features which could be highly relevant to the reason why the young person has been considered eligible for Redthread which would make it difficult to establish the accuracy of any matching.

An alternative control group could be people who are referred to the Redthread service but do not engage with it. Again, there could be key differences in person characteristics that are not identifiable in the data and may introduce important biases, but if referrals are coded within the routine hospital data this may be a more achievable option.

Chances of detecting an impact

Based on evidence of the potential impact of similar services, we estimate that 110 people who engaged with the service would need to have been followed for six months to have an 80% chance

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of detecting a 10% reduction in reattendance. With longer follow-up and a greater assumed impact, the sample size would be smaller. Further details of this analysis, including projected sample sizes under different assumptions, are shown in *Appendix 4, Figure 13*. From February 2020 to December 2021, a total of 59 young people engaged with the full longer-term programme rather than shorter-term crisis support, and with a current engagement rate of about five per month, we estimate a total of 110 would be reached by the end of October 2022. If the aim is to evaluate only the service that has been operating since April 2021, then it would take somewhat longer. These calculations are for measuring the impact of the full programme of support on hospital reattendance. If we included people receiving shorter term crisis support, then it may take a shorter time to reach the required cohort size, although the required cohort size may be larger if the assumed impact of such support is less.

Summary of advantages and disadvantages of this option

This option is the only one that follows up cohorts of matched cases and controls and may be the most robust design of the options being considered, also offering most statistical power. However, being able to identify an appropriate control group remains an important barrier and the approach would have to accommodate the consenting process. Moreover, it does not account for the positive impact Redthread service users might have on others in the community. For example, by indirectly influencing a reduction in the numbers of hospital attendances of others.

Option 1b – Targeted follow-up of patients referred to the Redthread service

The design of this analysis would be similar to Option 1a (see *Figure 9*), where the cases include all patients who are referred to Redthread, not just those who engage with the programme. This is therefore more akin to an intention-to-treat approach.

Data requirements

Referrals cannot be reliably identified from the hospital's own data unless referrals are better coded within the local hospital records, for example, by using a SNOMED code for violence reduction services e.g. SCTID: 410236002, Violence control education (procedure), (see *Chapter 5*). There is a process for using such codes within UCLH but they have told us that this has not been applied in at least 85% of cases. If such codes were reported in the national ECDS there would be no need to link local to national records, an analysis could be carried out with ECDS and inpatient HES data. However, this relies on accurate clinical coding and may miss patients who are not referred through ED or are picked up through Redthread's own data searches.

Consent

Once a referral is coded, all analysis would be based on routine hospital records, although the importance of consent is unclear, given that not all referrals will be engaging with the Redthread service. As a service evaluation conducted by UCLH with the intention of improving service delivery there may be no need for consent, although ethics approvals would still be required.

Controls or comparators

For this option, the control group would have to come from other hospitals, with associated challenges as described under option 1a.

Size of cohort

Since not all the cohort would be receiving the intervention, a larger sample would be needed to achieve appropriate statistical power. Also, if the referral code is only applied to ED records, people referred from departments other than ED may not be picked up.

Summary of advantages and disadvantages of this option

This option may circumvent the need to gain consent from people engaging with Redthread, since Redthread's own data would not be used, but this is currently unclear. The other issues associated with option 1a around selecting appropriate controls and measuring benefits within a community remain. Also, people not referred through ED may be missed. Between February 2020 and December 2021, 43% of referrals were engaged with the service either in the longer-term full programme of work (15%) or shorter-term crisis support (28%) so any impact of the intervention over that period will only be observed among a minority of cases and therefore harder to detect. However, since after the COVID-19 restrictions the service has been operating more as intended, engagement rates are expected to be higher which raises the power of this approach.

Option 1c – Targeted follow-up of patients potentially eligible for the Redthread service

This analysis would have a similar matched case-control design as illustrated in *Figure 9* (without the alternative comparator group), but cases would be identified from routine hospital records as individuals potentially eligible for the Redthread service. Therefore, this is essentially an evaluation of the impact of the Redthread intervention on eligible young people attending hospital as a whole group, rather than just on those who receive the service.

Data requirements

Data would all come from routine hospital records.

Selecting cases

There would be a major challenge in identifying who could be eligible for Redthread from the routine data. As mentioned above, when discussing the problems with identifying control groups under Option 1a, there are several non-coded features which could be highly relevant to the reason why the young person has been considered eligible for Redthread. For example, it may not be obvious that a young person presenting at hospital is at-risk, but a clinician may have reason to suspect they are a victim of an adverse event and would benefit from Redthread support.

Based on the list of clinical codes we identified within the ECDS, (see *Appendix 3, Table 12*) we found 3,275 patients aged 11 to 24 who may have been eligible for Redthread attending ED between February 2020 and August 2021. As a comparison, over the same period, far fewer young people were referred to Redthread: 252 in all, of which 43 became fully engaged with the service. There may be ways of improving the criteria for selecting potentially eligible people with more detailed analyses of hospital data, but, as mentioned above, the data for UCLH have been incomplete for some of the key fields that would help.

Consent

Since we would not know which of the cases actually engage with Redthread, the consenting issue for Redthread users would not be an issue.

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Controls or comparators

Control groups derived from routine hospital data would be a better match than under Options 1a and 1b, since the same fields would be used to identify both cases and controls. There would also be no data linkage required between information held on Redthread's system and routine hospital data.

Size of cohort

Because a potentially eligible cohort derived in this way is so much larger than numbers referred to or engaging with Redthread, analysis of that cohort would be very likely to miss any direct impact of Redthread. This analysis is better viewed as an assessment of the service on the whole cohort of eligible young people attending UCLH.

Summary of advantages and disadvantages of this option

This option circumvents the need to gain consent from people engaging with Redthread, since Redthread's own data would not be used. Also, it would be possible to obtain a better matched control group. However, the issue associated with option 1a around selecting appropriate controls and measuring benefits within a community remains. Unless it becomes possible to identify eligible young people from the routine data with a reasonable degree of accuracy, any impact will only be observed among a minority of cases and therefore harder to detect.

Option 2 – Assessment of the impact of Redthread on emergency services at UCLH

The aim of this option would be to analyse the impact the Redthread service has on attendance at UCLH emergency services, particularly among individuals aged 11 to 24 where the reasons for attendance may indicate that the young person was eligible for Redthread intervention or support (Figure 10). Differences in attendance before and after Redthread services were operating would be compared with changes in attendance at other hospitals over the same period. Redthread (or other similar services) would not be operating at these other hospitals. To account for variable case mix, the populations would be directly standardised against a baseline national population. The 'before' period should probably predate the COVID-19 pandemic.

Data requirements

Data would all come from routine national datasets.

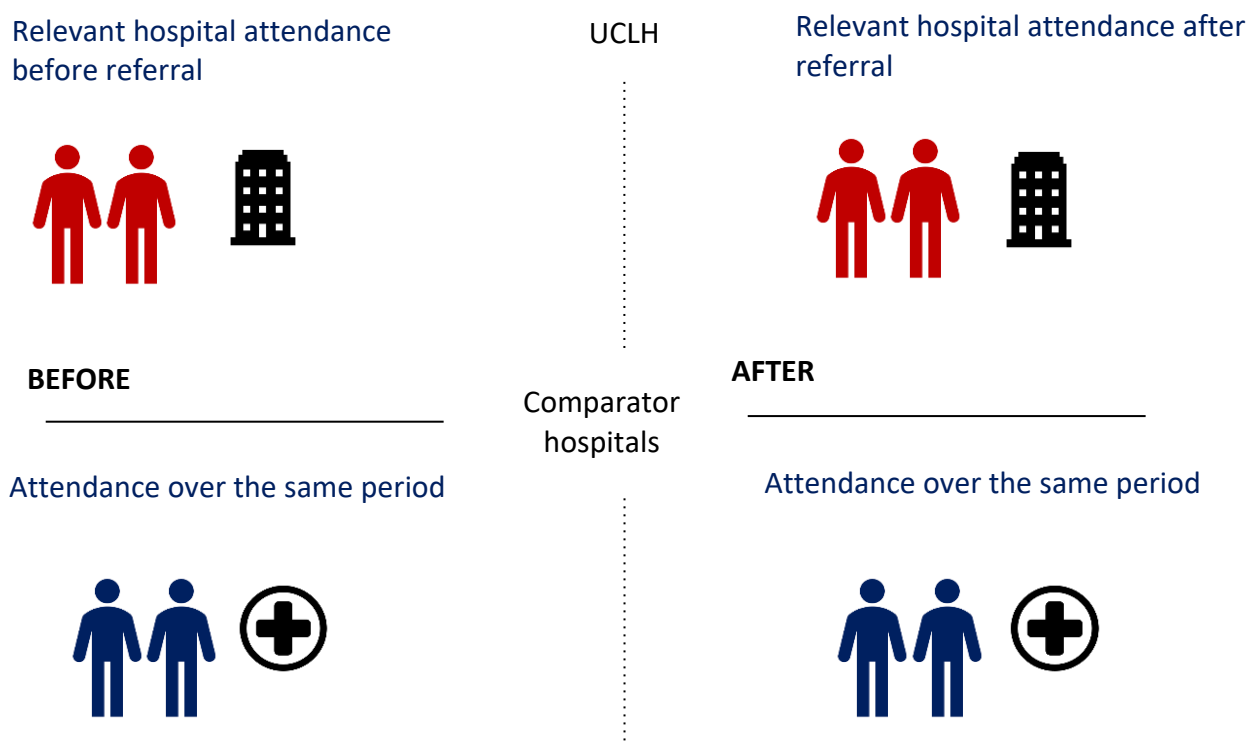


Figure 10. Overview of option 2.

Consent

This analysis will only use routine data sets and would not be able to identify people engaging with Redthread, so no further consent would be needed.

Controls or comparators

Comparator hospitals would not be operating a YVIP over the same period. Ideally, these would be within London, but given the increasing prevalence of these programmes it may be challenging to find such hospitals. However, since this is a before/after comparison, we could pick hospitals where they have such a service but where its use over the study period has remained stable.

Size of cohort

As mentioned under option 1c, we found 3,275 patients aged 11 to 24 who may have been eligible for Redthread attending ED at UCLH between February 2020 and August 2021. However, this analysis relies on being able to identify groups of patients attending emergency services that would be specific enough for the evaluators to notice any impact Redthread might be having. This is unlikely to be achieved unless better eligibility criteria can be derived from the routine data.

Summary of advantages and disadvantages of this option

As with options 1a, 1b and 1c, if Redthread users become less likely to be involved with violence themselves, they would be indirectly influencing wider numbers of admissions, which would not be

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measured using this approach. Also, as with option 1c, unless it would be possible to identify eligible young people from the routine data with a reasonable degree of accuracy, any impact will only be observed among a minority of cases and therefore harder to detect.

As young people could be attending several different EDs in London, an analysis that only focuses on one hospital would lose any impact of Redthread services on attendances elsewhere. As mentioned above, just under half of reattendances to ED at English NHS hospitals following a visit to the UCLH department are at another hospital.

Option 3 – Assessment of the impact of Redthread on local communities

The aim of the third option would be to assess the impact a person's engagement with Redthread might have on hospital attendances within the local neighbourhood in which the person lives (Figure 11). This would therefore also account for positive influences on others who may, themselves, become victims of violence or abuse and may be observable from patterns of area-level ED attendance and inpatient admission.

Analysis would investigate the relationship between the number of local people who have engaged with Redthread over time and changes in hospital attendance for residents of the same area. As with the previous options, criteria could be developed to allow a focus on attendances that are considered most relevant

Supporting evidence for this approach

A previous literature review which included the finding that violence in London is highly geographically concentrated, and a London-wide picture can mask significant variation between areas.²⁰ This report also confirms that many forms of violent crime are heavily clustered in a small proportion of Lower Super Output Areas (LSOAs), so when responding to the problem of high instances of violence, a localised approach is valuable. If the Redthread intervention reaches

individuals who are involved in gang-related violence, these areas may see an overall reduction in hospital presentations.

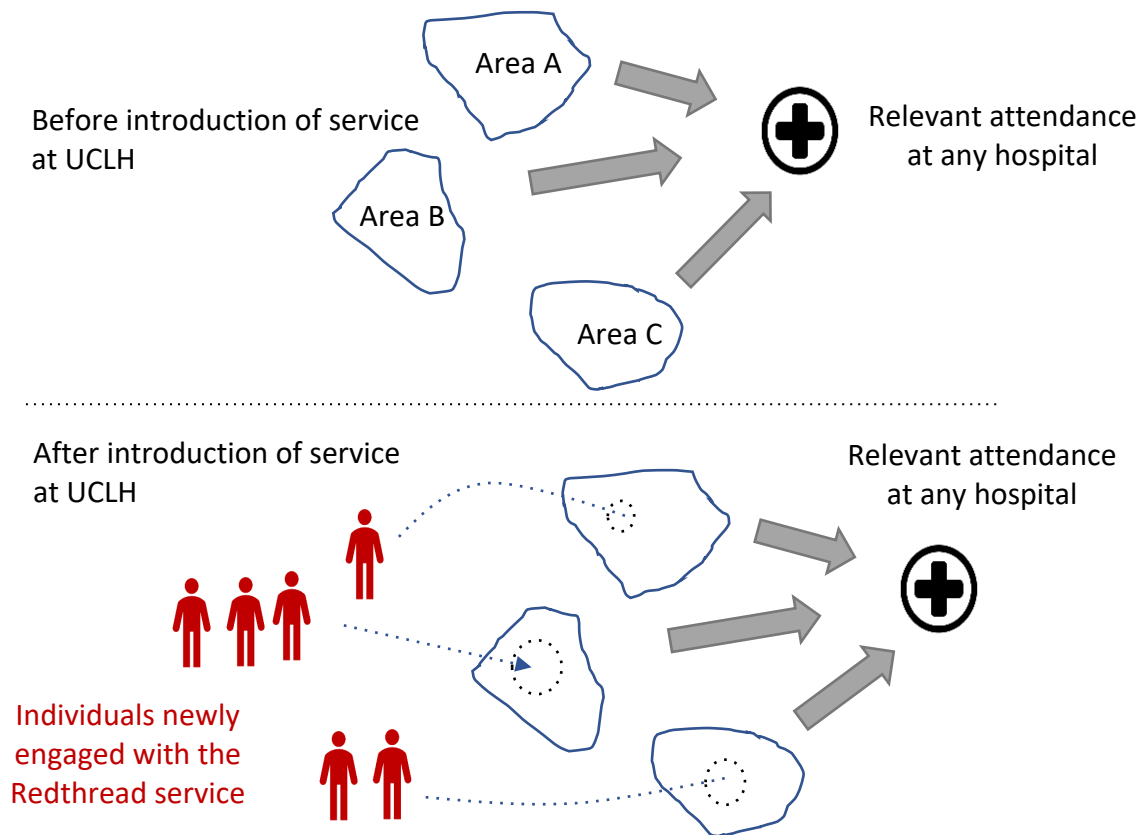


Figure 11. Overview of option 3.

Data requirements

Areas where people engaging with Redthread live could be provided by Redthread themselves and thereby avoiding any need to link to hospital records. Other areas with similar characteristics where no one is engaging with Redthread should also be selected. Data on hospital attendance would come from HES and ECDS as before, although we would need to identify a suitable area of residence. Neighbourhoods could be defined as Middle Super Output Areas (MSOAs) - census areas of mean population size of around 7,200, which are recorded by Redthread. However, even though an MSOA field is available in ECDS, it is not currently populated. Other area fields are populated, however, such as electoral ward, but they would need to be used consistently across datasets.

Consent

Redthread would need to provide information about where their service users lived, which would be the only data required from them. Although there would be no explicit means to identify Redthread users in the hospital data, knowledge about UCLH attendance and area of residence may be enough to identify them in routine data. Where there are sufficiently high numbers within an area, aggregated numbers would be sufficient. Where there are small numbers, it may be possible to exclude those areas given that the local impact may be small anyway, although the number of areas that are thus removed would need to be low in relation to those that are included.

Controls or comparators

Because this analysis is investigating relationships between levels of engagement in an area to outcomes there is no need for a comparator.

Likelihood of detecting any impact

Earlier in the project, we received data from Redthread that showed that of 28 people who were fully engaged with the longer programme, they were resident in a total of at least 16 MSOAs, and due to low numbers, some MSOAs had to be combined. This suggests that they may be too dispersed among different MSOAs and too low in number in comparison to relevant hospital attendance activity within the area, thus reducing the ability of such an analysis to detect Redthread's impact. Since the MSOA field has not been populated in the national emergency care data, this is difficult to determine. However, we recommend improved coding, or use areas that are recorded, such as electoral ward, so that the feasibility of an area-level option can be tested further.

Summary of advantages and disadvantages of this option

This option would not need to explicitly identify control groups and is the only option that takes account of any wider positive influence engagement that Redthread may have on local communities.

This approach assumes that any equivalent service at other hospitals remains stable for both before and after periods, so that any differences in hospital activity can mostly be attributed to the Redthread intervention at UCLH. To mitigate any problems, we could restrict to areas where this is more likely to be the case – so that the dominant change in service is that at UCLH.

Summary of options

Table 11 compares and summarises the requirements and issues associated with each option.

Table 11. Comparison of needs and issues relating to each option.

	Option				
	1a Matched case-control	1b Intention to treat	1c Evaluation of the eligible	2 Before and after	3 Geographical impact
Data requirements	Redthread data linked to routine national hospital ED and inpatient records	Routine national hospital ED and inpatient records with a referral code used by UCLH	Routine national hospital ED and inpatient records	Routine national hospital ED and inpatient records	Routine national hospital ED and inpatient records Redthread data for areas of residence
Cases	Patients identified from Redthread data	Patients identified as referrals in routine hospital records	Patients identified as 'eligible' from routine hospital records using diagnosis and reason for attendance codes	Relevant ED attendances and inpatient admissions from routine hospital records using diagnosis and reason for attendance codes	People aged 11 to 24 resident in local geographical areas, many of which, but not necessarily all, are where there are people engaging with Redthread
Consent	Consent required from Redthread service users or Section 251 approval	Consent may still need to be required, but this is to be determined	No further consent required	No further consent required	Consent required from Redthread service users where numbers are small, but possible to work with aggregated data
Selecting relevant hospital attendances from routine data	Relevant ED attendances and admissions from routine hospital records using diagnosis and reason for attendance codes	Relevant ED attendances and admissions from routine hospital records using diagnosis and reason for attendance codes	Relevant ED attendances and admissions from routine hospital records using diagnosis and reason for attendance codes	Relevant ED attendances and admissions from routine hospital records using diagnosis and reason for attendance codes	Relevant ED attendances and admissions from routine hospital records using diagnosis and reason for attendance codes

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	Option				
	1a Matched case-control	1b Intention to treat	1c Evaluation of the eligible	2 Before and after	3 Geographical impact
Controls or comparators	Relevant ED attendances and admissions from hospitals without a YVIP using codes relating to diagnosis and chief complaint Alternatively, compare young people who choose to engage with the UCLH service with those who choose not to	Relevant ED attendances and admissions from hospitals without a YVIP using codes relating to diagnosis and chief complaint	Relevant ED attendances and admissions from hospitals without a YVIP using codes relating to diagnosis and chief complaint	Hospitals without a YVIP	Each area is compared against each other. No formal controls needed
Chances of detecting an impact	Approximately 110 cases required to observe a 10% reduction in attendance	A larger sample size needed as many referrals would not engage with the service	This depends on how well 'eligible' people can be identified from the data. Although many eligible people will not engage, and there is a risk some wrongly identified as ineligible will engage	There is a risk that the number of people who engage with Redthread is much smaller than the number of attendances or admissions that are counted as relevant	There is a risk that the number of relevant attendances or admissions from an area could be much greater than those that could be influenced by people engaging with Redthread

	Option				
	1a Matched case-control	1b Intention to treat	1c Evaluation of the eligible	2 Before and after	3 Geographical impact
Other advantages	The most focused group of cases which is likely to have the best statistical power The option that met with most approval by Redthread and UCLH.	Can use routine hospital data exclusively, provided Redthread referrals are coded.	Can use routine hospital data exclusively A suitably matched control group would be easier to obtain	Can use routine hospital data exclusively No need to link ECDS and HES records	Attempts to measure the impact of those engaging with Redthread on others in the community No need to link ECDS and HES records
Disadvantages	No measure of the impact of those engaging with Redthread on others in the community Gaining consent from Redthread service users An appropriate control group may be hard to establish from routine hospital data	Relies on coding of referrals No measure of the impact of those engaging with Redthread on others in the community An appropriate control group may be hard to establish from routine hospital data Harder to detect an impact that may exist There may be issues with gaining consent	No measure of the impact of those engaging with Redthread on others in the community Harder to detect an impact that may exist Identifying eligible referrals from the routine hospital data	No measure of the impact of those engaging with Redthread on others in the community No measure of the impact on attendances at other hospitals May be hard to detect an impact that may exist	Statistical power currently unclear

	Option				
	1a Matched case-control	1b Intention to treat	1c Evaluation of the eligible	2 Before and after	3 Geographical impact
Reasons why currently infeasible	<p>Consenting process does not allow access to individual patient records from Redthread or linkage to national hospital records</p> <p>Section 251 application was not feasible over the time period of the project</p> <p>Nuffield Trust are currently not able to link HES with the ECDS</p>	<p>Referrals are only infrequently coded in the national data</p> <p>Nuffield Trust are currently not able to link HES with the ECDS</p>	<p>Identification of eligible patients within the hospital data has not been sufficiently precise</p> <p>Nuffield Trust are currently not able to link HES with the ECDS</p>	<p>Identification of relevant attendances and admissions in the hospital data has not been sufficiently precise</p>	<p>MSOAs of residence not reported in the national emergency care data which has hindered analysis using the area codes provided by Redthread</p>

Conclusions and recommendations

None of the options for analysis of impact have been feasible within the timescale for the project for the following reasons:

- Gaining any consent to link data relating to people engaging with Redthread was not going to be possible.
- The time it would take to gain further approvals to use linked data would put the completion of the project within the agreed timescale at risk and approvals would not be guaranteed.
- The evaluation team were did not have the facility to link emergency care and inpatient records.
- COVID-19 had a major impact on the implementation of the service and corresponding recruitment numbers.
- It was not possible to identify eligible groups of patients from routine hospital data with sufficient sensitivity and specificity.

Our options for assessment of impact have been limited to measuring reattendance, since this has been seen as the only feasible outcome that can be explored with the data available. However, this raises two important questions: firstly, how well one can identify from routine hospital records which reattendances would be potentially avoidable and, secondly, how well reattendance avoidance reflects all the advantages of using Redthread.

For this rapid evaluation, we have concluded that the best outcome would be to address the barriers and suggest ways forward to facilitate future evaluation of the Redthread service at UCLH and youth violence reduction services at other hospitals. The most effective options are likely to be either option 1a or option 3, although there is still some uncertainty about how well the impact of Redthread can be detected in area-level data.

Our recommendations are:

- I. For Redthread to consider how to enable appropriate sharing of individual-level data on people who choose to engage and who choose not to engage with the service, along with the levels of engagement.
- II. For analysts to maintain reattendance as one measure of impact and work with clinicians and Redthread to develop criteria from routine hospital records that can be used to identify which attendances are potentially avoidable.
- III. Similarly, if option 1 is the preferred evaluation model, then to develop criteria for identifying groups of patients attending other hospitals from which control groups can be selected. For clinicians to routinely record when a Redthread referral has been made by using the relevant code, rather than relying on free text.
- IV. For UCLH to improve the coding of injury intent within their Emergency Care data, particularly of the 'chief complaint'.
- V. That suitable geographical areas are decided upon between Redthread and UCLH, making it feasible to test an area-level approach (option 3).

Chapter 8: Discussions and conclusions

Overview

This study was a mixed-methods evaluation of the implementation and local impact of the Redthread YVIP service at UCLH.

We carried out searches for available evidence on hospital-based violent crime interventions for young people, and reviewed existing and current evaluations of Redthread interventions (see *Chapter 3*). We also evaluated processes of implementation of the Redthread service at UCLH at different time points, and developed an understanding of the programme theory (what Redthread call their ‘theory of change’) and factors that had enabled the service to be embedded in children, adolescent and young adults’ services at UCLH (see *Chapter 4*).

We reviewed the data being used and created by Redthread to manage the YVIP service at UCLH (see *Chapter 5*), and assessed the feasibility of using these data, in combination with other secondary datasets, undertake a cost analysis (see *Chapter 6*), and evaluate the impact of the service (see *Chapter 7*).

In this chapter, we provide a summary of our key findings. We also discuss the lessons learned in the context of the existing evidence, the strengths and limitations of our evaluation, recommendations for future research and conclusions.

Summary of key findings

Below, we describe our key findings.

Evidence reviews and current evaluation evidence (*Chapter 3*)

- Available evidence indicates that young people who present in EDs from physical violent injury (e.g. arising from gun and knife-crime) are at significant risk of repeat injury. Moreover, children and young people are vulnerable to a variety of risks in the community and can therefore re-present to EDs due to different forms of harm: physical assault interpersonal violence, substance misuse and severe mental health problems related to safeguarding issues.
- To address young people’s exposure to risk and safeguarding harms, hospitals have introduced youth violence interventions within EDs and trauma centres that are focused on behavioural change. Hospital-based YVIPs are one approach and aim to reduce a young person’s overall risk of harm and reinjury. Most of the evidence base on these interventions comes from the USA. These programmes typically focus on gun injuries in the American health system context with injury recidivism tracked as a primary outcome, using hospital data.
- Evidence suggests that YVIP can reduce reinjury. However, a problem with assessing the evidence base is the heterogeneity found across youth-based hospital interventions as a whole in terms of the nature of the intervention and how outcomes are reported. Some are brief behavioural interventions, some involve hospital social workers as opposed to youth workers, programmes can target different age ranges (e.g. young adults up to 30 years of age in some cases), and studies can include relatively small sample sizes.

- In the context of high health treatment costs in the USA for gun injury, the evidence suggests youth violence interventions can be cost-effective where they help to prevent violent incidences.
- The literature also highlights ongoing issues with data sharing across hospitals, meaning that measuring outcomes for repeat injury across different geographies and health providers, or systems, remains difficult.
- Our review confirmed there is limited evidence from the UK health system in particular about the impact of youth-violence and youth-worker hospital interventions focused on prevention.

Assessment of programme theory and implementation at UCLH (*Chapter 4*)

- Within UCLH's adolescent and paediatric services, the Redthread service is viewed positively and as filling a gap in service provision. Redthread's status as an independent, non-statutory service was viewed as a factor which enabled vulnerable young people to share information with a youth worker. This information was often useful to clinicians and could help inform patient care. A youth worker could also advocate for young people within the hospital setting, and bridge services within the community (e.g. housing, specialist support services, social care and education). This underscores the importance to frontline clinicians of having stronger links with the community to support vulnerable young people following their discharge from hospital, especially those for whom child safeguarding protocols no longer apply (e.g. those aged over 18 years old).
- Paediatricians, child safeguarding experts, and child and adolescent psychiatrists are particular champions of the Redthread service, perceiving that it not only fulfils a need for young people not met by standard clinical care, but that youth workers can help a young person to better engage in their medical care and treatment. The service is not viewed as duplicating other services or roles at UCLH (e.g. hospital social workers, playworkers or child safeguarding).
- In practice, Redthread's service goes beyond the 'teachable moment' (which provides an opportunity for dialogue with a young person about their health risk and personal motivation to introduce behavioural changes in their life). For example, Redthread have been engaged in a range of activities at UCLH, including:
 - Long-term case management work (e.g. this could be up to six months, or more, engagement with a youth worker). This is intensive support for young people at highest risk of harm, commonly with complex social and family situations and who have experienced trauma.
 - On-site short term crisis support within the hospital (e.g. helping the person to get food, providing reassurance).
 - Education and training for hospital and external staff (e.g. on contextual safeguarding). For example, with respect to safeguarding young people aged 11-24 years old, and how to engage positively with a young person in distress.
 - Awareness-raising and other communications within UCLH, for example attending safeguarding meetings, and activity to promote to staff how to make a referral.
- The service was severely disrupted by the COVID-19 pandemic and this impacted on the embedding of the Redthread service beyond paediatrics and adolescent services, affecting its influence within the adult ED in particular. Redthread is normally dependent on youth workers' physical presence in EDs, however, youth workers were generally not on-site at

UCLH from March 2020 to April 2021. Whilst the charity continued to provide case management support to young people virtually (which many young people were reported to like due to their habitual use of mobile devices), a lack of physical youth worker presence will have resulted in lower staff awareness of the service.

- By winter 2021/22, Redthread were perceived to be well embedded in the paediatric ED and adolescent services (including wards), and there was increasing awareness of the service in outpatient departments which saw vulnerable young people with chronic illness. Redthread and clinical staff noted that more could be done to raise staff awareness of Redthread across the Trust – especially amongst nurses, junior doctors and other staff working in adult ED. This is particularly important due to staff changes and turnover (e.g. rotations).
- Identification of eligible young people was not solely dependent on youth workers being in ED, either paediatric or adult ED. Referral routes at UCLH were diverse and could come from other inpatient services. Changes had arisen due partly to the impact of COVID-19, therefore the identification of eligible referrals went beyond ED services.
- Reasons for referral were by no means limited to young people with knife injuries or those who had been subject to sexual or physical assaults, but also included substance misuse, suicidal ideation and mental health crises. Staff observed a particular increase in young people presenting with severe mental health problems and distress on account of disruption caused by the COVID-19 pandemic (e.g. domestic violence and family instability). This raised questions about the most appropriate referral criteria for the service, given that Redthread is not a mental health crisis service.
- The key implementation barriers faced were:
 - The impact of the COVID-19 pandemic, with paediatric and adolescent services being temporarily moved away from UCLH to neighbouring London trusts.
 - UCLH staff changes and turnover during the implementation period which necessitates regular staff training to ensure all staff are aware of the service and how to refer.
 - Lack of physical space for Redthread (e.g. office space to ensure their presence and have confidential discussions with young people).
 - Difficulties engaging young people aged over 18 presenting in adult ED, unless a clinician was aware of the Redthread service and had obtained consent prior to their discharge.
- Staff suggested the following enablers were key to successful embedding of the service:
 - ‘Invested’ senior clinical and operational staff to champion the service locally and across departments (e.g. senior clinicians and ED managers).
 - Integration of Redthread youth workers within hospital processes for identifying vulnerable young people and discussing their care (e.g. MDT inpatient reviews, safeguarding meetings, safety planning).
 - Physical space near ED for engaging with young people (e.g. for confidential discussions).
 - Electronic healthcare record integration (e.g. EPIC) which has been especially useful for enabling referrals to be made directly by clinicians when youth workers are off-site. Indeed, some staff even suggested a prompt might be helpful to remind clinicians they can refer an eligible young person to Redthread.
 - Clear SOPs have been agreed between the hospital and Redthread.

Description and review of data used to manage the Redthread service at UCLH (*Chapter 5*)

- Redthread collect a wealth of data on individuals, particularly on those who engage longer-term with the service. Data on engagement rates support the qualitative finding that a greater proportion of 11 to 17-year-olds referred to Redthread receive some form of support from the service (59%) compared to those aged 18 to 24 (23%).
- Describing the service users and measuring outcomes was challenging in the absence of linkage between Redthread data and routine healthcare data. The main limitations to using Redthread data in isolation included:
 - Redthread's consent model did not allow individual-level records to be shared beyond their organisation, and we could only analyse aggregated data.
 - Aggregated data could not be analysed with respect to multiple characteristics at the same time, so we could not establish whether there were inequalities in engagement levels within specific groups.
 - Data on hospital activity of service users were not regularly captured by Redthread, and - when collected - only showed activity within UCLH. This is in the context of a hospital where nearly half of all 11 to 24-year-olds who reattended after an initial ED attendance did so at another hospital trust.
- There were also limitations to only using data from UCLH's patient administration system:
 - Redthread referrals were not consistently flagged, and where they had been recorded, there was no indication as to whether the individuals had accepted or declined support.
 - UCLH did not systematically record information relating to the intent behind injuries, which would have helped us to understand whether an individual might have been eligible to receive Redthread services.
- To improve identification of the eligible cohort, referrals to Redthread services should be recorded in a dedicated data field, and the injury intent emergency care data field should be completed, so that potentially relevant hospital attendances can be drawn out from the data more easily.
- With respect to new hospital-based YVIPs, we recommend that prior to service roll-out, sufficient time is earmarked for setting out data requirements and to ascertain the feasibility of reasonable options for robust quantitative evaluation.

Costs of service at UCLH (*Chapter 6*)

- We were unable to conduct a cost-effectiveness analysis due to a lack of good quality evidence describing the impacts of YVIPs on subsequent use of hospital services.
- A cost-consequence analysis showed that there was a statistically significant decrease in assessed risks for young people engaged for longer-term YVIP support for the period April 2020 – November 2021 for the following risks:
 - 'experiencing further harm', and
 - 'not maintaining positive relationships with family'.
- The mean cost per person engaging with Redthread support-- over a 21-month period, was calculated to be £1,865.
- The mean cost for the emergency inpatient treatment of an artificially constructed group, similar to those likely to be referred to Redthread in UCLH, was estimated to be £5,789 while the mean cost per attendance at A&E was £203.

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- Interpretation of these results should be made with caution due to our research being limited by the small sample of patients, lack of a control group, inability to evaluate effectiveness and the subjective assessment of risks based on Redthread personnel.

Feasibility of quantitative evaluation of service at UCLH (*Chapter 7*)

- Redthread aims to have a positive impact across a wide range of aspects of young people's lives, for example in education, crime, housing, benefits and employment, as well as reducing attendance at hospital. We focused on the latter as we considered it easier to quantify and monitor given the available data.
- We considered a number of possible options for a rapid quantitative evaluation of the impact of the service but concluded that none of them would be currently feasible. The reasons for this are due to combinations of the following, some of which overlap with the data limitations described above:
 - relatively small numbers of young people have so far engaged in the full longer-term programme with Redthread at UCLH, leading to likely insufficiently powered analyses of the impact of that particular programme over the period of the research project.
 - lack of consent to enable access to individual person-level data for Redthread users to link to hospital administrative data.
 - likely difficulty in being able to detect the impact of the service among wider cohorts (such as in people attending ED with potentially eligible presentations).
 - a lack of key information recorded in UCLH ED records, for example, information about the most likely human intent of the injury, and patient engagement with the violence intervention programme.
 - our inability to link national hospital inpatient and emergency care records due to the lack of linkable patient identifiers across the datasets.
 - the difficulty in identifying comparable control groups from routine hospital data.
- We contend that, were data and governance barriers able to be resolved, the two most promising options for quantitative evaluation would be ones:
 - Comparing the data of young people engaged with Redthread to a set of appropriately matched control individuals, and
 - Studying the impact of Redthread at small area level.
- We have therefore made recommendations to facilitate future evaluation:
 - For analysts to use reattendance as one measure of impact, and work with clinicians and Redthread to develop criteria from routine hospital records that can be used to identify which attendances are potentially avoidable.
 - Similarly, develop criteria for identifying groups of patients attending other hospitals from which control groups can be selected.
 - For Redthread and acute hospital partners to consider mechanisms by which information from the service, as to who chooses to engage with different levels of support, and who chooses not to engage, can be linked to the routine data for analysis purposes.
 - For clinicians to routinely record when a Redthread referral has been made by using the relevant code in the patient administration system, rather than only using free

text. If a person is identified by Redthread themselves, then for this to be also flagged in the routine patient data.

- That suitable geographical areas are decided upon between Redthread and UCLH, making it feasible to test an area-level approach.

How findings relate to previous research

In this section we present our findings in relation to previous research.

Service implementation

Several findings from this evaluation at UCLH align with observations from Redthread evaluations at other NHS trusts.

Firstly, that NHS Staff are receptive to youth workers being on-site and value Redthread as an independent, expert, professional service which fills a gap within current NHS provision and has potential to bridge secondary healthcare and community services.

Secondly, the critical importance of timely consent of young people within emergency settings, given the 'opt-in' model that underpins the charity's programme theory and ethos (i.e. young people must voluntarily engage with the service). However, compared to MTCs in London (e.g. St Mary's, St George's), it appears that young people referred to the service at UCLH comprise a different population profile going beyond the local geographical boundaries (because of transport links) and have different physical injuries to those commonly arising from assault and gang violence (e.g. gun shot and knife wounds which are usually directed to London MTCs). Therefore, even if gang-involvement is directly or indirectly suspected in a case, clinicians speak of complex presentations and treating young people who are victims of sexual abuse, domestic violence, have severe mental health problems, or a long-term condition that has flared up due to social factors (for example, peer intimidation, family conflict). A youth worker's case load at UCLH might therefore extend beyond short-term crisis support work to providing longer-term support beyond six months, and to helping young people who are not from the local borough and who require advocacy across statutory services both inside and outside of London. This suggests that the Redthread service model for local hospitals (such as UCLH) requires adaptation to reflect differences from MTCs, for example more diverse referral pathways beyond adult ED including outpatients and specialist paediatric and adolescent services.

Finally, this NIHR RSET evaluation concurs with an evaluation in the Midlands that found that services such as Redthread rely on "highly motivated individuals to promote adoption by giving access to NHS organisations, leveraging personal and professional networks and internal lobbying".¹¹³

Quantitative impact

Consistent, good quality evidence on the impact of violence intervention schemes on subsequent healthcare use, and other related outcomes, has been lacking (see *Chapter 3*). As discussed in *Chapters 5* and *7*, we have not been able to contribute our own quantitative assessment of impact, but have made recommendations for future evaluations. However, our reflections are in accordance with observations made in a qualitative evaluation of Redthread's YVIP expansion into sites in the Midlands,³⁵ where one of several "potential threats and barriers" was identified as being "A failure

to value and integrate routine data to describe how YVIPs are supporting the work of NHS and other staff, ensuring safety after discharge and securing engagement with community-based services.”

Costs

The acute treatment costs of penetrating trauma injury in England and Wales vary by patient, cause and body region of injury and treatment characteristics. Our findings are consistent with other studies in England and Wales showing that healthcare costs are considerable and much higher than the costs of YVIP interventions. The costs reported for England and Wales, in 2008 by a TARN-based study which focused on more severely injured patients and also included cost of prehospital care were estimated at £7,983.¹⁰⁸ Another study, reviewing the cost of 187 gunshot injuries treated at a teaching hospital in Manchester, reported a mean cost of £2,698 for patients admitted for inpatient care.¹⁰⁹ In most of the studies, the A&E costs are not identified separately from the total healthcare costs. A study conducted in South Wales estimated that about 30.0% of assaults resulted in a visit to A&E at a cost of £200 per attendance in 2019.¹⁰⁷

Another important economic aspect related to programmes targeting youth violence is that some – and possibly the most significant part – of the costs and benefits materialise outside of health and social care. These generally refer to costs associated with the criminal justice system or incarceration, but also costs associated with disability or lost productivity (as opposed to the generation of income from employment and tax). Healthcare services have been estimated to be only a small fraction of the total costs (especially in relation to life-time effects of the physical and emotional harm) amounting to 0.03% of total costs for homicide or from 3-6% for crimes with injuries, rape or sexual offences.¹⁰⁵

Global research on violence has identified the burden and costs that violence places on health and social prospects across the life course.¹¹⁴ Violence affects not only health outcomes, quality of life and social choices that people make but also have wider consequences on families, communities and society.¹⁰⁷

Increased spending on violence prevention would help to reduce the economic burden on the healthcare system, the huge burden that arises from the long-term health impacts of adverse childhood experiences and would also increase the savings that would accrue outside of the healthcare system.

Strengths and limitations

Strengths

Our study was carried out as a rapid, mixed-methods evaluation, integrating qualitative and quantitative methods. Components included a review of the evidence, interviews, meeting observations, and analysis of national hospital and local service activity and costs datasets. We were aided throughout by close collaboration with a variety of stakeholders including Redthread and UCLH staff, and external advisers. These relationships helped us to gain access to key people, information and datasets.

Despite the challenging circumstances brought about by the COVID-19 pandemic for UCLH and Redthread, we were able to conduct confidential interviews with frontline staff, Redthread managers and youth workers, and a small number of meeting observations, largely on account of working in close collaboration with clinical leads at UCLH, and general staff enthusiasm for the service.

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The approach we brought to our quantitative analysis was thorough and broad in its scope. In trying to determine the feasibility of evaluation of impact, we considered several different perspectives: that of the individual young person, the hospital, and the community. This work has led to recommendations to improve future efforts at evaluation which will be helpful beyond the service at UCLH.

This study provides valuable reflections on the main costs of, and potential risk reductions resulting from Redthread YVIP service. It also gives an indication of the success rate Redthread might need to achieve in terms of preventing readmission in order to recoup the costs of its intervention.

Limitations

The implementation of the service was significantly disrupted by the COVID-19 pandemic, and this had consequences for how the service embedded itself at UCLH. Just as this had an impact on the traction of the Redthread service outside of paediatric and adolescent services, it also had an impact on our ability to engage with staff outside of those services. In particular, it remained particularly difficult to gain traction with the evaluation from staff based in the adult ED at UCLH and those with lower awareness of the Redthread service. Future evaluations or research studies will need to engage with staff treating young people in different parts of the Trust beyond paediatric and young people's services.

The uniqueness of the implementation of the service at UCLH (due to its particular context) also meant that our study would have benefitted from direct comparison with another ED in London. We recommend that multi-site case studies are conducted at trust level in future to allow for systematic comparisons across hospitals, at similar time points. In particular, multiple case studies could be used to generate knowledge about how Redthread implementation processes, and youth-violence services more generally, should be adapted and tailored given the types of services a trust provides, the staff skill mix, and types of clinical presentations most commonly seen within EDs.

The research team were not able to approach young people who had engaged with Redthread to ask directly about the impact of the service for practical and ethical reasons. In addition, due to the pandemic and the necessary shift to remote data collection, we were not able to carry out observations of clinical-patient interactions. We may have therefore missed out on important insights into how the service was received by young people, and its wider impacts. While we attempted to mitigate this limitation by seeking to interview Redthread's Youth Ambassadors, this latter route also ultimately proved impractical.

While in one respect (as noted above) our analysis of the feasibility of measuring quantitative impact covered a variety of perspectives, for the evaluation of a service whose aims encompass many aspects of a young person's life and experience, our focus on measuring impact solely via subsequent reattendances or readmissions was a limitation. Moreover, it is possible that a positive consequence of engaging with Redthread could be an increase in their engagement with healthcare services and hence their likelihood to reattend hospital, even for harm-related incidents, but we have no evidence as to the extent to which this might happen.

It is understandable that Redthread have taken utmost care to prevent data of supported young people being shared via strong consent processes, but it must be acknowledged that this has also meant that possibly the strongest options for analysis were not possible. Other routes to analysis were also difficult to realise due to a lack of specific data being collected by the hospital, in addition

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to relatively small numbers of young people having been engaged for longer-term support over the evaluation period.

The lack of linkable Redthread and hospital data meant that our analysis of costs was not based on directly measured costs of service recipients; we instead had to rely on a constructed group of patients with broadly similar characteristics and diagnoses. However, our success in constructing Redthread-eligible or Redthread-like populations from national hospital data was difficult to appraise. In addition, the constructed group were based only on those admitted as emergencies, and the relatively high cost of treatment per admission reflects this fact.

The analysis of consequences was based on data from Redthread's risk assessment process. While informative, and based on the professional judgment of youth workers, this process was subjective, and should be considered with appropriate caution. The analysis was carried out with data from a very small number of young people, and the scale from 1-3 used for measuring risk indicator may miss on granularities of the distribution of the individual risk continuum.

Equality, Diversity and Inclusion

Participant representation

Redthread's service was concerned with providing support to potentially vulnerable, or at-risk young people aged from 11 to 24. The service's setting was an inner-city London hospital, close to major national and regional transport links. Of those who received a longer-term service from Redthread and whose ethnicity was known, approximately two-thirds were from non-White ethnic groups.

As such, this study reflects on a service which aims to improve the care and prospects of potentially under-served groups of individuals.

While it was not possible to conduct interviews with young people who had experienced the Redthread service for ethical and practical reasons, we interviewed Redthread youth workers and clinical and other staff whose responsibilities and experiences covered the care of potentially vulnerable younger people.

Future research

This evaluation has contributed to the qualitative evidence available on the implementation of a YVIP in a large London acute trust, however there are a number of additional areas that would benefit from future research.

These include:

- Mixed-methods, multi-site case studies that enable cross-case comparisons to be undertaken.
- Studies focused on the perspectives of young people who have engaged with – or are potentially eligible – for Redthread support, exploring any differences across age cohorts (e.g. under and over 18-year-olds) and those that receive short-, medium- and longer-term support.
- Studies which are able to solve the data challenges identified to be able to estimate quantitative impacts, and cost effectiveness.

- Studies that are able to look beyond hospital-based outcomes and quantify the impact on, for example, educational attainment, recidivism, mental health and the use of drugs and alcohol.

We made limited progress in adding to the evidence of quantitative impact of such schemes, but have discussed how this might be improved to enable future evaluation. Although many previous studies have focused on the direct impact of engaging with youth violence reduction services, we also propose an area-based approach which aims to capture less direct impacts on others within local communities. However, further work would need to be undertaken to better assess its feasibility.

We note that the Youth Endowment Fund has funded a research team from the University of Birmingham to study Redthread services across 13 sites, beginning in 2022.¹¹⁵ There is limited information available as to the design of the study, but information from Redthread suggests that this will use a quasi-experimental design using propensity scoring matching.

Conclusions

To conclude, our evaluation was not able to determine a feasible approach to measuring the quantitative impact of Redthread's YVIP at UCLH in the time available, but we have been able to reflect on data describing the service, including costs, and make recommendations to support future evaluation. We have been able to contribute to the qualitative evidence on the implementation of the service. Redthread's service was largely viewed positively as a necessary service for young people at risk of harm (beyond involvement in violence), and one which was complementary to clinical and other statutory services. The service became particularly well embedded in paediatric ED and adolescent services, but less so in adult ED, possibly in part as a consequence of the impact of the COVID-19 pandemic. The diverse reasons behind individual referrals, the various routes by which young people were identified, and the mix of specific support interventions provided together emphasised the view that this was a complex intervention, with challenges in implementation. Recently published guidance to support implementation of violence reduction services has emphasised the need for evaluation to be undertaken as a key improvement activity, and touches on data that ought to be routinely collected.¹⁸ There is a clear need for good quality evidence of impact and our recommendations may help to improve future evaluation.

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Ethical Approval

The project was categorised as a service evaluation by the Health Research Authority (HRA) decision tool and University College London/University College London Hospitals (UCL/UCLH) Joint Research Office.

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Contributions of authors

- **Professor John Appleby** (Director of Research and Chief Economist, Nuffield Trust) was the principal investigator and led the overall evaluation. He led on, and contributed to conception, design, analysis, and write-up of all aspects of the study, and is lead author of this report.
- **Theo Georghiou** (Senior Fellow, Nuffield Trust) contributed to the conception and design of the study, the quantitative aspects of the study and the write-up of the study.
- **Dr Jean Ledger** (Senior Research Fellow, University College London) contributed to the conception and design of the study, the qualitative aspects of the evaluation, the evidence review and the write-up of the study.
- **Lucina Rolewicz** (Researcher, Nuffield Trust) contributed to the conception and design of the study, the quantitative aspects of the evaluation and the write-up of the study.
- **Chris Sherlaw-Johnson** (Senior Fellow, Nuffield Trust) contributed to the conception and design of the study, the quantitative aspects of the evaluation and the write-up of the study.
- **Dr Sonila M. Tomini** (Research Fellow, University College London) contributed to the conception and design of the study, the economic evaluation and write-up of that part of the work.
- **Dr Jason M. Frerich** (Harvard University) contributed to the evidence review and the write-up of the study.
- **Pei Li Ng** (Project Manager, University College London) managed the evaluation and supported with drafting of the final report.

All authors contributed to integrating the findings of the study. All authors made critical revisions to the report for important intellectual content and approved the final manuscript. All authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the article are appropriately investigated and resolved.

Data Sharing Statement

The use of HES Admitted Patient Care data and Emergency Care Data Set data was governed by a data sharing agreement with NHS Digital covering NIHR RSET analysis (DARS-NIC-194629-S4F9X). Hospital Episode Statistics data are reused with permission of NHS Digital (Copyright © 2022, NHS Digital. All rights reserved). All data requests should be submitted to the corresponding author for consideration.

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<https://youthendowmentfund.org.uk/news/the-youth-endowment-fund-announces-an-18-million-investment-in-alternatives-to-arrest-conviction-and-custody-for-children/#:~:text=Search%20for%3A-,The%20Youth%20Endowment%20Fund%20announces%20an%20%C2%A318%20million%20investment,by%20giving%20them%20another%20chance.> (Accessed 30 September 2021).

116. Redthread. Youth Violence Intervention Programme (YVIP) Theory of Change. 2022.

Appendices

Appendix 1: Final search strategies across two databases

MEDLINE

Ovid MEDLINE(R) ALL <1946 to February 14, 2022>

- 1 Domestic Violence/ or Violence/ or Intimate Partner Violence/ or Gun Violence/ 43545
- 2 assault.mp. 12686
- 3 "Wounds and Injuries"/ 80409
- 4 human trafficking.mp. 819
- 5 domestic violence.mp. or Domestic Violence/ 11958
- 6 Crime Victims/ or knife crime.mp. 11703
- 7 Wounds, Penetrating/ or stabbing.mp. 13277
- 8 (gang violence or gang).mp. 1459
- 9 gang exploitation.mp. 1
- 10 sexual exploitation.mp. 650
- 11 Adolescent/ or adolescent.mp. 2194729
- 12 Young Adult/ 978523
- 13 children.mp. or Child/ 2225512
- 14 juvenile.mp. 90983
- 15 Emergency Service, Hospital/ 80576
- 16 urgent care.mp.2766
- 17 (Major Trauma Centre or Major Trauma Center).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms] 634
- 18 emergency department.mp. 99941
- 19 Hospitalization/ 125139
- 20 Pediatrics/ 57154
- 21 youth worker.mp. 24

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22 Adolescent Development/ 5155
 23 teachable moment.mp. 593
 24 youth services.mp. 183
 25 hospital-based violence prevention.mp. 10
 26 intervention.mp. 723390
 27 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 156293
 28 11 or 12 or 13 or 14 3898408
 29 15 or 16 or 17 or 18 or 19 or 20 308825
 30 21 or 22 or 23 or 24 or 25 or 26 728825
 31 27 and 28 and 29 and 30 554
 32 limit 31 to (english language and yr="2012 - 2022") 283

Embase <1980 to 2022 Week 06>

1 Domestic Violence/ or Violence/ or Intimate Partner Violence/ or Gun Violence/ 66651
 2 assault.mp. 20248
 3 "Wounds and Injuries"/ 119213
 4 human trafficking.mp. 950
 5 domestic violence.mp. or Domestic Violence/ 14920
 6 Crime Victims/ or knife crime.mp. 4016
 7 Wounds, Penetrating/ or stabbing.mp. 10183
 8 (gang violence or gang).mp. 1786
 9 gang exploitation.mp. 1
 10 sexual exploitation.mp. 1004
 11 Adolescent/ or adolescent.mp. 1640407
 12 Young Adult/ 445356
 13 children.mp. or Child/ 2235948
 14 juvenile.mp. 147699
 15 Emergency Service, Hospital/ 7609

16 urgent care.mp.4413

17 (Major Trauma Centre or Major Trauma Center).mp. [mp=title, abstract, heading word, drug
trade name, original title, device manufacturer, drug manufacturer, device trade name,
keyword heading word, floating subheading word, candidate term word] 1159

18 emergency department.mp. 153578

19 Hospitalization/ 439434

20 Pediatrics/ 80304

21 youth worker.mp. 62

22 Adolescent Development/ 4264

23 teachable moment.mp. 778

24 youth services.mp. 230

25 hospital-based violence prevention.mp. 9

26 intervention.mp. 1106006

27 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 215902

28 11 or 12 or 13 or 14 3415021

29 15 or 16 or 17 or 18 or 19 or 20 656973

30 21 or 22 or 23 or 24 or 25 or 26 1110762

31 27 and 28 and 29 and 30 497

32 limit 31 to (english language and yr="2012 - 2022") 366

Appendix 2: Variation in place of A&E reattendance after an initial A&E visit to UCLH

Background

The aim of this analysis was to understand the extent to which young people who attend the A&E department at UCLH will also visit other A&E departments around the country. This would indicate the implications of focusing an analysis of reattendance by Redthread service users to just UCLH or whether it would need to be widened to a wider set of hospitals across the country.

Methods

From the HES A&E records, we selected the first attendance of any patient to the UCLH department between 1st April 2018 and 31st March 2020. If one of these patients had a subsequent visit recorded over the same period at an English NHS acute trust, we recorded the hospital trust where this occurred.

Results

There were 12,047 A&E individuals who presented at UCLH between 1st April 2018 and 31st March 2020 with a subsequent visit over the same period at an English NHS acute trust. These reattendances took place at a total of 128 different acute trusts and 6,441 (53.5%) were at UCLH. 4,303 (35.7%) were at other London trusts with the next most frequent trust being the Royal Free London NHS Foundation Trust with 673 (5.6%) of reattendances (Figure 12).

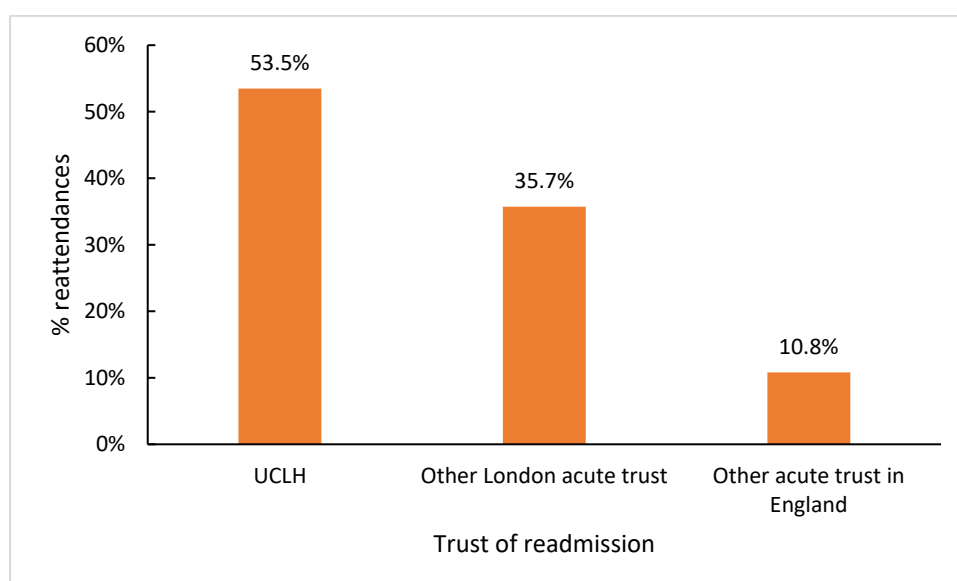


Figure 12: Proportion of subsequent A&E reattendances by English acute trust between April 2018 and March 2020 following an initial A&E visit to UCLH over the same period. Only the first reattendance for each individual is included.

Appendix 3: Identification of people potentially eligible for Youth Violence Intervention Programmes from routine hospital administrative data

Background

The aim of this analysis was to investigate how routine hospital inpatient data and emergency care data could be used to identify people who might be eligible for YVIPs. This would serve three purposes:

- to identify control groups for individual patient-level analysis
- to identify non-elective hospital admissions and attendances that may be avoided by a successful YVIP, and
- to identify a case cohort for analyses of the impact on people eligible for YVIP.

Methods

Redthread record the reasons why young people present to hospital and are referred to their programme, and we mapped these reasons to relevant diagnosis and presentations codes within hospital data. The hospital data we investigated were HES for non-elective inpatient visits and the ECDS for ED attendance. Patient records were limited to young people aged 11 to 24 (inclusive). For patients attending UCLH, we counted numbers between February 2020 (when the Redthread service began) and August 2021.

For inpatient visits we recorded diagnoses on admission (primary or secondary) and for ED attendance we recorded the chief complaint.

Results

The reasons for hospital attendance and for referral to Redthread, as recorded by Redthread, are shown in Table 12, together with ICD10 codes from the inpatient data and chief complaint codes in the ECDS data to which we matched them.

Between February 2020 and August 2021 there were 252 young people referred to Redthread of which 43 engaged with the full longer-term programme. In comparison, over the same period, there were 161 young people aged between 11 and 24 admitted to UCLH with at least one of the matched inpatient diagnosis codes and 3,275 with one of the chief complaint codes.

The size of the matched group from the ECDS data could be reduced if UCLH reported information for an 'injury intent' code as this would rule out accidental injuries. A similar analysis at another London teaching hospital found that, where injury intent was recorded, 21% relate to physical assault or self-harm.

Many reasons for referral to Redthread are not covered by these ICD-10 or chief complaint codes, particularly those that relate to risks and exploitation. Also, these matches are not precise, even though we may match a reason for referral, in some cases there may be no physical signs that correspond to a clinical diagnosis or chief complaint. This may be especially so at UCLH which is not a MCT and where the Redthread service has more focus on prevention.

Table 12: Mapping reasons for presentation and referral to ICD10 diagnosis codes in the inpatient data.

Reasons for presentation	Reasons for referral to Redthread	ICD10 diagnosis codes in HES inpatient data	Chief complaint codes in ECDS
Assault (includes stabbing, other bladed or sharp object, gunshot, vehicle used as weapon, blunt object, bottle, glassed, burns, chemical substance used, combination of body parts used as weapon, explosive used, feet/fist/head/other body part used as weapon, physical assault but threatened with weapon, pushed, strangulation, rape)	Assault	Contact with knife, sword or dagger (W26) Hit, struck, kicked, twisted, bitten, scratched by another person (W50)	Bleeding from nose, burn, chest injury, disturbance of consciousness, dizziness, dressing change/wound surveillance, injuries, laceration, light-headedness, nonfatal submersion, puncture wound, traumatic amputation, wound care
Police-related injury		Striking against or bumped into by another person (W51)	
Wound care		Crushed, pushed, or stepped on by crowd or human stampede (W52) Other fall on same level due to collision with, or pushing by, another person (W03) Assault (X85-Y05, Y08-Y09)	

Reasons for presentation	Reasons for referral to Redthread	ICD10 diagnosis codes in HES inpatient data	Chief complaint codes in ECDS
		Sequelae of assault (Y871)	
Mental health (includes overdose, self-harm, suicidality) or substance misuse (alcohol, drugs)		Symptoms and signs involving emotional state, including nervousness, agitation and restlessness, irritability and anger, hostility, physical violence (R45)	Alcohol intoxication delirium, alcohol withdrawal syndrome, anxiety, bizarre behaviour, feeling depressed, delusions, drug withdrawal, poisoning, self-injurious behaviour, substance misuse, suicidal, suicidal thoughts
		Intentional self-harm (X60-X84)	

Reasons for presentation	Reasons for referral to Redthread	ICD10 diagnosis codes in HES inpatient data	Chief complaint codes in ECDS
	Domestic violence, history of assault, sexual violence, child sexual exploitation	Physical, sexual or psychological abuse and other maltreatment syndromes (T74) Neglect and abandonment (Y06) Other maltreatment including mental cruelty, physical/sexual abuse, torture (Y07) Problems related to alleged sexual or physical abuse (Z614-Z616) Sequelae of events of undetermined intent (Y872)	Physical aggression, social problem, traumatic injury, unusual change in behaviour, victim of sexual aggression
Accident: fall or accidental injury (3 rd party or self-inflicted), road traffic accident		Falls (W00-W19)	Falls
Illness	Risk of harm	Unmatched	Unmatched
Maternity appointment	Child criminal exploitation		
Threatened with a weapon	Affected by gang activity		
No hospital appointment	Gang affiliation		

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Reasons for presentation	Reasons for referral to Redthread	ICD10 diagnosis codes in HES inpatient data	Chief complaint codes in ECDS
Outpatient appointment	Witnessing violence		
Other	Other		

Appendix 4: Power calculations for analyses of the impact of Redthread on future hospital attendance of those engaging with the service using a matched case control study

Background

The power calculations presented in this Appendix are for Option 1a, which is for evaluating the impact of the Redthread programme on the future hospital attendance of people who engage with it. This was the preferred option for Redthread and UCLH and likely to be the one where there would be a higher likelihood of detecting an effect.

Methods

We aimed to estimate a sample size required to achieve a power of 80%, testing with a 95% confidence interval. To obtain this we required estimates for:

- the baseline reattendance rates for young people eligible for Redthread in the absence of the programme, and
- the likely impact of the programme on these reattendance rates.

For both of these we investigated the literature for previous studies of similar patients. We were not able to use the ECDS because it had no patient identifiers that could be used to track the attendance patterns of individuals: each identifier was unique to each visit rather than for each individual.

Research is limited on reattendance to EDs for younger people, but NPC Associates (2018) found that the project baseline reattendance rate over 12 months in patients aged 11 to 25 was 21%. Dickson *et al.* (2021) reported similar baseline reattendance at 18%. For inpatient readmissions, Herbert *et al.* (2015) found that the rate for adolescents aged between 10 and 19 who were admitted for adversity-related problems was 10.4% over a nine-year period, which equates to a much lower rate of 1.2% per year, many of whom would be likely to have come through ED first anyway.

In terms of the impact of YVIPs on reattendance, a previous evaluation of the Redthread programme at St Mary's Hospital in London estimated that hospital reattendance rates for those engaged with Redthread significantly decreased within one year by 33% (from 21% to 14%) (NPC Associates, 2018). This reduction is similar to one reported by the Redthread service at Nottingham University Hospitals (Dickson *et al.* 2021).

To assess statistical power, we analysed a range of scenarios and preferred to be cautious with our recommendations in case effect sizes of 33% are not realised. Our more cautious baseline assumption was to assume an 11% baseline reattendance rate over six months and effect sizes from 10% reductions to 30%.

Results

Estimated sample sizes under other scenarios are illustrated in Figure 13. With an 11% baseline reattendance rate, we estimated that 110 cases and 110 controls would need to be followed up to observe a reduction of 10%. With greater reductions of 30% the required sample sizes would be far

lower, yet there is no guarantee that such an impact would be seen and it is better to recruit samples of sufficient size to give a better chance of more moderate impacts to be detected.

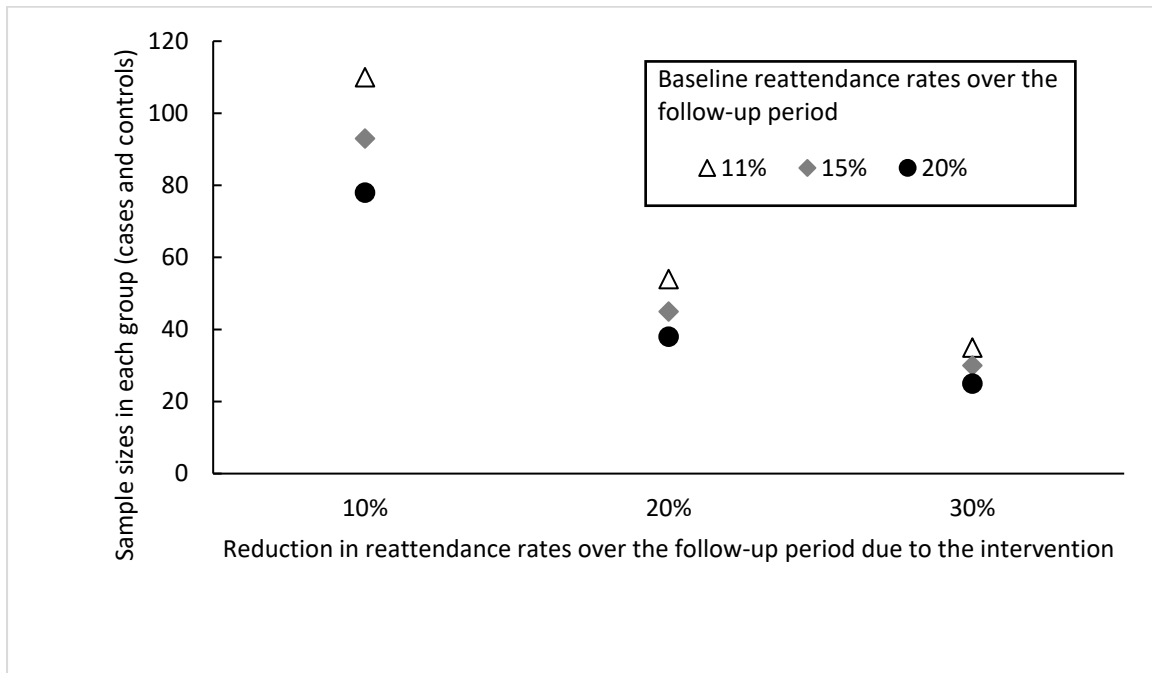


Figure 13 Estimated sample sizes required under different assumptions of baseline reattendance rates and the effect of the Redthread intervention to achieve 80% power.

Appendix 5. Redthread service user risk assessment results

Table 13 List of risk indicator.

The risk assessment variables	Earlier score (number of young people/%)	Recent score (number of young people/%)
Risk of young person of experiencing further harm		
1=Low score	12 (33.3%)	22 (61.1%)
2=Medium score	19 (52.8%)	11 (30.6%)
3=High score	5 (13.9%)	3 (8.3%)
Risk of young person participating in further harm		
1=Low score	26 (72.2%)	29 (80.6%)
2=Medium score	8 (22.2%)	5 (13.9%)
3=High score	2 (5.6%)	2 (5.6%)
Risk of exploitation (criminal, sexual, grooming)		
1=Low score	26 (72.2%)	29 (80.6%)
2=Medium score	6 (16.7%)	6 (16.7%)
3=High score	4 (11.1%)	1 (2.8%)
Risk of young person experiencing criminal behaviour		
1=Low score	25 (69.4%)	28 (77.8%)
2=Medium score	6 (16.7%)	7 (19.4%)
3=High score	5 (13.9%)	1 (2.8%)
Risk of young person participating in further criminal behaviour		
1=Low score	30 (83.3%)	29 (80.6%)
2=Medium score	3 (8.3%)	6 (16.7%)
3=High score	3 (8.3%)	1 (2.8%)
Risk of young person continuing a lifestyle that exposes them to further harm/injury		
1=Low score	20 (55.6%)	25 (69.4%)
2=Medium score	11 (30.6%)	6 (16.7%)
3=High score	5 (13.9%)	5 (13.9%)
Risk of young person not engaging in education, training, or employment		
1=Low score	19 (52.8%)	26 (72.2%)
2=Medium score	10 (27.8%)	5 (13.9%)
3=High score	7 (19.4%)	5 (13.9%)
Risk of young person not maintaining positive relationships with family		
1=Low score	15 (41.7%)	22 (61.1%)
2=Medium score	13 (36.1%)	10 (27.8%)
3=High score	8 (22.2%)	4 (11.1%)
Risk of young person not willing to engage with other services		
1=Low score	28 (77.8%)	30 (83.3%)
2=Medium score	7 (19.4%)	4 (11.1%)
3=High score	1 (2.8%)	2 (5.6%)
Risk of young person not being able to identify escalating problems		

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1=Low score	24 (66.7%)	25 (69.4%)
2=Medium score	8 (22.2%)	9 (25.0%)
3=High score	4 (11.1%)	2 (5.6%)
Overall Scoring: Risk of harm to others		
1=Low score	31 (86.1%)	31 (86.1%)
2=Medium score	5 (13.9%)	5 (13.9%)
3=High score	.	.
Overall Scoring: Risk of harm from others		
1=Low score	17 (47.2%)	24 (66.7%)
2=Medium score	15 (41.7%)	9 (25.0%)
3=High score	4 (11.1%)	3 (8.3%)
Overall Scoring: Risk of harm to self		
1=Low score	21 (58.3%)	27 (75.0%)
2=Medium score	11 (30.6%)	6 (16.7%)
3=High score	4 (11.1%)	3 (8.3%)
How safe do you feel right now? (10-point Likert scale)*	7.11 10 th percentile = 3 90 th percentile = 10	7.77 10 th percentile = 5 90 th percentile = 10

Source: Based on the data provided by Redthread on risk assessment.

*) is the mean of the score.

Appendix 6. Redthread’s Theory of Change (October 2022 version)

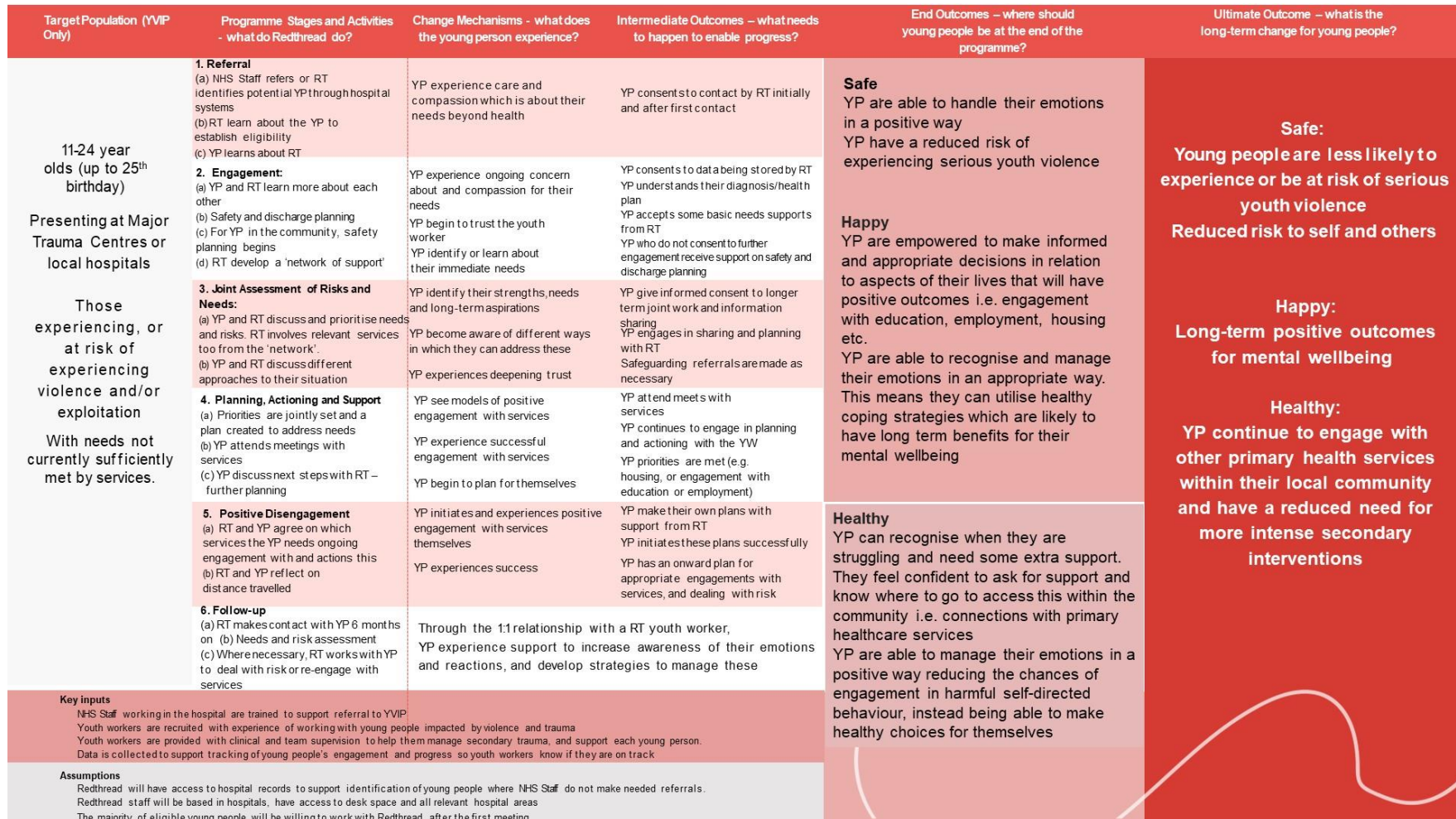


Figure 14 Redthread Theory of Change (October 2022 version)

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Reproduced with permission from Redthread's Youth Violence Intervention Programme (YVIP) Theory of Change.¹¹⁶

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