


Supporting High-impAct useRs in Emergency Departments (SHarED) quality improvement: a mixed-method evaluation

Carlos Sillero-Rejon ^{1,2}, Megan Kirbyshire,³ Rebecca Thorpe,⁴ Gareth Myring,^{1,2} Clare Evans,³ Johanna Lloyd-Rees,⁴ Angela Bezer,⁴ Hugh McLeod^{1,2}

To cite: Sillero-Rejon C, Kirbyshire M, Thorpe R, *et al.* Supporting High-impAct useRs in Emergency Departments (SHarED) quality improvement: a mixed-method evaluation. *BMJ Open Quality* 2023;**12**:e002496. doi:10.1136/bmjopen-2023-002496

► Additional supplemental material is published online only. To view, please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2023-002496>).

Received 11 July 2023
Accepted 2 December 2023



© Author(s) (or their employer(s)) 2023. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

¹Population Health Sciences, Bristol Medical School, University of Bristol, Bristol, UK
²The National Institute for Health and Care Research Applied Research Collaboration West (NIHR ARC West) at University Hospitals Bristol and Weston NHS Foundation Trust, UK, Bristol, UK

³Health Innovation West of England, Bristol, UK

⁴University Hospitals Bristol and Weston NHS Foundation Trust, Bristol, UK

Correspondence to

Dr Carlos Sillero-Rejon;
carlos.sillero-rejon@bristol.ac.uk

ABSTRACT

Background The need to better manage frequent attenders or high-impact users (HIUs) in hospital emergency departments (EDs) is widely recognised. These patients often have complex medical needs and are also frequent users of other health and care services. The West of England Academic Health Science Network launched its Supporting High impAct useRs in Emergency Departments (SHarED) quality improvement programme to spread a local HIU intervention across six other EDs in five Trusts.

Aim SHarED aimed to reduce ED attendance and hospital admissions by 20% for enrolled HIUs. To evaluate the implementation of SHarED, we sought to learn about the experience of staff with HIU roles and their ED colleagues and assess the impact on HIU attendance and admissions.

Methods We analysed a range of data including semistructured interviews with 10 HIU staff; the number of ED staff trained in HIU management; an ED staff experience survey; and ED attendances and hospital admissions for 148 HIUs enrolled in SHarED.

Results Staff with HIU roles were unanimously positive about the benefits of SHarED for both staff and patients. SHarED contributed to supporting ED staff with patient-centred recommendations and provided the basis for more integrated case management across the health and care system. 55% of ED staff received training. There were improvements in staff views relating to confidence, support, training and HIUs receiving more appropriate care. The mean monthly ED attendance per HIU reduced over time. Follow-up data for 86% (127/148) of cases showed a mean monthly ED attendances per HIU reduced by 33%, from 2.1 to 1.4, between the 6 months pre-enrolment and post-enrolment ($p < 0.001$).

Conclusion SHarED illustrates the considerable potential for a quality improvement programme to promote more integrated case management by specialist teams across the health and care system for particularly vulnerable individuals and improve working arrangements for hard-pressed staff.

INTRODUCTION

Frequent attenders or high-impact users (HIUs) are usually defined as patients who attend a hospital emergency department (ED) five or more times within 12 months.¹ These patients often have complex medical

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Frequent attendance in hospital emergency departments (EDs) is a worldwide problem that, despite the national recognition of the rationale for better management of high-impact users (HIUs), has relied on the local efforts of clinicians to change working practices.

WHAT THIS STUDY ADDS

⇒ The Supporting High impAct useRs in Emergency Departments (SHarED) quality improvement programme was successful in spreading a model of HIU management based on the identification, proactive management, monitoring and review of these patients, with clear benefits to ED staff, and potential benefits to patients and resource use.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ SHarED illustrates the considerable potential for a quality improvement programme to promote more integrated case management by specialist teams across the health and care system for particularly vulnerable individuals and improve working arrangements for hard-pressed staff.

needs, are frequent users of other health and social care services including hospital admissions, and have higher mortality rates.^{1–5} In England, 2.1% of ED attenders presented five or more times in 2016/2017, accounting for 10.7% of ED attendances.⁶ The particular needs of HIUs, in addition to system-level challenges regarding the management of urgent and emergency care pathways, including delays in hospital discharge, have contributed to EDs being a difficult work environment for staff.^{3,4}

In 2017, the Royal College of Emergency Medicine¹ and National Health Service (NHS) England promoted action to ensure that HIUs have their needs ‘met more effectively through an improved, integrated service, reducing their future attendances

at A&E'.¹ In 2022, NHS England announced that it was working to increase the provision of high-intensity user services.^{5,7} The use of personalised care plans has been advocated for these patients,^{1,7,8} potentially reducing ED attendance and hospital admissions.^{3,9–12} Despite national recognition of the rationale for better management of HIUs, service improvement has relied on the local efforts of clinicians to change working practices.^{10,13}

In 2020, the West of England Academic Health Science Network (AHSN) launched the Supporting High impAct useRs in Emergency Departments (SHarED) quality improvement programme to spread an HIU intervention first developed in the Bristol Royal Infirmary (BRI) ED across the six other EDs in five local hospital Trusts.¹⁰ SHarED provided funding for ED staff to implement processes for the identification, proactive management, monitoring and review of HIUs.¹⁴

To evaluate SHarED, we aimed to understand a range of factors including implementation, changes in working practices, impact, sustainability and resource use from the perspective of ED staff with HIU roles in the five participating Trusts. We sought to provide further insight into the impact of SHarED by analysing data collected during the programme. The findings are intended to inform the potential future rollout of an HIU quality improvement programme.

METHODS

Setting

All six EDs (in addition to the BRI's ED) in the five hospital Trusts within the West of England AHSN participated: Gloucestershire Hospitals NHS Foundation Trust, Great Western Hospitals NHS Foundation Trust, North Bristol NHS Trust, Royal United Hospitals Bath NHS Foundation Trust, and University Hospitals Bristol and Weston NHS Foundation Trust.

Intervention development and core characteristics

The HIU team at the BRI was formed in 2015 to 'share specialised clinical knowledge to support individual patients to make better decisions about their health by addressing their specific issues and formulating a personal support plan'.¹⁰ The initial focus was frequent attenders presenting with drug/alcohol problems and mental health issues, who were homeless, and whose behaviour, including verbal aggression, impacted staff.¹⁰ Over its first 12 months, the BRI HIU team instigated multidisciplinary collaboration to create personal support plans (PSPs) for 87 selected HIUs, who subsequently experienced reductions in ED attendance and hospital admissions.¹⁰ In 2017, the Trust funded a part-time HIU nurse coordinator and some of the lead ED consultant's time to facilitate their HIU work.

SHarED broadly followed the collaborative quality improvement programme model developed by Berwick to promote the BRI's HIU approach across the region.¹⁵ SHarED aimed to reduce ED attendance of enrolled

HIUs by 20% over 12 months and improve the experience of HIUs and ED staff over the period. In addition to the provision of clinical leadership, project management and opportunities for peer-support for staff to facilitate the use of PSPs, and networking; SHarED created a toolkit to support each component of the intervention: (1) referral, triaging and prioritisation of HIUs, (2) creation of PSPs, (3) arrangements for multidisciplinary team meetings, (4) communication with patients and General Practitioners (GPs), (5) ED staff training and (6) data collection and reporting arrangements. The theory of change for SHarED is shown in online supplemental figure S1).

SHarED funded part-time roles for an HIU nurse coordinator and lead consultant in each participating ED, initially for 20 weeks, with an expectation that approximately 20 HIUs would be recruited during this period. The project was officially launched in 2019 but was delayed until 2020 due to the COVID-19 pandemic. Funding was also extended, in part due to constraints associated with the COVID-19 pandemic for additional 37 weeks (20 weeks for the service and 17 weeks for data collection purposes).

Intervention evaluation

Our evaluation had two components. First, a qualitative study of the views of participating HIU staff on the implementation of SHarED and its subsequent sustainability, which was informed by the realist evaluation framework. We aimed to understand how HIUs' staff engaged with and implemented the SHarED, how working practices relating to HIUs changed during the funded period, the perceived impact of the SHarED programme, the barriers and facilitators relating to its sustainability, and how the SHarED funding was used to deliver programme.¹⁶ Second, an analysis of anonymised data collected by the SHarED programme for service evaluation of the number of ED attendances and hospital admissions for HIUs included in the SHarED programme, estimated impact of changes on resource use, the number of ED staff trained in HIU management, and responses from ED staff to three surveys on their experiences in managing HIUs. We did not collect data from HIUs on their experience in health and care services.

Data sources and measures

The SHarED project manager invited six HIU consultant leads, including the SHarED and BRI clinical lead, and five HIU coordinators to be interviewed. One consultant and one coordinator had taken on their HIU role after the SHarED had been completed. One of the HIU coordinators did not respond to the invitation, so the researcher undertook 10 interviews with consultant leads from all five participating Trusts and coordinators from four of the five Trusts. The interviews were undertaken between October 2022 and February 2023, lasting from 45 to 60 min and were conducted via Microsoft Teams. The interviews were guided by an iteratively developed

topic guide, which covered themes including, history, planning and implementation, delivery, impact, sustainability, and resource use.

Anonymised quantitative data were collected by the project manager as part of the SHarED programme for service evaluation for those patients enrolled during SHarED implementation. Data for HIUs from the six participating EDs included age, Trust, and number of ED attendances and hospital admissions per month for 12 months before and after the intervention. The number of ED staff trained in HIU management during SHarED was also collected from each ED. The SHarED's staff experience survey included 12 questions about managing HIUs and was sent to all ED staff three times: September 2020, March 2021 and July 2021 (online supplemental table S1).

To estimate the average cost for an ED attendance, we used the national average cost from the 2021/2022 National Cost Collection for the NHS.¹⁷ To estimate an average cost for a hospital admission applicable to HIUs, we used internal data from the BRI for activity from Healthcare Resource Group codes applicable to this type of patient cohort, and a cost for each code was also retrieved from the National Cost Collection (see online supplemental table S2).

Analysis

Interview audio files were transcribed, anonymised and checked for accuracy. Data analysis was based on Framework methods, which apply a thematic structure to summarise and classify data using a series of matrices to organise data informed by the research questions, interview topic guide and realist approach.^{18 19} The text was coded to represent key topics/themes and recorded in columns, with rows representing individual informants. This facilitated the exploration of themes and patterns across the range of informants. Analysis of the first interviews informed further data collection: early insights informed changes to the topic guide used during later interviews. Researchers coded the interviews they conducted, independently double-coded a subsample of transcripts and discussed the preliminary coding framework and themes to ensure the rigour of the emerging analysis.

The number of monthly ED attendances and hospital admissions for HIUs during the 12 months before and after being enrolled in SHarED were summarised using descriptive statistics. Due to the variation in the duration of follow-up data, we categorised HIUs by the number of months with follow-up data, from 3 to 12 months. Researchers analysed emergency visits and hospital admissions for each HIUs category using two baseline periods: (1) 12 months before the intervention and (2) the number of months before enrolment to match the number of months of follow-up data. Differences in the average of monthly ED visits and hospital admissions were compared using t-tests for HIUs with follow-up periods of 3, 6, 9 and 12 months. The number and proportion of staff trained in EDs were reported. Staff survey data

were summarised by the mean score, on a scale of 0–100, per question, by staff role and survey wave. Differences in mean scores between staff roles and waves were compared using t-tests. The open-text questions were coded, each to different themes, reporting the frequencies that staff mentioned each theme for each wave. Statistical analysis was conducted in R V.4.2.1 and Stata V.16.

We report the SHarED funding and impact on ED attendance and hospital admission costs, based on the 6-month follow-up data, from a Trust perspective using local cost data.

RESULTS

HIU staff views

Working environment in EDs

The EDs were unanimously viewed as difficult and challenging environments for staff due to longstanding issues (e.g., insufficient capacity across the health and care system and consequently long waiting times for service users in EDs and across care pathways) which had a negative impact on staff:

Every year I think it can't get any worse and every year it does. [...] it's just exceptionally busy, there's lots of people who can't access any other resources, so ED is where everyone comes at the end of the day, whether they need to or not so it's busier and busier. (#8)

HIU characteristics and challenges for EDs and the wider health and care system

HIUs were broadly characterised by high levels of vulnerability and marginalisation, facing a wide range of issues from mental health, alcohol and drug abuse, violence, exploitation, homelessness, and chaotic life conditions to chronic pain and complex medical conditions. The circumstances of HIUs when presenting at ED spanned a wide spectrum, including individuals viewed as being challenging for staff to manage, because the standard protocols for assessment and treatment were not viewed as fit-for-purpose. This scenario contributed to unsatisfactory encounters for staff in the ED and more widely across the health and care system.

While SHarED's initial HIU definition was those attending ED five or more times in the previous 12 months, the participating EDs typically implemented their own criteria for identifying HIUs, including a focus on attendance over a shorter period. All the Trusts further broadened their approach to allow staff to refer individuals viewed as having a high impact on staff during an attendance:

Any member of staff, like reception, nurses, doctors, other people outside ED can refer [...] it gives the staff something they feel they're doing for those patients. So we find it quite advantageous because it makes people feel empowered to make a difference. (#7)

Local implementation of SHarED programme

Staff reported that SHarED enabled ED staff to learn about BRI's HIU model, which provided a practical framework for improving the management of HIUs and could be adapted to local characteristics. The project management and materials provided, such as template letters to patients and other professionals and data recording tools, were viewed as useful. The AHSN funding enabled HIU nurse coordinator roles and consultant leads to be recruited with time dedicated to the project and the HIU team. The networking opportunities with the other HIU teams for staff participating in SHarED, during and after the programme, were highly valued. SHarED enabled previously unstructured and improvised HIU initiatives to evolve into more established and clearly defined services.

Proactive management of HIUs: staff roles in the ED and wider health and care system

Staff reported that initial contact with the HIU or their GP by letter could lead to behaviour change clearly benefiting both the individual and the healthcare system. For more complex cases, the core element of HIU management was the creation, sharing and use of a PSP. Depending on the HIU's circumstances, the PSP would be written and signed off by the HIU nurse coordinator, HIU consultant lead or specialists from outside the ED. PSPs had three key objectives: (1) engagement with HIUs about their behaviour and needs; (2) recommendations for ED clinicians to aid their interaction with HIUs and (3) collaboration between professionals working across the health and care system to share specialist expertise and co-ordinate person-centred care:

It's a really important way for us to convey [...] really vital information to our clinicians at any time of day. (#10)

Many PSPs had a key multidisciplinary component, such that specialist teams (mental health, safeguarding, pain, community, homelessness, drug and alcohol, etc.) either verified recommendations made by ED clinicians, led on generation of new recommendations, or shared their existing plans. One Trust's HIU team included a pain consultant and an HIU coordinator based in its safeguarding team. This broader perspective on HIU staff roles represented a more holistic approach to managing HIUs, which actively promoted more integrated case management for HIUs across health and social care providers.

Benefits for ED patients, staff, and the wider health and care system

The HIU staff were confident HIUs benefited, although being such a heterogeneous group this was manifested in different ways, from support to change behaviour (e.g., attending ED less frequently), or improved access to other specialist services, to a more consistent, person-centred care, with potentially less waiting and fewer unnecessary investigations, delivered with compassion:

I expect that they feel a bit less stigma, so they're not being left for longer than other patients in the waiting room, they're not being treated any differently. (#5)

In the context of the high turnover of medical and nursing staff, the use of PSPs was unanimously viewed as beneficial for frontline staff who felt more empowered when providing care to HIUs. The practical aid PSPs provided staff, and the raised awareness of HIUs' circumstances, contributed to positive changes in culture relating to staff perceptions of HIUs, and tangibly reduced workload-related pressure. The more structured approach to an ED-based HIU service, facilitated by SHarED, enabled improved communication between different care providers and services to develop more holistic and integrated care across the health and care system.

We had it on the wall that we'd demonstrated a good change in attitude and perception [...] there definitely was a degree of eyes rolling, why are they here again, but I think there was a level of understanding once the project was in place because we were talking about it and explaining it and people could understand it a bit better. (#8)

[Having a PSP] makes people feel more satisfied with an interaction and also more confident to go and see somebody for whom they don't have the answer because they then have [...] a plan where they know that these things have already been done. (#4)

Impact on resource use

All the interviewed ED staff were confident that their HIU service had led to better care provision associated with a reduction in hospital resources used. However, the focus on quantifying impact in terms of changes in the number of ED attendances and hospital admissions was viewed as providing, in isolation, only limited insight into the impact of the HIU service. Although each HIU service generated a business case for funding to continue the SHarED intervention, only one ED was successful in securing long-term funding through its Trust. One of the key issues for the business cases was a requirement to demonstrate cost savings. However, there appeared to be no consensus about what evidence would be viewed as sufficient to secure the level of funding required to continue the staff capacity enabled by the SHarED programme. One ED secured funding from its Integrated Care Board (ICB), rather than Trust, building on the existing wider HIU infrastructure already in place. Another ED secured funding from the existing ED budget.

Barriers and challenges

SHarED and HIU teams faced challenges including recruiting and promoting roles for two HIU teams, aligning goals with other programmes that could also support HIUs, and engaging clinical leads, management and ICBs in spite of being essential for HIU teams' performance and its sustainability. The supporting network

between HIU teams supported by SHarED was reported to be valuable; HIU staff subsequently struggled to maintain this network without the AHSN support. All EDs experienced difficulties with securing funding to sustain their HIU service.

We would all like to think that things that improve patient experience and staff experience should be valued and resourced by the NHS, but of course it often just comes down to finances. So, it would be rare that an idea just about staff welfare, or just about patient experience, would be funded. (#5)

Impact on ED attendance and hospital admissions

Three-month post-enrolment follow-up data were reported for 148 HIUs from the six EDs. The availability of follow-up data reduced over time such that 6-month follow-up data were available for 86% (127/148) of cases and for 22% (33/148) of cases at 12 months (tables 1 and 2). During the 12 months prior to enrolment in SHarED, the mean number of ED attendances and hospital admissions per HIU increased over time (figure 1). This pattern of activity reversed post-enrolment, with the reduction experienced during the first 3 months subsequently maintained, at least for those HIUs for whom further follow-up data were available (figure 1).

Given the availability of follow-up data, a comparison of the experience 6 months pre-enrolment and post-enrolment offers the best measure of the impact of SHarED: the mean monthly ED attendances per HIU reduced by 33% from 2.1 to 1.4, which was statistically significant ($p < 0.001$) (table 1) with a range from 27% to 49% between EDs. Between the same 6-month periods, the mean monthly hospital admissions per HIU reduced by 67% from 0.6 to 0.2, which was statistically significant ($p < 0.001$) (table 2) with a range from 41% to 72% between EDs. A similar pattern of change over time was evident at 3, 9 and 12 months (tables 1 and 2). The mean age of the 148 HIUs was 39.3 years (SD 15.7).

ED staff training

During SHarED, 55% (372/671) of staff across the six participating EDs received training on the management of HIUs.

ED staff survey

The survey of ED staff had response rates of 24% (258/1042) in wave 1, 36% (348/967) in wave 2 and 12% (131/1092) in wave 3. The survey included seven statements for which staff were asked to give a rating on a scale of 0 'strongly disagree' to 100 'strongly agree' (see online supplemental table S1 for statement text). Wave one represents baseline views and the subsequent waves indicate how views changed over time.

On average, staff who responded to the survey reported being more confident when assessing and treating HIUs over time: there was clear evidence of the increase from 65 to 72 between waves 1 and 3 ($p = 0.002$) (table 3).

Table 1 Mean monthly attendances per HIU enrolled in SHarED across the six participating EDs

Months of follow-up	Mean monthly number of ED visits pre-enrolment and post-enrolment in SHarED						Difference in the monthly number of ED visits						
	Baseline 12 months			Baseline equal to follow-up period			12 months baseline			Baseline equal to follow-up period			
	HIUs (n)	Mean	SD	Mean	SD	SD	Value	95% CI	P value	Change (%)	95% CI	P value	Change (%)
3	148	1.6	1.0	2.4	2.1	1.9	0.0	-0.29 to 0.30	0.991	0	-1.12 to -0.41	<0.001	-33
4	142	1.6	1.0	2.3	1.7	1.8							
5	135	1.7	1.0	2.2	1.5	1.6							
6	127	1.6	1.0	2.1	1.3	1.4	-0.3	-0.55 to -0.03	0.030	-13	-0.98 to -0.43	<0.001	-33
7	111	1.7	1.0	2.0	1.2	1.4							
8	110	1.7	1.0	1.9	1.1	1.4							
9	96	1.8	1.0	1.9	1.0	1.3	-0.5	-0.72 to -0.17	0.002	-28	-0.88 to -0.34	<0.001	-32
10	81	1.8	1.0	1.9	1.1	1.4							
11	45	1.5	0.9	1.5	0.9	1.2							
12	33	1.6	1.0	1.6	1.0	1.3	-0.5	-0.93 to -0.13	0.011	-38	-0.93 to -0.13	0.011	-38

ED, emergency department; HIU, high-impact user; SHarED, Supporting High Impact users in Emergency Departments.



Table 2 Mean monthly hospital admissions per HIU enrolled in SHarED across the six participating EDs

Months of follow-up	Mean monthly number of ED visits pre-enrolment and post-enrolment in SHarED				Difference in the monthly number of ED visits															
	12 months baseline		Baseline equivalent to follow-up period		12 months baseline		Baseline equivalent to follow-up period													
	Mean	SD	Mean	SD	Mean	SD	Mean	SD												
	HIUs (n)																			
3	148	0.5	0.5	0.6	0.8	0.5	0.3	0.5	0.3	Value	95% CI	P value	Change (%)	Value	95% CI	P value	Change (%)			
4	142	0.5	0.5	0.6	0.7	0.3	0.4	0.4	0.4	-0.2	-0.25 to -0.09	<0.001	-40	-0.3	-0.44 to -0.19	<0.001	-50			
5	135	0.5	0.5	0.6	0.6	0.3	0.4	0.4	0.4	-0.3	-0.33 to -0.17	<0.001	-60	-0.3	-0.41 to -0.24	<0.001	-67			
6	127	0.5	0.5	0.6	0.6	0.2	0.3	0.3	0.3	-0.4	-0.44 to -0.25	<0.001	-67	-0.4	-0.47 to -0.27	<0.001	-67			
7	116	0.5	0.5	0.6	0.6	0.2	0.3	0.3	0.3	-0.2	-0.37 to -0.09	0.002	-50	-0.2	-0.39 to -0.09	0.002	-50			
8	110	0.5	0.5	0.6	0.6	0.2	0.3	0.3	0.3	-0.4	-0.44 to -0.25	<0.001	-67	-0.4	-0.47 to -0.27	<0.001	-67			
9	96	0.6	0.5	0.6	0.6	0.2	0.3	0.3	0.3	-0.2	-0.37 to -0.09	0.002	-50	-0.2	-0.39 to -0.09	0.002	-50			
10	81	0.6	0.5	0.6	0.6	0.2	0.3	0.3	0.3											
11	45	0.4	0.4	0.4	0.4	0.2	0.3	0.3	0.3											
12	33	0.4	0.4	0.4	0.4	0.2	0.2	0.2	0.2											

ED, emergency department; HIU, high-impact user; SHarED, Supporting High Impact useRs in Emergency Departments.

Staff reported being similarly better supported when managing HIUs (table 3). The largest improvement in ratings related to the statement ‘The department does a good job in training staff in how to manage High Impact Users’, which increased from 40 in wave 1 to 62 in both waves 2 and 3 (table 3). The response to the statement ‘High Impact Users impact negatively on my mental well-being, either in the present or past’ did not significantly change over time. Statements relating to the care of HIUs all received higher mean ratings over time (table 3), with significant changes in receiving appropriate assessment and treatment between wave 3 and 1 ($p<0.001$).

We assigned responses to the survey’s open-text questions to themes, which are summarised in figure 2. ED staff were more aware of how to refer patients to their HIU service over time and that the PSPs were increasingly available via electronic patient records. Staff reported being more sure about the care provided to HIUs, but were also more aware of the risk of violence from these patients. Staff also reported that the major risks to HIUs were the provision of inappropriate assessment or management, and missed diagnoses (figure 2).

Estimated impact on resources

SHarED costs totalled £139 944 including project management (£46 453), BRI time (£23 679) and funding to EDs for staff time (£69 812). Using the 6-month follow-up experience, there was a reduction of 528 ED visits and 306 hospital admissions. The estimated mean costs of ED attendance and hospital admissions avoided were £297 and £577, respectively. Therefore, the estimated impact on costs associated with the reduction in ED attendance and hospital admissions was £333 529. Deducting the SHarED costs suggested a potential net cost saving of up to £193 585. If this change in activity is assumed to have also been experienced by the 21 HIUs for whom 6-month follow-up data were not available, the total cost saving was £388 680 with a net cost saving of £248 736.

DISCUSSION

SHarED responded to a nationally recognised need to improve the management of HIUs by delivering a quality improvement programme to promote one ED’s established model across the six other EDs in the region. SHarED was the first ED-based HIU quality improvement programme in the NHS, and it was successful in enabling clinicians to establish more person-centred services for HIUs, despite the concurrent challenges associated with COVID-19. SHarED aimed to reduce ED attendance by 20% over 12 months for selected HIUs and the available data indicate that this level of impact was achieved by all sites with an estimated consequent positive impact on resource use.

The ED clinicians with HIU roles were unanimously positive about the benefits of SHarED for both staff and patients, and the staff survey demonstrated a wider impact on issues including awareness and training. A

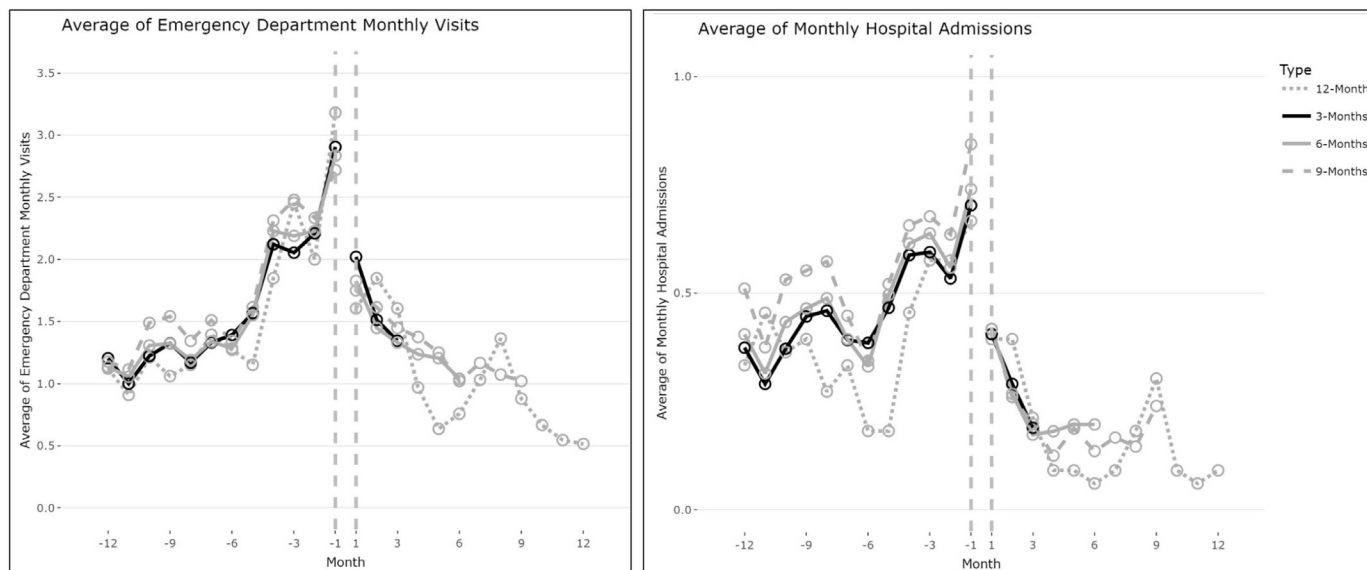


Figure 1 Mean monthly ED attendances and hospital admissions per HIU enrolled in SHarED across the six participating EDs. Average of ED monthly visits (on the left) and the average of monthly hospital admissions (on the right) 12 months before personal support plans were created and 12 months after for high-impact users categorised in four groups regarding the numbers of months with follow-up data: 3, 6, 9 or 12 months. ED, emergency department; HIU, high-impact user; SHarED, Supporting High impAct useRs in Emergency Departments.

key component of the HIU model was the use of PSPs to strengthen both care planning and case management. SHarED proactive management of HIUs enabled better care planning by supporting frontline ED staff with patient-centred recommendations for HIUs and provided the basis for more integrated case management by specialist teams across the health and care system.^{3 8 12 20–22} One of the participating Trusts contributed a key role in promoting this more holistic approach, which was enabled by leadership from the local ICB, and could be viewed as an exemplar for future development of a future quality improvement programme. Moreover, frequent ED attendance can be viewed as characteristic of a complex system,²² which requires solutions at a system level as well as at the individual level,^{22 23} thus, a system-wide approach has been recommended.^{13 24}

SHarED participants' locally determined criteria for identifying HIUs mirrored the lack of a single definition of HIUs in the literature,^{25–27} as local differences in population characteristics and services influence the heterogeneity of this diverse group of individuals with complex health needs.^{2 6 12 24–26 28 29}

The SHarED programme, through the establishment of HIU teams and, more specifically through the use of PSPs, improved the working conditions and workload of frontline ED staff who were more able to provide appropriate and compassionate care and better manage HIUs' expectations. Indeed, SHarED contributed to a cultural shift in ED staff towards this vulnerable group of patients that reported to have experienced stigma and discriminatory behaviour from healthcare staff before.^{13 30 31}

Our evaluation of the impact of SHarED on resource use is limited because data on ED attendance and hospital admissions were collected for only a small number of

HIUs as staff implemented new ways of working. Some reduction in resource use by HIUs would be expected due to mortality, moving away, incarceration, or other unrelated resolution of needs. More robust evidence of the impact of this type of quality improvement programme on HIU resource use could be generated by analysing a range of routine data using more sophisticated designs. While one current study will contribute to this,³² the evidence presented here warrants consideration. If we assume SHarED may have been responsible for half the reduction in ED attendance and hospital admissions, it would have generated a net cost saving of approximately £54 396 for the 148 HIUs. Future evaluation should also engage with HIUs to understand first-hand their experience health and care services.

Suggested next steps

Our evaluation provides a basis for developing the SHarED programme for more widespread use. SHarED focused on improving the delivery of person-centred care for HIUs and also improved the working conditions and workload of frontline ED staff, which is particularly important during this sustained period of national crisis in the delivery of emergency medicine.

Facilitation of ongoing support for the cross-organisational networking and peer-support opportunities for staff would enable further valuable learning to promote HIU service sustainability and innovation, for ICB commissioners, ED staff, Trust leaders and wider stakeholders.

Giving SHarED a more holistic orientation to reflect the wider impact of HIUs on the health and care system would be advantageous. One option for achieving this would be to seek explicit engagement from ICB commissioners,



Table 3 Staff survey statement responses on a scale of 0 ‘strongly disagree’ to 100 ‘strongly agree’

Variable	Wave 1 (September 2020)			Wave 2 (March 2021)			Wave 3 (July 2021)			Change in mean score (Wave 2–Wave 1)			Change in mean score (Wave 3–Wave 1)		
	n	Mean	SD	n	Mean	SD	n	Mean	SD	Value	95% CI	P value	Value	95% CI	P value
Managing HIUs															
Staff confidence	257	65	22	346	68	22	3	3*	3*	-0.34 to 6.75	0.076	21	7***	2.67 to 11.96	0.002
Doctors	87	65	18	99	70	17	5*	5*	5*	-0.39 to 9.60	0.071	18	3	-3.08 to 9.83	0.303
Nurses	130	66	22	181	70	20	4	4	4	-1.11 to 8.41	0.133	21	9***	2.77 to 15.55	0.005
Others	40	57	30	66	58	28	1	1	1	-10.04 to 12.85	0.808	29	8	-9.77 to 25.97	0.367
Well supported	258	64	25	345	76	21	12***	12***	12***	8.34 to 15.65	<0.001	22	9***	3.76 to 13.88	0.001
Doctors	87	66	20	99	73	17	8***	8***	8***	2.28 to 13.03	0.006	17	18	0.94 to 14.82	0.026
Nurses	130	64	25	181	77	21	13***	13***	13***	7.95 to 18.46	<0.001	24	19	1.70 to 16.39	0.016
Others	41	60	30	65	76	25	16***	16***	16***	5.60 to 27.01	0.003	14	9	-9.73 to 27.16	0.348
HIU staff training	253	40	25	347	62	26	22***	22***	22***	17.74 to 26.20	<0.001	28	22***	16.18 to 27.36	<0.001
Doctors	86	44	22	99	60	24	16***	16***	16***	9.02 to 22.42	<0.001	24	17***	8.31 to 24.78	<0.001
Nurses	128	38	25	181	62	27	24***	24***	24***	18.12 to 30.16	<0.001	28	25***	16.67 to 32.40	<0.001
Others	39	37	31	67	64	29	27***	27***	27***	15.55 to 39.08	<0.001	15	37	4.24 to 44.11	0.018
Negative impact	258	49	32	331	48	30	-1	-1	-1	-6.04 to 4.04	0.697	30	5	-1.56 to 11.84	0.132
Doctors	87	52	29	94	53	29	1	1	1	-7.16 to 9.66	0.770	29	8	-2.49 to 18.47	0.134
Nurses	130	49	33	175	46	31	-2	-2	-2	-9.52 to 4.97	0.537	30	5	-4.24 to 14.99	0.272
Others	41	45	34	62	46	31	1	1	1	-12.15 to 13.37	0.925	28	-7	-27.30 to 13.04	0.481
HIUs care															
Dignity and respect	258	61	28	346	70	25	9***	9***	9***	5.10 to 13.59	<0.001	29	5	-1.14 to 10.83	0.112
Doctors	87	51	23	98	59	23	8**	8**	8**	1.70 to 15.05	0.014	29	8*	-0.98 to 17.11	0.080
Nurses	130	64	29	181	73	24	10***	10***	10***	3.65 to 15.41	0.002	28	6	-2.55 to 14.36	0.170
Others	41	72	29	67	77	26	5	5	5	-5.50 to 15.97	0.336	29	-4	-22.03 to 13.42	0.629
Appropriate care	254	65	27	344	74	23	10***	10***	10***	5.88 to 13.94	<0.001	26	7***	1.86 to 13.13	0.009
Doctors	87	57	23	98	65	24	8**	8**	8**	1.22 to 14.96	0.021	25	10**	1.68 to 18.92	0.020
Nurses	127	67	28	179	77	21	10**	10**	10**	4.40 to 15.46	0.001	26	8*	-0.35 to 15.79	0.061
Others	40	74	27	67	82	23	8*	8*	8*	-1.49 to 17.87	0.096	15	2	-14.71 to 18.41	0.824
Timely care	255	65	27	348	72	25	7**	7**	7**	3.21 to 11.53	0.001	27	5*	-0.65 to 10.91	0.082
Doctors	87	59	25	99	65	25	6	6	6	-1.22 to 13.19	0.103	25	4	-5.00 to 13.00	0.381
Nurses	127	67	27	182	76	23	9***	9***	9***	3.27 to 14.58	0.002	27	8**	0.05 to 16.21	0.049
Others	41	70	30	67	72	27	2	2	2	-8.52 to 13.34	0.664	15	31	-20.03 to 16.55	0.849

‘Others’ included health care assistants, paramedics, admin and undefined staff categories.

*p<0.10, **p<0.05, ***p<0.01.

HIU, high-impact user.

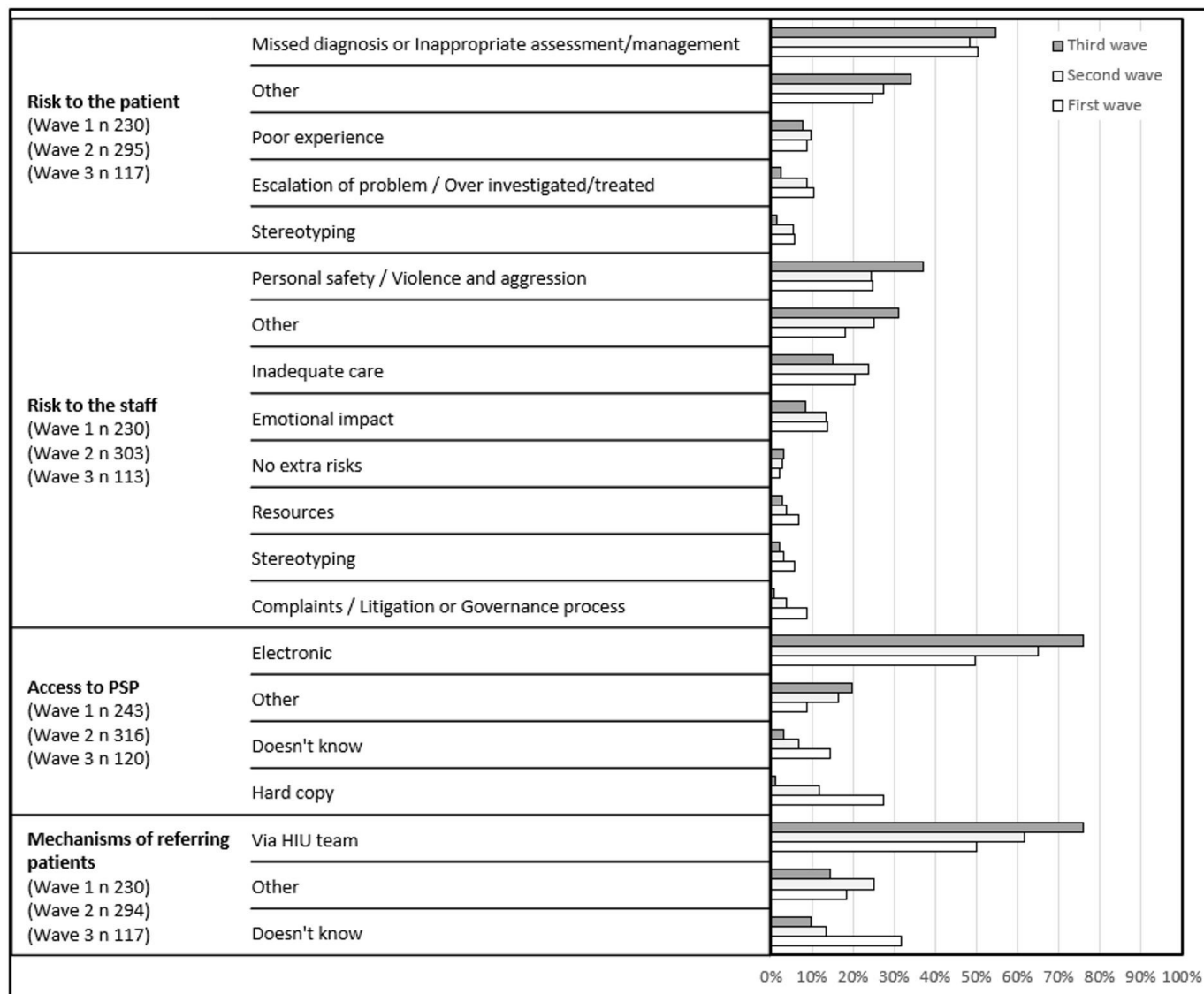


Figure 2 Staff survey themes assigned to open text question responses. PSP, personal support plan.

in addition to ED staff and acute Trust leaders, when recruiting new localities.

Additional support for HIU staff to make the case for further funding from Trusts and/or ICBs would be warranted to sustain the new working practices. Despite the confidence of participating staff that their HIU services had led to better care provision associated with a reduction in the use of hospital resources, there was no consensus about what evidence would be viewed as sufficient to secure ongoing funding for the type of HIU service enabled by the SHarED programme.

CONCLUSIONS

Overall, SHarED illustrates the considerable potential for a quality improvement programme to promote more integrated case management by specialist teams across the health and care system for HIUs as particularly vulnerable individuals and improve working arrangements for hard-pressed ED staff. Health and care system bodies

should consider positively the funding and sustaining of HIU teams in EDs and the widespread of SHarED quality improvement.

Acknowledgements The project team would like to thank Steve Strong and Sarah Biggs who provided helpful feedback on our qualitative analysis from a public perspective.

Contributors CSR and HM as researchers conceptualised and designed the study and data collection method to study high-impact user staff views; conducted semi-structured interviews and carried out the analyses. MK as the project manager of SHarED contributed to recruiting participants for interviews. WEAHSN (now Health Innovation West of England) designed the data collection method and collected data for HIU attendances, hospital admissions, number of staff trained and staff survey for the purpose of service evaluation; CSR and HM analysed these data. RT provided the clinical leadership for SHarED. CSR and HM drafted the initial manuscript, and reviewed and revised the manuscript. All authors reviewed and revised the manuscript. All authors approved the final manuscript as submitted and agreed to be accountable for all aspects of the work. HM acts as the guarantor of this study.

Funding This work was jointly funded by the West of England Academic Health Science Network (AHSN) in collaboration with the National Institute for Health and Care Research Applied Research Collaboration West (NIHR ARC West). The views

expressed are those of the author(s) and not necessarily those of NHS England, NHS Improvement, the NIHR or the Department of Health and Social Care.

Competing interests None declared.

Patient and public involvement Patients and/or the public were involved in the design, or conduct, or reporting, or dissemination plans of this research. Refer to the Methods section for further details.

Patient consent for publication Not applicable.

Ethics approval The qualitative study was approved by the University of Bristol Faculty of Health Sciences Research Ethics Committee (approval code: 10275) and the NHS Health Research Authority and Health and Care Research Wales (IRAS project ID: 300027) and local R&D from the five Trusts. The analysis of the anonymised quantitative data collected as part of the SHarED programme for service evaluation was managed using a Data Protection Impact Assessment with the five Trusts. Interviewees gave informed consent to participate in the study before taking part.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement No data are available.

Supplemental material This content has been supplied by the author(s). It has not been vetted by BMJ Publishing Group Limited (BMJ) and may not have been peer-reviewed. Any opinions or recommendations discussed are solely those of the author(s) and are not endorsed by BMJ. BMJ disclaims all liability and responsibility arising from any reliance placed on the content. Where the content includes any translated material, BMJ does not warrant the accuracy and reliability of the translations (including but not limited to local regulations, clinical guidelines, terminology, drug names and drug dosages), and is not responsible for any error and/or omissions arising from translation and adaptation or otherwise.

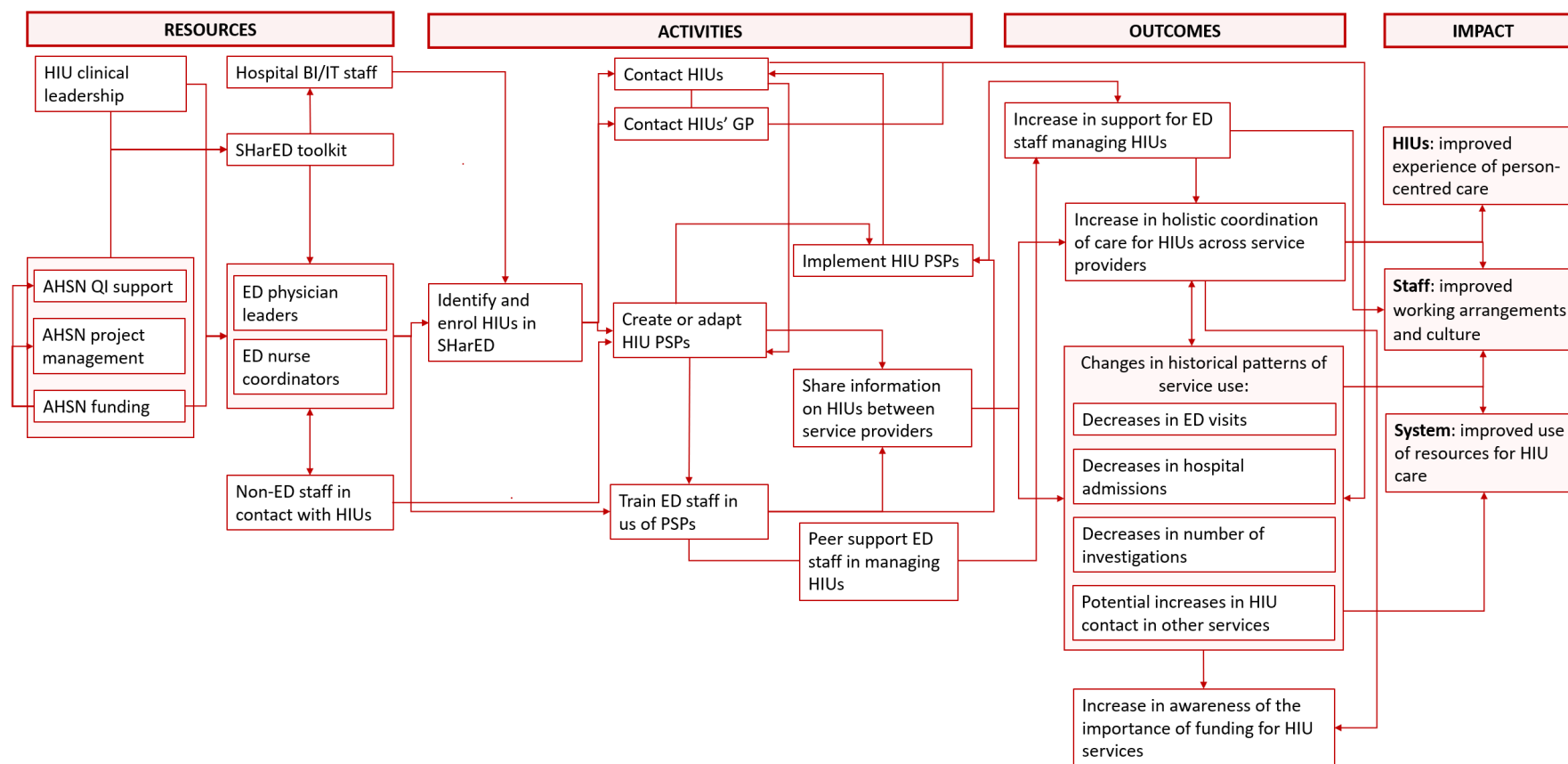
Open access This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

ORCID iD

Carlos Sillero-Rejon <http://orcid.org/0000-0001-5502-9247>

REFERENCES

- Royal College of Emergency Medicine. *Frequent Attenders in the Emergency Department*. London: Royal College of Emergency Medicine, 2017. Available: https://rcem.ac.uk/wp-content/uploads/2021/10/Frequent_Attenders_in_the_ED_Aug2017.pdf [accessed 5 May 2021].
- Krieg C, Hudon C, Chouinard M-C, et al. Individual predictors of frequent emergency Department use: a Scoping review. *BMC Health Serv Res* 2016;16:594-594..
- Moe J, Kirkland SW, Rawe E, et al. Effectiveness of interventions to decrease emergency Department visits by adult frequent users: A systematic review. *Acad Emerg Med* 2017;24:40-52.
- NHS England. Technical guidance for refreshing NHS Plans 2018/19 annex A: Commissioning for Quality and Innovation (CQUIN) indicator specification 2017-2019, Available: <https://www.england.nhs.uk/publication/cquin-indicator-specification/> [Accessed 13 Feb 2023].
- NHS England. Next steps in increasing capacity and operational resilience in urgent and emergency care ahead of winter, Available: <https://www.england.nhs.uk/long-read/next-steps-in-increasing-capacity-and-operational-resilience-in-urgent-and-emergency-care-ahead-of-winter/> [Accessed 13 Feb 2023].
- Greenfield G, Blair M, Aylin PP, et al. Frequent Attendances at emergency departments in England. *Emerg Med J* 2020;37:597-9.
- NHS England. High Intensity Use programme, Available: <https://www.england.nhs.uk/high-intensity-use-programme/> [Accessed 13 Feb 2023].
- Iovan S, Lantz PM, Allan K, et al. Interventions to decrease use in Prehospital and emergency care settings among super-Utilizers in the United States: A systematic review. *Med Care Res Rev* 2020;77:99-111.
- Hudon C, Chouinard M-C, Lambert M, et al. Effectiveness of case management interventions for frequent users of Healthcare services: a Scoping review. *BMJ Open* 2016;6:e012353.
- Lloyd-Rees J. Supporting frequent Attenders to reduce their visits to an emergency Department. *Emerg Nurse* 2018;27:21-7.
- Newton A, Sarker SJ, Parfitt A, et al. Individual care plans can reduce hospital admission rate for patients who frequently attend the emergency Department. *Emerg Med J* 2011;28:654-7.
- Soril LJJ, Leggett LE, Lorenzetti DL, et al. Reducing frequent visits to the emergency Department: a systematic review of interventions. *PLOS ONE* 2015;10:e0123660.
- Daniels J, Osborn M, Davis C. Better safe than sorry? frequent attendance in a hospital emergency Department: an exploratory study. *Br J Pain* 2018;12:10-9.
- SHarED: supporting high impact users in Emergency Departments. West of England Academic Health Science Network, Available: <https://www.weahsn.net/our-work/transforming-services-and-systems/shared/> [Accessed 30 Sep 2020].
- Kilo CM. A framework for collaborative improvement: lessons from the Institute for Healthcare improvement's breakthrough series. *Qual Manag Health Care* 1998;6:1-13.
- Pawson R. *Evidence-based policy: a realist perspective*. In: *Making realism work*. Routledge, 2005: 26-49.
- NHS England. National Cost Collection for the NHS, Available: <https://www.england.nhs.uk/costing-in-the-nhs/national-cost-collection/> [Accessed 3 Mar 2023].
- Ritchie J, Lewis J, Nicholls CM, et al. *Qualitative research practice: A guide for social science students and researchers*. Sage, 2013.
- Ritchie J, Spencer L, O'Connor W. Carrying out qualitative analysis. *Qualitative Research Practice: A Guide for Social Science Students and Researchers* 2003;2003:219-62.
- Grover CA, Sughair J, Stooles S, et al. Case management reduces length of stay, charges, and testing in emergency Department frequent users. *West J Emerg Med* 2018;19:238-44.
- Korczak V, Shanthosh J, Jan S, et al. Costs and effects of interventions targeting frequent Presenters to the emergency Department: a systematic and narrative review. *BMC Emerg Med* 2019;19:83.
- Burton C, Stone T, Oliver P, et al. Frequent attendance at the emergency Department shows typical features of complex systems: analysis of Multicentre linked data. *Emerg Med J* 2022;39:3-9.
- Than M, Richardson S, Pickering J. Emergency Department frequent Attenders: big data insights for a big and complex problem. *Emerg Med J* 2022;39:2.
- Jacob R, Wong ML, Hayhurst C, et al. Designing services for frequent Attenders to the emergency Department: a Characterisation of this population to inform service design. *Clin Med (Lond)* 2016;16:325-9.
- Hotham R, O'Keefe C, Stone T, et al. Heterogeneity of reasons for attendance in frequent Attenders of emergency departments and its relationship to future attendance. *Emerg Med J* 2022;39:10-5.
- Shannon B, Pang R, Jepson M, et al. What is the prevalence of frequent attendance to emergency departments and what is the impact on emergency Department utilisation? A systematic review and meta-analysis. *Intern Emerg Med* 2020;15:1303-16.
- Soril LJJ, Leggett LE, Lorenzetti DL, et al. Characteristics of frequent users of the emergency Department in the general adult population: A systematic review of international Healthcare systems. *Health Policy* 2016;120:S0168-8510(16)30024-0:452-61..
- LaCalle EJ, Rabin EJ, Genes NG. High-frequency users of emergency Department care. *J Emerg Med* 2013;44:S0736-4679(12)01565-X:1167-73..
- Ronksley PE, Liu EY, McKay JA, et al. Variations in resource intensity and cost among high users of the emergency Department. *Acad Emerg Med* 2016;23:722-30.
- Baggio S, Iglesias K, Hugli O, et al. Associations between perceived discrimination and health status among frequent emergency Department users. *Eur J Emerg Med* 2017;24:136-41.
- Perry A, Lawrence V, Henderson C. Stigmatisation of those with mental health conditions in the acute general hospital setting. A qualitative framework synthesis. *Soc Sci Med* 2020;255:S0277-9536(20)30193-3:112974..
- Frequent Users of the Emergency Department: Improving and Standardising Services-a mixed methods study - NIHR Funding and Awards, Available: <https://fundingawards.nihr.ac.uk/award/NIHR132852> [Accessed 13 Feb 2023].

Figure S1. Supporting High impAct UseRs in Emergency Departments (SHarED)Theory of Change Diagram

AHSN – Academic Health Science Network

BI – Business Intelligence

ED – Emergency Department

HIU – High Impact User

IT – Information Technology

PSP – Personal Support Plan

QI – Quality Improvement

Table S1. Staff survey questions

Domain	Statement/Question	Q
Staff confidence	I feel confident when assessing and treating High Impact Users in the department *	Q1
Well supported	I feel well supported by other staff when managing High Impact Users *	Q2
Negative impact	High Impact Users impact negatively on my mental wellbeing, either in the present or past *	Q7
HIU staff training	The department does a good job in training staff in how to manage High Impact Users *	Q6
Dignity & respect	High Impact Users are treated with the same level of dignity and respect as other patients in the Emergency Department *	Q3
Appropriate care	High Impact Users always receive appropriate assessment and treatment when they attend *	Q4
Timely care	High Impact Users always receive timely care when they attend in comparison to other patients *	Q5
Referral mechanisms	Can you describe the different mechanisms of referring patients to the High Impact User Service? **	Q8
Access PSP	Can you describe how/where the Personal Support Plans can be accessed in your department? **	Q9
Risk to the Staff	What do you feel are the greatest risks when managing High Impact Users to yourself? **	Q10
Risk to the patient	What do you feel are the greatest risks when managing High Impact Users to the patient? **	Q11
Additional Comments	Do you have any additional comments, questions, suggestions or concerns about any aspect of caring for High Impact Users? **	Q12

* response on scale 0-100: 0 = strongly disagree, 100 = strongly agree. ** response open text

Table S2. Bristol Royal Infirmary activity for Health Research Groups codes applicable to High-Impact Users, and National Cost Collection for the NHS 2021/2022

HRG code	Number	Cost*	Total cost
Abdominal Pain without Interventions	454	£562	£255,036
Acute Alcohol Intoxication with CC Score 0-2	194	£532	£103,161
Acute Alcohol Intoxication with CC Score 3+	28	£656	£18,366
Acute Combined Drug Intoxication	34	£533	£18,136
Acute Drug Intoxication	14	£521	£7,292
Tendency to Fall, Senility or Other Conditions Affecting Cognitive Functions, without Interventions, with CC Score 0-1	212	£656	£139,000
Environmental Effects	5	£601	£3,003
Hypothermia, Frostbite or Other Effects of Reduced Temperature, with CC Score 0-1	7	£564	£3,949
Hypothermia, Frostbite or Other Effects of Reduced Temperature, with CC Score 2+	6	£712	£4,275
Headache, Migraine or Cerebrospinal Fluid Leak, with CC Score 0-6	230	£527	£121,233
Behavioural Syndromes, treated by a Non-Specialist Mental Health Service Provider	16	£654	£10,463
Mental and Behavioural Disorders Due to Drug or Alcohol Use, treated by a Non-Specialist Mental Health Service Provider	240	£657	£157,652
Mood Affective Disorders, treated by a Non-Specialist Mental Health Service Provider	65	£506	£32,867
Neurotic, Stress-Related or Somatoform Disorders, treated by a Non-Specialist Mental Health Service Provider	92	£504	£46,411
Observation or Counselling, with CC Score 0	12	£438	£5,251
Observation or Counselling, with CC Score 1+	7	£558	£3,909
Other Mental Health Disorders, treated by a Non-Specialist Mental Health Service Provider	10	£698	£6,982
Admission Related to Social Factors with Interventions	1	£2,093	£2,093
Admission Related to Social Factors without Interventions, with CC Score 0	26	£669	£17,399
Admission Related to Social Factors without Interventions, with CC Score 1+	35	£676	£23,666
Signs or Symptoms, Involving Appearance or Behaviour, with CC Score 0-1	122	£488	£59,496
Signs or Symptoms, Involving Appearance or Behaviour, with CC Score 2+	59	£651	£38,431

*Cost for short stay length