Evaluating the Diversion of Alcohol-Related Attendances

An Evaluation of Alcohol Intoxication Management Services: Implications for Service Delivery, Patient Benefit and Harm Reduction

Protocol Version 4.4
28.01.16

Sheffield URMS ref 140437
STH R&D ref 19210
NIHR HS&DR 14/04/25
IRAS ID 192273
ISRCTN

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Funding Acknowledgement
This study was funded by the National Institute for Health Research (HS&DR) Project Number 14/04/25

National Institute for Health Research
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<td>13.13.15</td>
<td>Final proposal, following review</td>
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<td>2</td>
<td>01.11.15</td>
<td>Specified WS1 (iv) Sampling process, researcher LG replaced PB</td>
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<td>3</td>
<td>30.11.15</td>
<td>Clarified WS1 (iii) all six AIMS, added intent to seek verbal permissions to conduct telephone questionnaire, WS2 removal of intention to collect NHS numbers from AIMS and ED users but to examine mechanisms for linking AIMS data to routine NHS data. Re- formatted with front sheet, ToC. Changes reported to NIHR via NET SCC.</td>
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<td>15.01.16</td>
<td>Changed WS1 (iii) Telephone to postal survey, WS1 (iv) sample size revised, addressed comments from initial PR Review submission (09.12.15) RE: sensitive AIMS patient approach. Terminology: AIMS changed to Alcohol Intoxication Management Services (AIMS)</td>
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<td>4.1</td>
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<td>Removed section on dissemination</td>
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<td>4.2</td>
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<td>Minor revisions</td>
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<td>4.3</td>
<td>18.01.16</td>
<td>Added reference for WS1 (iii) Walk-in centre survey process. Clarified PPI roles, Steering Committee Member and separate Advisory Group. Cross referenced all numbered references. Logo added.</td>
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<td>4.4</td>
<td>28.01.16</td>
<td>Added WS1 (i) (ii) Sample size and recruitment information. Added Crime and Disorder Act (1998)</td>
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Note: S Substantial amendment; M Minor amendment
EDARA – Protocol – V4.4 – 28.01.16

Project Summary

Alcohol Intoxication Management Services, (AIMS, sometimes referred to as Alcohol Treatment Centers, Alcohol Recovery Centres, Alcohol Welfare Centres and, in the media, “Drunk Tanks”) are designed to receive, treat and monitor intoxicated patients who would normally attend Emergency Departments (ED) and to lessen the burden that alcohol-misuse, an avoidable healthcare cost, places on unscheduled care. They are usually located close to areas characterised by excessive intoxication and are open at times when levels of intoxication peak (e.g. Friday and Saturday evenings). AIMS therefore offer the potential to mitigate some of the pressures on ED at times when it is experiencing a sustained increase in demand [1]. The need to reduce pressure in ED is clear. Most admissions to ED are alcohol-related at peak times [2] and they cause the ED clinical environment to suffer, as well as staff morale. Staff become stressed causing a detriment to care [3] and patients can become aggressive or fearful [4-8]. This impact on ED is exacerbated since the Association of Chief Police Officers’ (ACPO) recommendation that the intoxicated cannot be admitted into custody until a clinical decision maker, typically in the ED, has determined that it is safe to do so [9]. This project aims to estimate the effectiveness, cost-effectiveness, efficiency and acceptability of AIMS in managing alcohol-related ED attendances.

The proposed evaluation method, organised into three work streams (WS), is that of a natural experiment, comparing areas in which AIMS have been implemented or are planned to control cities matched using Home Office iQuanta “similar families” [10]. Mixed methods are used to address specific research questions.

WS1 will use ethnographic studies; interviews with stakeholders, policy makers and practitioners; interviews with patients attending AIMS and surveys of ED and AIMS users. WS1 focuses on four research questions: (i) what is the impact of AIMS on the work practices and professional identities of frontline staff in managing the intoxicated and other related work activities? (ii) What are the micro-, meso- and macro-levels factors that contribute to AIMS development and implementation, what are the key ingredients required for successful implementation and what barriers to implementation exist across partnerships? (iii) To what extent is treatment in AIMS acceptable to users? (iv) To what extent does implementation of an AIMS affect users’ views on treatment in EDs? In WS2 routine data will be analysed to quantify the effect of AIMS in respect of key performance indicators. WS2 addresses the research question to what extent does AIMS implementation affect key performance indicators in ambulance and health services? WS3 addresses the question what are the costs of setting up and running an AIMS and what cost savings may be realised elsewhere? WS3 works alongside WS2 and in addition collates data required for cost-efficiency analyses. If AIMS are found to be effective, in respect of key performance indicators, this WS will feed forward into a separate project that models’ the likely effect of national rollout.

WS1 will consider the impact of AIMS on working lives of front-line professionals in the emergency care system. Interviews with AIMS users will inform the development of a survey for this group to assess the acceptability of AIMS. Surveys will assess the impact of AIMS on ED users’ perceptions of the ED environment, compared to control EDs where there is no AIMS implementation. The inter-agency relationships between the police, health, ambulance and the broader community, required for successful implementation, including opportunities for shared funding, will be considered. This is of particular merit given that alcohol policy sits within the Home Office (and as such is regarded as a matter for criminal justice) but health services are centrally involved with managing the consequences of alcohol misuse. WS2 will assess any improvements to effectiveness across partners (e.g. ambulance handover times, patient episode duration in ED) and explore whether the effects of improved capacity (e.g. fewer police and ambulance resources in ED bottlenecks) due to AIMS provision impacts on community safety and therefore alcohol-related violence. In WS3 an economic evaluation will determine the costs required to set up and run an AIMS and estimate the cost savings to other health services.

Finally, the project will seek to capture the variability that exists in NTE provision for managing the intoxicated. The research will provide evidence that informs local and national decision makers on opportunities for a national rollout across UK cities and will share what is known about what works through the study of effectiveness, efficiency, processes, barriers and opportunities. The goal is actionable learning outcomes that are applicable to those involved with managing alcohol related harm in city centre environments. As such, it will provide a novel and robust perspective both on the
impact of alcohol on health and the community generally, its management and addresses the paucity of available research evidence in this area.

General Information

Protocol Title: An Evaluation of Alcohol Intoxication Management Services: Implications for Service Delivery, Patient Benefit and Harm Reduction

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Rationale and Background

The influx of acutely alcohol intoxicated patients (AAI) is clustered around certain days of the week and around significant social events [21-23]. This surge in intoxicated patients has consequences for unscheduled care and spills over to affect ambulance, police and unscheduled care service delivery in the community generally. Alcohol misuse affects individual health outcomes, local communities and promotes crime. It impacts on health service use and there is now a policy focus on tackling the health and wider harms associated with alcohol [24]. Approximately 70% of attendances at EDs are alcohol-related at peak times [2]. These additional attendances cause overcrowding and accordingly impacts on all patients, staff and the community. This increased burden places all patients at greater risk, prolongs pain and suffering, increases patient waits, increases patient dissatisfaction, increases ambulance handover times, decreases physician productivity, increases frustration among staff and promotes violence [4-7]. ED bottlenecks, coupled with a general increase of pressure on available resources [8], contribute to reduced ambulance capacity and undermine the provision of care in the ED [8]. A report ordered by the House of Commons into NHS ambulance services contained the observation that “delays in handing over patients from ambulances to hospitals lead to poor patient experience and reduced capacity in ambulance services.” Over one-fifth of patient handovers from ambulance crews to ED staff at hospitals take longer than the recommended 15 minutes. If ambulances are queuing in hospitals, they are not available to take other calls, therefore potentially affecting health in the community. The problem investigated is therefore the impact of Alcohol Intoxication Management Services on health service provision, patient well-being and the community generally and what, if any, improvements in the delivery of healthcare AIMS can offer.

Unscheduled care in the UK is experiencing unprecedented demand to the extent that national media regularly reports on failings in this sector and patient dissatisfaction. One source of this additional demand is attendances for alcohol misuse, people who have consumed levels of alcohol such that clinical involvement is required. An understanding of appropriate and safe opportunities to divert the intoxicated away from unscheduled care will not only benefit health services but also allied partners who are also involved with the care and management of these people.
Since at least the 1980s city centres have become increasingly characterised by premises licensed for the on-site sale and consumption of alcohol and alcohol use has increased substantially over this time. The effect is that acute intoxication is now the most common reason why patients attend ED on Friday and Saturday evenings. It is unlikely that this will change substantially in the coming decade (Minimum Unit Pricing, for example, would not substantively affect the price of alcohol in licensed premises). It is therefore necessary to manage these patients effectively so that their impact on services is minimised. Currently, however, there is no national or international literature that provides insights into how services can be optimised or what cost-effective solutions are available. The impact of acute intoxication is not adequately described in respect of its impact on service provision (e.g. spill-over effects such that members of the community are affected by activity in the NTE through ambulance delays). Preliminary evaluations \[37\] suggest reallocating clinical and other resources can yield a substantial improvement in the provision of unscheduled care. However, the responsibility for managing the intoxicated, funding and staffing AIMS involves ambulance, police and primary care. Further, long-term treatment for patients with alcohol misuse will involve secondary care, Drug and Alcohol Teams and allied services. It is therefore a complex area of inquiry. This project capitalises on strong links with practitioners and current interest across services in better managing the intoxicated, together with the necessary expertise to conduct a large mixed-methods evaluation of existing and planned provision. The need for expert advice to policy makers and practitioners is salient, pressing and timely; this evaluation addresses this need.

Study Goals and Objectives

Aims and objectives are described according to the Work Streams (WS) detailed in “Research Plan / Methods”. WSs organise the project by methodological need, such that WS1 involves human participant research and will require ethical approval, WS2 involves the analysis of anonymised data and requires data sharing agreements and WS3 involves only the analysis of data collected through WS2. WS1 is further disaggregated into four components.

WS I Aim (i) will provide insights into the macro-, meso- and micro levels of AIMS-related activity through targeting three locations where there is are established AIMS, a mobile AIMS (or “booze bus”) and no AIMS-related service. These locations will be selected due to their proximity to Cardiff (including Cardiff itself as one research centre). WS II Aim (ii) will overlap with WS I Aim (i), but include additional locations as some practitioners and policy makers will be located in, for example, London and elsewhere. WS I Aim (iii), WS II and WS III will focus on six locations whose selection is described further below.

Work Stream 1

(i) Aims: What is the impact of Alcohol Intoxication Management Services (AIMS) on the work practices and professional identities of frontline staff in managing the intoxicated and other related work activities? (Lead: DA)

To examine the impact of AIMS on the frontline work setting. Explore the division of labour and roles and responsibilities in managing the intoxicated, the impact of managing the intoxicated on the working lives of those responsible (healthcare professionals, ambulance staff, police, door workers, street pastors/street angels) including morale, stress, occupational identity, job satisfaction; the effects of managing the intoxicated on the wider role responsibilities and service provision, and the implications of AIMS on all of the above. To explore barriers and facilitators of AIMS implementation from the perspective of frontline staff.

Objectives

- Undertake longitudinal non-participant observation of practice to examine the impact of AIMS on the local work ecology.
- Explore the division of labour, roles and responsibilities in managing the intoxicated and impact on practitioners’ working lives (e.g. occupational identity).
(ii) Aims – Context - What are the micro-, meso- and macro-levels factors that contribute to AIMS development and implementation, what are the key ingredients required for successful implementation and what barriers to implementation exist across partnerships? (Lead: SCM & DA)

To explore barriers and facilitators of AIMS and develop programme theories, with reference to barriers, governance, funding, partnerships, data sharing across partners, long-term treatment for alcohol misuse (e.g. arrest referral schemes and brief interventions) and acceptability. To explore variation in pathways of care for the intoxicated. For example, the Home Office set up 20 Local Alcohol Action Areas (LAAA) in 2014 to combat drink-fuelled crime and disorder and the damage caused to people's health. LAAAs provides a bottom-up approach to recording and disseminating good practice. Whereas ACPO, for example, is actively considering more punitive measure, such as legislation for new fines and custody. This considers macro and meso levels, to complement the micro-level approach in the ethnographic study.

Objectives

- Semi-structured interviews with local and national stakeholders and practitioners.
- Identify and describe variation in the management of the intoxicated.
- In conjunction with other project elements, including Patient and Public Involvement (PPI), to lead on the co-production of guidance on AIMS development and implementation.

(iii) Aim – To what extent is treatment in AIMS acceptable to users? (Lead: AOC)

Objectives

- Face-to-face semi-structured interviews with 16-20 AIMS users on AIMS acceptability.
- Using interview data, construct an exit questionnaire and survey 50 AIMS users in each location.

(iv) Aim – To what extent does implementation of an AIMS affect users’ views on attendance in EDs? (Lead: AOC)

Objectives

- Postal questionnaires to all relevant users for one month.

Work Stream 2

Aims – To what extent does AIMS implementation affect key performance indicators in ambulance and health services? (Lead: SG)

Determine the effect of AIMS implementation on key performance indicators across health (waiting times, unplanned re-attendance) and ambulance (handover times) services, measure successful diversion into AIMS. Explore secondary effects of AIMS implementation (ambulance response times, reduction in violent assaults through increased police presence).

Objectives

- Access and analyse routine data from health, and ambulance services (and to explore police data) across six AIMS and six control locations.
- Explore data relating to practitioner well-being (e.g. assaults on staff, RIDDOR reportable events, staff retention and turn-over, sick days; with the expectation that these data will be used descriptively due to poor quality).

Work Stream 3

Aims – What are the costs of setting up and running an AIMS and what cost savings may be realised elsewhere? (Lead: AB & TY)

Working with WSII, collate data necessary for cost-effectiveness analyses should it be found that AIMS implementation is effective in respect of key performance indicators.
**Objectives**

- Identify set-up and running costs for AIMS using a standardised costing exercise and by examining commissioning documents and contracts.
- Resolve costs by sector (health, ambulance and police), before, during, and after AIMS setup.
- Quantify short-term AIMS health benefits due to changes in patient care (e.g. improved ED waiting times, treatment times, time to initial assessment, ambulance response times, and reduced city centre assaults due to increased police capacity).

**Study Design**

A natural experiment comparing areas in which AIMS have been implemented (or planned and implemented in the course of the project) against matched cities with no AIMS provision (controls, matched using Home Office iQuanta “similar families” [10]).

Through consultation with the steering group, evidence of effectiveness, benefits and costs will be used in the co-production of models of care for different town and city contexts. The project is organised into discrete work packages, with a series of sub-packages, each having identified leads.

Locations vary by work package. For outcome analyses, economic evaluation and surveys of users’ views we will examine six locations in which AIMS have been implemented, compared to six matched control locations. The ethnographic study will involve one location in which a permanent AIMS is located (e.g. Swansea and Cardiff), one location with mobile facilities (e.g. Bristol) and one control location where AIMS are not envisaged (e.g. Nottingham). AIMS selection will be further informed by availability of ED attendance data through HES. If data are not available (either through HES or from the hospital directly) then they will be excluded. Health service users will all be over 18 years of age (less than 6% of alcohol-related attendances are below this age and those under 18 are not typically treated in AIMS, instead referred to ED). Majors will be excluded (those with urgent clinical need) as they will neither be treated in an AIMS nor typically wait in shared ED waiting areas.

**Work Stream 1**

(i) Ethnographic studies of the impact of AIMS on the frontline work setting (Lead: DA)

Three ethnographic case studies will be undertaken of purposefully selected sites in which there is an established AIMS (Cardiff), in which there is a mobile AIMS (e.g. the Bristol “booze bus”) and one where and AIMS has not been implemented (e.g. Nottingham) in order to explore the impact of AIMS and alcohol misuse on frontline staff.

**Theoretical framework**

Data generation will be informed by ecological theories of the division of labour and activity theory. Ecology theories of the division of labour conceptualise the world of work as a dynamic social system and direct attention to the connections between social groups and institutions and their interdependence in a wider field of action [13-15]. For these theorists, the system of work is forever changing in response to economic, technological and social factors that reshape occupations and impact on work content with a range of implications for professional identity and skill mix. An activity system is the basic unit of analysis in activity theory and refers to a constellation of inter-related practices and artefacts oriented towards a shared object, in this case management of the intoxicated. Activities are not regarded as belonging to an individual but are part of a collective endeavour with an associated division of labour: tools, technologies, norms, rules and conventions. Collaboration is achieved by distributing the goals between different actors who align their actions according to the objective of the overall activity. Objects not only keep together the diverse elements of a given activity system, they also connect different activity systems together.
Thus the object of one activity system can become a resource for (or a hindrance) to another. More recent work in this field takes at least two or more interacting activity systems as the minimal unit of analysis [12]. In this study we are concerned with how managing the intoxicated impacts on related activities, such as care of ED patients generally, community policing, and transporting patients to hospital. Furthermore, all cases will have in place arrangements for managing the intoxicated, but the introduction of AIMS introduces a new actor into pre-existing work ecology with wider implications for the workers and associated activity systems, such as the care of healthcare accidents and emergencies (healthcare professionals and ambulance staff) or maintaining law and order (police). We propose to explore these relationships and their effects.

**Methods**

Ethnographic methods will be deployed to explore management of the intoxicated in each site and the implications of AIMS on the local activity system and wider system of work. Data will be generated through non-participant observation (shadowing individuals, observing key processes and ‘fly on the wall’ observational strategies) of everyday practice with relevant occupational groups (staff grades and time will be collected for the Economic Analysis, below): ED nurses, healthcare assistants, doctors, ambulance personnel, Street pastors and AIMS staff. This will be supplemented by ethnographic interviews and the analysis of relevant artefacts, such as policies (including ACPO and LAAA guidance), protocols, and referral systems. Our concern will be with understanding the related practices, division of labour and artefacts involved managing the intoxicated and the implications this has for the working lives of staff and their occupational identities.

We will collect 4 months of observational data in each case study site (12 months in total); sampling will be purposive and designed to develop an understanding of the local services in each case and the everyday work of key participants with the precise mixture of shadowing, ethnographic interviewing and fly on the wall approaches to be determined by the practicalities of the fieldwork and the requirements of data generation. Periods of fieldwork/shadowing will in general last up to 6 hours, unless there are analytic reasons for longer periods in the field (such as understanding the impact of dealing with the intoxicated for a full shift). All individuals who are shadowed and/or interviewed will be provided with information sheets and asked to provide full informed consent. It is not possible to determine the exact sample size ahead of the fieldwork, but the aim is to shadow selected categories of staff across the key stakeholder groups to develop an in-depth understanding of their working lives and the everyday organization of services. The number of participants is unlikely to exceed 30 in each case, (i.e. 30 in ‘Established AIMS’ site, 30 in ‘Mobile AIMS’ and 30 in ‘Non-AIMS’ site. (Total 90) but the sample size is indicative and the precise number of participants will reflect the practicalities of the fieldwork and the needs of data generation and the resources available to undertake the work.

Observations will be undertaken over the life time of the study, in order to give researchers exposure to the rhythms of the night time economy and the local context and be able to spend sufficient time with the relevant occupational groups in each site to better understand their working worlds. Observations will be recorded contemporaneously as low inference-style field notes, that capture what was actually said and done without interpretation, and later word processed. Interviews will be embedded in the observational process and where possible digitally recorded. Documents and records will be treated as both a resource and a topic. Their content will be analysed to inform our understanding of organisational processes and practices. Their form will be analysed in order to develop a better understanding of their role in the wider activity system. Conventions have been developed for recording and transcribing field notes to ensure comparability of data so that, for example, we are able to differentiate verbatim extracts from researcher accounts. In addition to generating data on the impact of AIMS on the working lives of staff, we will also attend to those factors which, from the perspective of frontline staff, facilitate and or hinder their work.

**Analysis**

Data generation and analysis will be undertaken concurrently, facilitating a progressive narrowing of focus that is designed to develop in-depth understanding of the activity systems in each case and the implications of AIMS for practice. The various materials collected (field notes, interviews, documents) will be used in a triangulating fashion to develop concrete descriptions of relevant aspects of activity systems in each case targeting the key themes and topics of specific analytic concern. DA will lead
this through frequent meetings with the research staff and by engaging with the field data. In addition, we will schedule breaks in the fieldwork to enable formal hypothesis refinement that further informs subsequent data generation. These will also be occasions to provide real-time feedback to the study sites and the Steering Committee, Stakeholder Group and Learning Community. Previous studies of healthcare interventions have highlighted how summative evaluations miss the opportunity to alert service providers to issues that need to be addressed. This will enable shared learning across the case studies in order that sites have an opportunity to improve on their systems and/or implementation processes. DA, JS, VS and SG are clinically trained, so that we are able to comment on clinical processes and provide site specific feedback where the research has identified issues of concern. This is consistent with the rapid appraisal cycles in which research is folded into action and becomes a catalyst for change. This is not without its challenges however, and such decisions will be taken in consultation with the Management Group and Steering Group. We will also carefully record our feedback and follow up on its effects on practices.

In the final analysis, all data will be transcribed and entered into ATLAS.ti to augment retrieval and management. For each case the data will be triangulated to build up a picture of management of the intoxicated and its implications for staff. Within case analysis will compare the experiences of different occupational groups.

Cross-case analysis will compare the experiences of those working in permanent AIMS, those in cases with mobile units and those where there is no ACT. In addition we will also explore the experiences of front-line staff of ACT implementation, in the sites where this is relevant.

(ii) Context (Leads: SCM & DA)

To understand the meso- and macro-organisational and policy context of AIMS (e.g. barriers, governance, funding, strategic partnerships, data systems and cross-sectorial acceptability, in the context of policy implications of alcohol misuse and onward care and treatment of alcohol misuse) using critical realistic methods [16, 17] through interviews with national and local stakeholders. To situate the AIMS within the broader ecology of practice and describe the inter-relationships between partners, including opportunities to refer AIMS patients for interventions to address misuse and possible policy and legislative changes that might facilitate improve efficiency (e.g. conditional cautions and fines).

Theoretical framework

Implementation of AIMS introduces new practices into established organisational methods of working, a process often affected by normative beliefs, resources and the actions of the people and groups involved [38], including LAAAs and ACPO.

The importance of promoting and understanding such processes within the evaluation of complex processes has received increasing attention in recent years [39]. We will adopt the framework proposed by Steckler [16] and use a critical realistic approach [17] to elucidate what works best, for whom, in what context. This approach considers implementation and sustainability through early and sustained engagements with policy and practice in the co-production of an ecologically valid AIMS model. We will adopt a rigorous pragmatic research design and engage an ongoing cycle of knowledge exchange (e.g. through engagement with the Learning Community and Stakeholder Group). Drawing on Normalisation Process Theory, attention to coherence, Coherence, cognitive participation, collective action and reflexive monitoring [39] will focus attention on how new processes are understood by and introduced into working settings, on their operation and on appraisal of the impact and effect of innovative practices subsequently. Collectively, these elements can facilitate an in-depth evaluation that allows exploration of the intrinsic processes and mechanisms operating during project adoption, development and implementation, and encourages subsequent reflection on the overall process.

Methods

Participants will be recruited purposefully across regions in which AIMS have been implemented, are planned and not envisaged. Participants will be stratified by responsibility (e.g. national, local), by sector (e.g. ambulance, police, health, voluntary), by responsibility (e.g. practitioner, decision maker, advisor, commissioner). Interviews will either be face-to-face or by telephone according to participant
availability. All individuals who are invited to be interviewed will be informed about the research and asked to give verbal consent. It is not possible to determine the exact sample size ahead of the fieldwork, but the aim is to interview around 30 AIMS-related staff, 10 in each of the case study sites. Interviews will be recorded and transcribed. Recruitment will continue until data saturation is reached in each site. Participants identified as representatives of national bodies will be stratified by organisation.

**Analysis**

The first phase of analysis will involve transcript scrutiny and the categorisation of data into dominant themes determined a priori (e.g. barriers, governance, funding, strategic partnerships, data systems and cross-sectorial acceptability, in the context of policy implications of alcohol misuse) and explored by semi-structured interviews. This will form the basis of an analytical framework-matrix contributing to secondary analyses in the identification of sub-constructs to analyse for innovation and relate these to the themes and emergent sub-themes.

Qualitative methods will be used to consider the AIMS implementation at meso- and macro-levels, with reference to barriers, governance, funding, strategic partnerships, data systems and cross-sectorial acceptability, in the context of policy implications of alcohol misuse. Undertaken with national and local stakeholders and to document variations in service configuration in respect of key outcomes. Participants will include local leads across unscheduled care, police and ambulance services, local policy makers, the 20 Local Alcohol Action Areas across England and Wales (set up in 2014 to combat drink-fuelled crime and disorder and the damage caused to people’s health) and Police and Crime Commissioners, as well as representatives from the Department of Health, ACPO and the Home Office. Local practitioners will be drawn from those areas identified in the Ethnographic Study. Data will be used to examine how treatment for alcohol-related harm is implemented and to facilitate interpretation of AIMS effects [19]. In line with MRC guidelines [20], this component of the evaluation will enable the development and refinement of a programme model for the AIMS, including its key processes, impacts, governance and outcomes. Data will be analysed using an inductive, grounded approach [18], whereby themes are allowed to emerge from the data rather than the data being used to test a hypothesis. Participant recruitment, continuing to data saturation, is pragmatic. Further documentary analyses will be conducted on key policy documents to inform the evaluation, including local and national policy, health governance, data protection, data sharing and AIMS funding. Analyses (inductive, grounded [18]) will examine AIMS impact on alcohol-related harm management [19] and develop an AIMS programme model [20].

(iii) **AIMS Users’ Views (Lead: AO’C)**

**Rationale**

Care offered in the NHS must be acceptable to users. Repeat users of EDs related to alcohol may not want to return to an AIMS if they find treatment unsatisfactory. This must be balanced with concerns that AIMS may normalise alcohol intoxication, which can be explored here from the user perspective.

**Evidence Base**

We found nothing published about the views of AIMS users or ED users in respect of alcohol-related attendance. Related publications were interviews with five binge drinkers admitted to hospital [40], and a qualitative study of ED users for medication overdose [41]. In the latter, potential participants were approached by the researcher before discharge, obtaining a participation rate of 37%. Although many participants had hazy recollections of the trip to hospital and initial treatment (sometimes due to alcohol), most retained some awareness and so were able to reflect on their experience.

**Design**

Sequential mixed methods study of qualitative interviews followed by a survey.

**Methods and analysis**

We will undertake qualitative interviews with 16-20 AIMS users. We will recruit them from six AIMS with different models and attempt maximum variation sampling regarding age, gender and ethnicity.
Obtaining consent for interview may be challenging and we may have to use convenience sampling. A researcher will recruit users face-to-face in the AIMS when they are sober enough to offer written consent to be interviewed at a later date. This is likely to be at the point of discharge (>90% users are discharged home) and when a clinical decision maker decides that it is safe for patients to be discharged (this is the criteria usually employed to determine whether patients are able to provide informed consent). We will undertake telephone interviews using mobile phone numbers within a week of consent, starting the interviews by re-confirming consent. We will conduct these interviews at a pre-arranged time and day as specified by the participant. We will attempt to contact the participant three times. We have selected this approach because there is unlikely to be private space at an AIMS to interview people immediately, we want people to have a chance to reflect on their consent, and mobile phone interviews offer maximum flexibility for AIMS users who may have diverse or chaotic lifestyles. Interviews will last 30-60 minutes covering their views of using the AIMS (e.g. access, treatment given, experiences with different staff from different services, discharge, information and advice). They will be transcribed verbatim. We will use framework analysis with a strong emphasis on emergent themes given the lack of research in this field. The findings from these interviews will be published and also be used to inform the development of a brief questionnaire (2-4 pages) for an exit survey of AIMS users.

The Cardiff AIMS treats on average more than 20 people a night, totalling 40 people in a week. For five weeks in each of the six AIMS, staff will hand service users a covering letter, exit questionnaire and reply paid envelope at the point of discharge. Service users can choose to complete the questionnaire at the AIMS, place it in the envelope, and then put it in a sealed box in a manned and protected part of the AIMS. Alternatively service users can take the questionnaire away and post it back in the reply paid envelope. Reply paid envelopes will be addressed to the University of Sheffield. Completion of the questionnaire will be taken as informed consent. We used this approach successfully in an evaluation of six commuter walk in centres [53] Use of AIMS in this time period would yield around 1,200 potential respondents. An expected response rate of 25% will yield around 300 responses. 300 responses for the AIMS survey will allow us to estimate 80% satisfaction for AIMS to within 5% (n=250 needed). In terms of different satisfaction levels between different models of AIMS we can compare two different models such as fixed v mobile and detect a difference of 10% (70% v 80%) at the 5% level with 80% power (n=300 needed). Data will be analysed in SPSS and variation in views measured between different models of AIMS (we will not have the statistical power to measure differences between all six individual AIMS).

(iv) ED Users’ Views (Lead: AO’C)

Rationale

Removing alcohol related ED users may improve views of the ED environment for other ED users.

Evidence Base

An organisation called Picker Institute Europe undertakes ED user surveys in England around every two years for the Care Quality commission. They have an established methodology which we will follow. They obtained a 38% response rate for their 2012 survey.

A review of 16 articles assessing ED patient satisfaction reported response rates for in-department questionnaire of average 74% (range 51-84%) and postal survey average response rate of 18% (Range 9-25%) [42].

Design

Comparison of users’ views in EDs in six areas with AIMS and six control areas.

Methods and analysis

There may be more than one ED per area (e.g. Manchester). EDs for children only will be excluded. The focus will be on minor cases only, defined by those discharged home, from adult and adult/child EDs. In each ED we will identify users who registered between the hours of 8pm and 4am on Fridays and Saturdays to mirror opening times of AIMS. In Sheffield adult ED this is around 90 per weekend.
An administrator in each ED will send postal questionnaires to all relevant users within a specified sampling month. This will total around 360 users in each ED. The expected response rate is 25%, yielding around 90 responses per ED. The total responses will be around 500 for AIMS areas v 500 for control areas. We will ensure our sampling month does not overlap with any national surveys of ED users in England, Wales or Northern Ireland. If EDs undertake local on-going surveys we will request that these are stopped during our sampling month to ensure that service users are only asked to complete a single questionnaire. We will apply Picker exclusion criteria and send one reminder. Although in-department surveys yield higher response rates, the resources required for this approach will be too high and a postal survey more practical. The questionnaire will be very short, focusing on perceptions of the environment, including the Picker question ‘did you feel threatened by other patients or visitors’. We will include one open-ended question on areas for improvement and search for numbers of alcohol-related comments as the outcome of interest. Data will be entered into SPSS and % views in AIMS compared with % views in control areas, adjusted for age and waiting time.

A controlled before and after design would be superior so we will also investigate the use of data from Picker surveys from 2003, 2004/5, 2008, 2012, 2014 and 2016 (if this is undertaken) to compare responses to the question ‘did you feel threatened by other patients or visitors’ before and after the introduction of AIMS in the six AIMS and control areas.

Our preliminary contact with Picker suggests that this may be possible if we can attend to anonymity requirements because of our need to focus on a subgroup of users. We will need to attend to the fact that these surveys are undertaken at different times of the year each year. Data will be entered into SPSS and the views of patients attending EDs with AIMS will be compared with those attending EDs without AIMS using t-tests and chi-squared tests. If we are able to obtain CQC Picker ED survey data we will look at changes in views at EDs compared with no-AIMS EDs.

**Work Stream 2 – Outcome Evaluation (Lead: SG)**

This work package will make use of a natural experiment comparing areas in which AIMS are established to those without AIMS provision to estimate the effect of AIMS availability upon use of emergency care and key performance indicators for emergency care providers. We will also collect data describing the activity of AIMS to evaluate AIMS safety, explain the effects of the AIMS and inform the economic analysis.

The study population will be people who seek emergency care during hours of AIMS activity from providers within the catchment area of the acute hospital or hospitals that take referrals from the AIMS or would be the provider of emergency care if the AIMS were not available. For the control sites the hours of AIMS activity will be those of the matched intervention site.

**Data collection**

Data will be collected from routine administrative data sources and supplemented by data collected at the AIMS and in neighbouring hospitals. Specific data collection methods are provided in relation to each process and outcome detailed below. No personal data will be collected and only staff responsible for providing care will have access to personal data.

**AIMS activity**

Existing AIMS record activity data from all attendances. We will extract the following anonymised data for all attendances: age, gender, hour and day of arrival, arrival by ambulance, reason for attendance, length of stay on the AIMS, investigations, diagnosis, treatments and disposal. During the study period, AIMS staff will also be asked to record any critical incidents that could potentially involve a risk to patient safety, such as delayed diagnosis or suboptimal supportive care, and any occasions when an ambulance arriving at the AIMS is redirected to the hospital.

We do not currently intend to use any identifiable details in this process. However, we will examine mechanisms for linking AIMS data to routine NHS data. If linkage to NHS is possible then we will determine whether AIMS or associated NHS organisation can provide anonymised linked data describing any use of NHS emergency care within the week following AIMS attendance. If the AIMS or NHS provider cannot provide anonymised data we will submit an application to the Confidentiality Advisory Group (CAG) for Section 251 approval to use NHS numbers to identify any subsequent NHS attendances by AIMS users. If CAG approval is obtained we will then submit a substantial
amendment to the REC describing how these data will be used without compromising patient autonomy or confidentiality.

Anonymised Hospital Episodes Statistics (HES) and ambulance service data will be obtained from acute hospital and ambulance service trusts serving the areas around AIMS and control areas. As we are also concerned with data relating to crime and disorder, data access is further facilitated by the Crime and Disorder Act 1998, which makes provisions for sharing if the purpose is to address disorder. As night time environments are characterised by disorder, and violent crime is one indicator we shall investigate, this evaluation will benefit from the allowances made in the Crime and Disorder Act 1998.

Outcomes

ED attendances (primary outcome)

We will use HES A&E data to measure ED attendances at hospitals in the intervention or control area during times of AIMS activity. The primary analysis will compare total ED attendances. Stratified analysis will be used to compare attendances according to whether they are likely to be related to alcohol intoxication, based on age (18-39 v other age groups), patient group (assault or deliberate self-harm v other) and diagnosis (poisoning, contusion, laceration or head injury v other). We will also undertake stratified analysis based on investigations and treatments to determine whether AIMS reduce attendances that only result in observation and/or advice and to estimate resource use for the economic analysis.

Hospital admissions

We will use HES data for admitted patient care to measure hospital admissions during hours of AIMS activity that are potentially related to alcohol intoxication. International Classification of Diseases (ICD) codes will be used to determine whether admissions are potentially related to alcohol intoxication, using an existing method [11], based upon classifications used by the Centers for Disease Control and Prevention and the Office for National Statistics [43]. Comparable Read Codes, ICD9 and 10 codes and ED diagnosis codes are being developed under the ELASiC study (PI: Moore; ESRC ES/L015471/1) and will be made available for this work stream. Two levels of attribution will be used: (i) fully alcohol attributable, e.g. alcohol poisoning, excessive blood level of alcohol, and (ii) partially alcohol attributable, e.g. poisoning (not alcohol), falls, motor vehicle crashes. Length of stay will be recorded and total attributable bed days calculated and compared.

ED key performance indicators

HES A&E data will be used to compare the following key performance indicators in hospitals in the intervention and control areas during times of AIMS activity: the median and 95th percentile total time in the ED (all patients together and stratified by admission v discharge), the median and 95th percentile time to treatment (all patients), the median and 95th percentile time to initial assessment (ambulance arrivals), the proportion leaving the ED before being seen for treatment and the proportion re-attending the ED within 7 days.

Ambulance service key performance indicators

Ambulance service dispatch data will be used to identify all calls originating from a geographical location within the AIMS catchment area during the hours of AIMS activity (or equivalent catchment area and matching hours for the control site). These data will be used to compare the following key performance indicators for the ambulance service between intervention and control sites: proportion of Red 1 and Red 2 calls responded to within 8 minutes, proportion of Category A calls responded to within 19 minutes, median time to arrival of ambulance-dispatched health professional for Category A calls, proportion of incidents managed without transport to the ED, and proportion of patients who re-contacted within 24 hours following treatment and discharge at the scene.

Other ambulance service measures

Dispatch data will also be used:
• To identify calls in the AIMS catchment area potentially related to alcohol intoxication (those coded as poisoning) to determine whether implementation of the AIMS changes the incidence of such calls compared to control sites.
• To identify and measure the duration of secondary transfers from the AIMS to hospital, for use in the economic analysis.

Further data sources to be explored include police violent crime data in areas with AIMS compared to areas without, to assess whether AIMS implementation affects violence, which may be attributable to increasing police resources in the NTE. In addition, routing Health and Safety data that captures assaults on staff (RIDDOR reportable events) will be explored to assess whether AIMS implementation is associated with improvements in this area. Finally, other routine data including staff sick leave and turnover will be similarly examined.

Data analysis

AIMS activity data will be presented descriptively to characterise patient presentations and AIMS management. These will be compared between AIMS and reported alongside structure and staffing to allow characterisation of different models of AIMS.

Safety will initially be assessed by calculating rates of critical incidents, hospital attendance after AIMS discharge, ambulance redirection to hospital, referral to hospital and hospital admission. These will be compared between different AIMS models. A more detailed safety evaluation will then be undertaken by asking two independent experts to review details of critical incidents (including those reported by the AIMS or identified through hospital attendance) and estimate the potential severity of any threat to patient safety.

The statistical methods used to compare ED attendances, hospital admissions and key performance indicators will depend upon whether pre-intervention data are available at the intervention sites. We will have a pre-measure for many of the outcomes, including the primary outcome – emergency department attendances. Hospital Episodes Statistics have been collecting data for attendances since 2008 and admissions since 1998. This allows us to retrospectively analyse pre-intervention data. Indeed an analysis of the Cardiff AIMS has already been undertaken to provide an uncontrolled before-after comparison of emergency department attendances [26]. If any of the outcome measures do not have historical routine data of sufficient quality to support interrupted time series analysis then we will use other methods that draw upon the opportunity for a natural experiment, for example comparing outcomes during times of alcohol treatment centre operation and using times when the alcohol treatment centre was not operational to provide baseline comparison. We have therefore planned our primary analysis on the basis of being able to use pre- and post-intervention data at both intervention and control sites, with secondary analysis using only post-intervention data if pre-intervention data are not available or of sufficient quality.

Primary analysis

Pilot data from Cardiff over a three year time period showed that the number of ED attendances and the average time of attendance increased over time and that a time series analysis was the most appropriate method to explore the impact of AIMS on ED attendances, the same approach will be used here [26]. Autoregressive Integrated Moving Average (ARIMA) models will be fitted to daily ED attendances to compare AIMS with usual care and different levels of AIMS and their impact on ED attendances [44, 45].

An interrupted time series approach will be used to explore the impact of AIMS over time (before-after study). The minimum length of time we will observe in our time series analysis is 365 days when comparing AIMS with non-AIMS areas, we expect the AIMS to be open twice a week and will therefore have approximately 104 observations for our time series models which we expect to be a sufficient number of time points for producing reliable models. Owing to the complexity of the models we will fit we have used a simulation approach to ensure the study would have sufficient power to detect a difference in the proportion of ED attendances [46]. On average we expect to see 300 A&E attendances per day (range 200 to 400), we ran 1000 simulations varying the reduction in the number of ED attendances as a results of AIMS from 10% to 1% using longitudinal Poisson modelling we are confident we have the power to detect a 4% reduction in ED attendances (the percentage change will be considerably larger within the evening period and within strata).

The Dickey-Fuller test, autocorrelation function (ACF) and partial autocorrelation function (PACF) will be used to establish seasonality, stationarity and differencing and the autoregressive and moving
average lags. Box-Pierce and Ljung-Box will be carried out to check the model fit and Akaike Information Criteria and Bayesian Information Criteria to check the goodness of fit of the models. The models will be stratified by type of incident, age, patient group and diagnosis, investigations and treatments in order to examine the effects of AIMS on different groups.

**Secondary data analysis**

The impact of AIMS and type of AIMS on number of hospital admissions (fully and partially attributed) to alcohol use will also be explored using time series methodology using the same methods described above. The Kaplan-Meier survival analysis method will be used to explore differences in total times in the ED, time to treatment and time to initial assessment by AIMS type and AIMS compared with usual care. The most appropriate test for examining differences between groups will be selected, for example if “failure” (e.g. time to discharge) times are evenly distributed over time a log-rank test will be used. If the HES A&E data is of sufficient quality to examine the impact of a number of variables on event times then an appropriate survival model such as the Cox proportional hazard model or a parametric equivalent will be fitted. The impact of length of stay in hospital for admissions that are either fully or partially attributed to alcohol use will be explored with regression analysis. Differences in proportions will be explored with chi-squared tests and logistic regression analysis to allow for differences in case-mix. STATA will be used for all analysis.

Given that we are using secondary data in our analysis we expect there to be some degree of missing data, providing the degree of missing data is not too extensive we will use multiple imputation in order to deal with the missing data [47]. However, we will (subject to other constraints) aim to include areas for the evaluation that are known to reliably report HES data.

**Work Stream 3 – Economic Evaluation (Leads: AB & TY)**

The component costs of AIMS will be compared to usual care. Results will be presented from the NHS and social care prospective. AIMS set up and running costs will be examined by a standardised costing exercise (e.g. staffing levels, training, consumables, overheads (building rental, heating and lighting) and from commissioning documents. We will use HES ED data to cost ED services before, during, and after AIMS setup and quantify other potential benefits of the AIMS (e.g. improved ED waiting times, treatment times, time to initial assessment and ambulance response times). We will present primary analysis as cost per ED attendance avoided. Ambulance response times and ED waiting times will be set alongside evidence on their relationship with risk of harm.

There are three main elements in the economic evaluation study with the study sites:

i. Effects of AIMS on Service Resource Use related to key performance indicators.
ii. Costs of services with and without AIMS.
iii. Modelling potential costs and resource use of national roll-out / uptake scenarios

(i) Effects of AIMS on service resource use related to key performance indicators

We will examine the effects of key items of resource use on ED attendance rates by including variables on resources measured in the time series models. Resource variables that will be explored will include – hospital admissions and length of stay for alcohol related conditions, staffing changes in ED, total time in the ED, number of ambulance journeys made and response times and AIMS attendances. This analysis will explain the effect of AIMS on NHS resources, ambulance and police services.

(ii) Costs of services with and without AIMS.

To quantify estimates of the costs of an AIMS service model versus usual care. We will undertake a costing exercise to quantify the main components of costs from the 6 study sites. Set up and running costs for an AIMS will be examined both by a standardised costing exercise (a structured request for information on staffing levels and grades, staff time, equipment, consumables, training and overhead costs) and by examination of commissioning documents including business cases for proposed service developments and actual commissioning contracts. The resource use related to the cost the
ED services during, and after setup of the associated AIMS will be obtained from HES ED data and ambulance service dispatch data.

Unit costs for resource use such as ED attendance and length of stay will be obtained from NHS reference costs for HES data and the ambulance service data [48]. Staff grades and times will have been recorded in the ethnographic analysis and unit costs will be obtained from agenda for change and unit costs for health and social care [49, 50]. Set up costs will be obtained from commissioning documents and business plans. Costs of AIMS will be compared with usual care and results presented for cost per ED admission avoided we will also compare the costs of different types of AIMS. We will also look at costs per ambulance dispatch avoided and examine the consequence of setting up an AIMS at a local level by looking at the displacement costs to local trusts of setting up AIMS.

Typically, AIMS are developed through partnerships including local government, police, healthcare and other agencies and set-up costs are likely to be provided across these sectors, in this study we are focusing on the costs to the health care sectors, though costs to other sectors are important. Therefore, the main analysis presented here will examine costs incurred by the health care sector. It is expected that the health care sector will implement some of the costs of the service; therefore sensitivity analysis will present results if the health care sector were to provide all the costs and if they were to provide none of the costs of the AIMS. Bootstrapping will be used to estimate uncertainty (confidence intervals) around cost estimates.

**Outputs**

We envisage at least five journal articles will be published across the work packages and one final report. In addition we have described a form of diffusion that is sensitive to practitioners’ needs across the duration of the project. We will also develop a rich source of information that will be published in an easy to digest and access format online. This will be a living resource that aims to develop the co-production of guidance on best practice through innovation [32-38] and likely realised as online Quarterly Updates, with additional opportunities for practitioners to contribute who are not directly affiliated with the project. The Management Group with the support of the SSC, with feedback from the Learning Community, will be responsible for defining and realising actionable learning outcomes across the duration of the project.

**Patient and Public Involvement**

Members of the Sheffield Emergency Care Forum have reviewed an early draft of this proposal. Comments motivated us to include all patients in ED (not just the intoxicated) and helped us formulate research questions relating to pre-treatment walk-outs from ED. “If there is a way to divert the intoxicated public to a place of safety for their own good and where they can be observed and treated as necessary, then steps should be taken to do this. The idea of AIMS is sound and should benefit everyone” (Enid). “This sounds like a fantastic project! In order to get the maximum out of it, I would say interviews would need to be conducted with a lot of different people” (Joe). On methods (including proposed data collection, inclusion/exclusion): “I have been in A&E at the [redacted] Hospital on a Friday evening and the disruption caused by the behaviour of intoxicated patients was very upsetting” (Alice). This highlighted the importance of measuring the impact of AIMS on ED attenders without alcohol intoxication and we added this into the project aims and objectives.

The complexity of the area to be examined demands that we involve three PPI groups; (1) The Involving People Network, Wales, (2) The Sheffield Emergency Care Forum (SECF) and (3) The Sheffield Addiction Recovery Research Panel (ShARRP). Our approach benefits the project through providing a independent steering committee member and PPI advisory group members; access to wider PPI groups that can be consulted across the lifespan of the project; giving the broadest cultural, geographical, experiential perspectives on AIMS and wider societal contexts; and demonstrates a novel model of multi-site PPI engagement relevant to future directions of National Institute of Health Research patient and public involvement.

The Involving People network covers patients and groups familiar with acute care in Wales and will provide the project with essential perspectives on the reality of drinking culture and related treatment. The Public Involvement Team, National Institute for Social Care and Health Research Clinical Research Centre (NISCHR CRC) Central Office (Cardiff) has recruited a PPI member, nominated to serve as an independent member of the study steering committee. The Sheffield Emergency Care
Forum (SECF) have an established track record of supporting high quality emergency care research. Members come from diverse backgrounds offering representation from local ambulance service personnel. One member of the SECF has already been nominated by this group to work with the AIMS project. She has commented at the proposal and application stages, is up to date with its progress and is ready to participate in the full project. The Sheffield Addiction Recovery Research Panel (ShARRP) provides a source of patient experiences from drug and alcohol treatment service users and family/carers. As the clinical lead (AI) for the ShARRP, there are several panel members with experience of alcohol abuse and some members with parental experience of addiction.

Training and support is provided by respective PPI groups as part of their organisation. The Involving People Welsh network provides a training programme to prepare network members for active involvement in research. These training days include four core training days; “An Induction to Involving People”, “Building Research Partnerships: Getting Involved and Influencing Research”, “An Introduction to Research Methods and Good Clinical Practice”. The Sheffield Emergency Care Forum (SECF) provide its members with regular support and training e.g. research methods, research ethics and governance provided by researchers at the University of Sheffield. The newly formed ShARRP PPI group is trained by Sheffield Teaching Hospitals Clinical Research Office in preparation for the work of a PPI panel. As clinical lead (AI) for the ShARRP and, having recognised the potential additional support needs of this ‘vulnerable’ PPI group has established links with treatment and support agencies in Sheffield to ensure their safety.

We envisage the PPI groups will be actively involved in the project. The aim of active involvement is to achieve insight into the methodology most likely to be well received by the intended cohort (measured by response rate, use of free text comments and active engagement in the process). We have consulted SECF around what methods they feel may yield the best quality and quantity of responses to ED and AIMS patient surveys. Our intention is to use the experience, particularly of our The Sheffield Addiction Recovery Research Panel (ShARRP) to help us build surveys of AIMS and ED patients (attending though alcohol intoxication) which can be read and understood by our participants. Our objective is to accurately capture the lived experience of these participants. Having some experience of alcohol misuse and the likely issues faced by AAIM patients can help us avoid potential barriers to providing feedback.

The main purpose of actively involving members of three diverse PPI groups is to maintain clear boundaries and roles for PPI within the project. An independent member of the Welsh Involving People PPI network will sit on the project steering group to ensure the critical project decisions are made with patient care and real world experience at their core.

We will work closely with members of the SECF and ShARRP to form a separate PPI advisory group via a named lead for PPI within the research team (AI). This method of involvement provides an efficient single point of accountability and communication between project team and PPI group.

In addition to meeting preparation and attendance the PPI advisory group would be invited to review all project documentation, correspond via email/phone in between meetings, review and comment on patient friendly recruitment and consent processes, review and suggest improvements on patient information sheets and consent forms, advise on patient friendly dissemination of findings for a lay audience, assist with the preparation of project lay summaries for dissemination, contribute to the design and content for a project website and other promotional material as required. We will engage our PPI advisory group in where and how best to present the findings from the project. Our intention would be to co-present these findings where appropriate, particularly at national PPI focussed research meetings and conferences to showcase our unique input across our three PPI groups.

Specific tasks

Work steam I

Aim (ii) -- PPI would be involved in the co-production of guidance on AIMS development and implementation.

Aim (iii) -- Advise on the AIMS users interview; recruitment/consent process, interview question wording, interview format and design. Advise on the analysis of AIMS User interview data (within the bounds of confidentiality) and the development of the AIMS exit survey.
Aim (iv) -- Input into the design and content of the ED users questionnaire.

We now describe the patients, carers and members of the public to be involved in further detail.

**The Involving People Network** is a group of people interested in becoming actively involved in health and social care research based in Wales. The network was originally set up in 2006 as part of the Clinical Research Collaboration Cymru (CRC Cymru) and since 2010 have been incorporated into the National Institute for Social Care and Health Research (NISCHR) Clinical Research Centre. The network is made up of over 200 patients, carers, service users and members of the public interested in a range of areas including; Dementia, Children and Young People, Cancer, Diabetes, Arthritis, Stroke and Public Health Improvement.

**The Sheffield Emergency Care Forum’s (SECF)** founding members were formerly part of the Sheffield Community Health Council and Sheffield Patient Forum before SECF was formed officially in 2009. The group take a special interest in research related to emergency care and have worked closely with teams from the Medical Care Research Unit (MCRU) and Emergency Medical Research in Sheffield (EMRiS) of the School of Health and Related Research, University of Sheffield. The group have a representative on the Strategic Local Priority Group for Public and Patient involvement for South Yorkshire and the Humber and links with other local and national PPI forums. Additionally, group members include past and present medical students who are able to give advice and ‘bridge the gap’ between the research and the public.

**The Sheffield Addiction Recovery Research Panel (ShARRP)** is a new PPI group created by researchers from the University of Sheffield and Hallam University and supported by the Clinical Research Office of Sheffield Teaching Hospitals NHS Foundation Trust. The group comprises of ex/current service users from drug/ alcohol treatment as well as family and carers of people who have had problems with drug and alcohol misuse. The group represents most of the main providers of local drug and alcohol treatment/ support groups in Sheffield including known national agencies such as; Alcoholics Anonymous, The Amy Winehouse Foundation, Turning Point, Addiction, Phoenix Futures and Crime Reductions Initiatives. Members are also well networked with local and national service user/ recovery groups providing a fantastic opportunity to showcase how research such as this can meaningfully engage and promote PPI.

**References**

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