Online supplementary material

Supplementary Table 1 - Data extractions for the intervention review (using abbreviated Template for Intervention Description and Replication (TIDieR)

Case Management

Author and Date	Hudon et al (2016); Hudon et al (2017); Grover et al (2018)
Item 1. Brief name	Case Management
Item 2. Why	Intensive personalised management (through a care plan) enables coordination of services and appropriate targeting of care.
Item 3. What (materials)	Care plan.
Item 4. What (procedures)	Composite package of interventions which may include: • case-finding • assessment • care planning • care co-ordination, including but not limited to: o medication management o self-care support o advocacy and negotiation o psychosocial support o monitoring and review. o case closure (in time-limited interventions). May also include self-management, patient education and disease management programmes.
Item 5. Who provided	Health care professionals, typically specialist nurses with

	medical support
Item 6. How	In an ED context, initial contact is within ED and then follow up may occur following discharge and may involve multiple health and social care agencies.
Item 7. Where	May be delivered face-to-face in a patient's home or in an ED setting or via the telephone
Item 8. When and how much	Frequency and duration of contacts varies according to need
Item 9. Tailoring	At intervals determined by case manager, may also be patient initiated.
Item 10. Modifications	Components from above list vary according to setting, skill mix and target population

Urgent Care Clinics

Author and Date	Scott (2009)
Item 1. Brief name	**Urgent Care Clinic**
Item 2. Why	To divert less serious, and therefore, potentially inappropriate cases from presenting at an ED.
Item 3. What (materials)	Treatment facility – may also include diagnostic services

Item 4. What (procedures)	Service that primarily treats injuries or illnesses requiring immediate care, but which may not be serious enough to require a visit to an Emergency Department.
Item 5. Who provided Item 6. How Item 7. Where Item 8. When and how much Item 9. Tailoring	General Practice teams Combination of minor injury/minor disease treatments plus triaging function for more serious cases. Urgent Care Centres are often located near Accident and Emergency departments. See Front of A&E General Practice (below) for collocated services.
Item 10. Modifications	
Item 11. How well (planned)	
Item 12: How well (actual)	

Data extraction for the initiatives review

Author and Date	Ng et al (2015)
Name	**#1. The West Middlesex Frequent Attenders Programme**
Setting (location)	ED
Setting (geographical)	London
Aim of initiative	Develop a model of care for frequent attenders. They have multifactorial reasons such as alcohol (31%), psychiatric (28%) and social (25%) as well as medical (87%)
Initiative details	Patient identified as a frequent attender, care plandeveloped following biopsychosocial assessment. Care plan adhered to patient records for reattendance. Care plans and patient progress reviewed every 2 weeks. Patients are seen in a frequent attenders clinic for brief interventions and other work and there is monitoring of subsequent attendances.
Reported outcomes	Reported outcomes for 7 patients with large reduction in ED attendances and reduction in costs.
Evaluation of initiative	N/A
Where next?	N/A
Headline message	"Proactive multidisciplinary management of frequent attenders significantly reduces attendances, improves patient care and saves money"

Author and Date	Ryan et al (2009)
Name	**#2. Barts Health NHS Trust 10 month pilot project**
Setting (location)	ED
Setting (geographical)	London
Aim of initiative	To better meet the needs of vulnerable ED patients who were also frequent attenders
Initiative details	Best practice inter-agency, multidisciplinary model of integrated care.
Reported outcomes	64 people received intervention. Significant reduction in attendances (reduced by 64%) and bed days. No increase in admissions.
Evaluation of initiative	Estimated gross cost savings of approximately £115,000
Where next?	Targeting frequent attenders at a cohort level, looking at other outcomes of interest.
Headline message	Significant reduction in A&E attendances and bed days. Number of admissions did not increase as A&E attendances reduced

Author and Date	Skov Kristensen et al (2018)
Name	**#3 The Sociolance**
Setting (location)	Community
Setting (geographical)	Denmark
Aim of initiative	To assist socially vulnerable and homeless people…with social and healthcare problems not requiring an emergency ambulance.
Initiative details	Most requests (83%) for the sociolance were made via the emergency medical dispatch centre. The sociolance attends a patient in need and delivers care on the spot or transports them to a more appropriate care provider. It provides referrals to other services.
Reported outcomes	In the 20 month project there were 2072 transportations, of which 83% were requested through the emergency medical dispatch centre. 90% were offered health/social care services and 75% accepted the offer. Nearly one in four were offered services in combined healthcare.
Evaluation of initiative	The intervention achieved its aims and acceptability was high
Where next?	N/A
Headline message	Different sort of intervention, delivered by non-ED emergency care, to bypass the ED where these patients might otherwise have been seen. Use and acceptability of intervention was high.

Author and Date	Harcourt et al (2018a; 2018b)
Name	**#4 Working Together to Connect Care**
Setting (location)	ED
Setting (geographical)	Australia
Aim of initiative	To improve care for the person who frequently attends the ED (more than four times in a month) "The main impetus for this program is to identify and provide more inclusive care to a vulnerable group of people who present to the emergency department multiple times"
Initiative details	Innovative program to provides assertive community case management coupled with an ED management plan to support people who frequently attend the ED. Involves: Identifying frequent attenders and flagging them on the system, case review and referral to community services by ED staff, case management of patients within and outside of the ED.
Reported outcomes	108 participants included in the evaluation. Comparing total presentations for 5 months pre commencement date (1,345 presentations) to 5 months post commencement date (1,009 presentations), results in a total of 336 less presentations through the Emergency Department.
Evaluation of initiative	Program participation has resulted in improved patient outcomes as demonstrated by crisis resolution, housing stability, engagement with primary health care and reduced frequency of ED presentations.
Where next?	N/A
Headline message	A personalized, integrated-care management approach is both flexible and effective in responding to the complex needs of five patients who frequently attend EDs.

Author and Date	Irving et al (2017)
Name	**#5. Alcohol Intoxication Management Services (AIMS)**
Setting (location)	ED and diverted from the ED
Setting (geographical)	UK
Aim of initiative	Alternative care pathway to divert acute alcohol related attendances from the ED
Initiative details	Open at predictable times, in locations with high incidence of intoxication, as a sustained and regular provision. People can be referred by ambulance staff, police or third sector and triaged and cared for in this setting.
Reported outcomes	NA
Evaluation of initiative	In Progress, no data from study
Where next?	
Headline Message	Do alternative treatment services for drunk revellers reduce the burden on emergency services?

Author and Date	West of England Patient Safety Collaborative (2018)
Name	**#6. Bristol Royal Infirmary High Impact User Group**
Setting (location)	ED
Setting (geographical)	Bristol, UK
Aim of initiative	To manage top 100 most frequent attending patients (varying from 20-70 attendances per year) through multidisciplinary group of ED and other medical staff alongside police, ambulance and other staff.
Initiative details	Support plans, behavioural contracts, signposting
Reported outcomes	Group has shown 80% reduction in ED attendances and hospital admissions
Evaluation of initiative	24/26 patients are no longer classified as high attenders
Where next?	Have written a toolkit to share experiences with other EDs. BMJ Mental Health Team of the Year Award 2018
Headline message	"Targeting this cohort will help manage their complex needs and redirect them in a controlled manner to the most appropriate service"

Author and Date	Garner et al (2015)
Name	**#7 Non-clinical Care Navigator**
Setting (location)	ED and Medical Assessment Unit (MAU) within hospital setting
Setting (geographical)	(e.g. Homerton University Hospital Foundation Trust and the Whittington Hospital, London).
Aim of initiative	To screen and offer signposting to services outside of hospital as appropriate
Initiative details	• Liaises with triage nurse team once people are medically cleared • Liaises with A&E rapid response team to identify patients readmitted multiple times, and offer information to help reduce further readmission CCG agreed funding for four navigators, covering two whole time equivalent posts, starting in February 2013. Their role was to approach patients in A&E waiting areas to: • educate and inform patients triaged by assessment nurse as only needing non-urgent appointments/ referrals about local services available, including GP and out of hours services, pharmacies, sexual health services, improving access to psychological therapies services and self-care; • show unregistered patients how to register with a GP, including informing patients which practices in their area are taking new patients and liaising with GP practices about the enrolment process needed; and • work with frequent attenders to help identify recurrent problems and signpost them to other services. • Navigators interacted with approximately 8% of patients attending A&E each month; number increased over time as service became embedded and pathways became established.
Reported outcomes	A&E staff felt the main benefit of the navigators was to offer more time to patients to talk them through registering with a

	local GP and their role, and felt this was more effective than just offering patients a leaflet. Assisting patients register with a GP amounted to a quarter of all navigator interactions. After this, 40% of patients registered with a GP - this was checked via NHS Spine, indicating a higher success rate than other known interventions to encourage GP registration. Information collected by navigators showed an ongoing need for education about different sources of healthcare. It was found that: • 46% of patients had not accessed other healthcare services about their symptoms before attending A&E; • difficultly accessing primary care was a key factor in use of A&E - more than 50% of patients were not registered with a GP; and • a significant number mentioned that getting an urgent appointment was too difficult/impossible. In terms of desired patient outcomes from their visit to A&E, 31% sought a diagnosis, 55% wanted treatment, 19% a prescription and 15% a referral to a specialist/further investigation. An economic model developed by the North and East London Commissioning Support Unit looked at: • cost savings arising from averted A&E attendances; • the benefit of GP registration in reducing the probability of future attendances for those registered; • the reduction in costs to the trust associated with improved patient records; and • the economic benefit for the CCG and the GP practice as a result of the increased number of previously unregistered patients registering with a local GP.
Evaluation of initiative	

	As a result of all the above components, there was an average net monetary benefit of over £160,000 per year for each whole time equivalent navigator.
Where next?	NA
Headline message	The introduction of non-clinical navigators has gone some way towards achieving: Increased GP registration, improved patient experience of A&E services, and raised awareness of community and voluntary sector services.

Author and Date	Arden & GEM Commissioning Support Unit (nd).
Name	**#8. Homeless Hospital Discharge Programme** [Care Navigators]
Setting (location)	ED & Hospital
Setting (geographical)	Arden and Greater East Midlands
Aim of initiative	To work as part of hospital discharge team to proactively identify homeless patients and establish their ongoing care needs.
Initiative details	Navigator works with a community-based 'broker' to find out help available and barriers to be addressed, eg. if a patient has been excluded from a hostels due to lack of cleanliness, a broker might be able to overcome the issue.
Reported outcomes	Service has been able to demonstrate: □ A high demand within hospital settings □ Positive outcomes for patients, who would have otherwise been discharged back into homelessness and without appropriate support, increasing likelihood of re-presenting at hospital □ Positive feedback from hospital staff □ Potential financial savings of over a quarter of a million pounds for CCGs
Evaluation of initiative	Front line medical staff received training to assist in understanding and identifying homelessness earlier, understanding underlying issues, and dispelling myths. This secures a safe discharge from hospital, reducing the likelihood of readmission. Following an initial trial period, the service was recommissioned across North Warwickshire.

Where next?	N/A
Headline message	Better communication with patients resulted in earlier identification of homelessness, leading to more efficient, quicker and better-planned discharge.

Author and Date	Pitalia (2013); Duffin (2013); Woodward & Proctor (2016)
Name	**#9. Acute Visiting Service/Rapid Access Doctor**
Setting (location)	Community
Setting (geographical)	Sutton, Surrey and Blackburn, Lancashire, Wiltshire
Aim of initiative	To Improve care for patients by: □ Reducing unnecessary ambulance conveyances, □ Reducing A&E attendances □ Reducing unplanned admissions. To improve quality and access to the right service at the right time, improving patient health and wellbeing. To increase capacity for the London Ambulance Service to attend higher priority calls. To make best use of resources and generating savings to help address the financial gap.
Initiative details	Existing Out of Hours provider commissioned to provide a dedicated GP with a driver in a non-London Ambulance Service vehicle (provided by the existing Out Of Hours provider). Responded to clinically appropriate Green (C3-C4) category triaged calls from 999 and be uniquely dispatched from the London Ambulance Service clinical decision making hub. Provided support to locally based Ambulance Crews. Scheme operated between 15:00-24:00 Friday, Saturday, Sunday and bank holidays from December 2014 to end of February 2015 Scheme was commissioned to assess, diagnose,

	prescribe and treat in the home, without requiring a paramedic response, conveyance to hospital or subsequent admission. Scheme offered potential to improve patient access to existing appropriate support services commissioned within the community.
Reported outcomes	Results from winter scheme using the RCGP accredited audit tool demonstrated that: • 75% of all pts seen by the service were treated within their own home leading to: ▯ Increase in capacity within the London Ambulance service to respond to higher acuity calls. ▯ Reduction in non elective attendances at the local acute trust. ▯ Reduction in admissions at the acute trust • Several cases identified from audit where individual patient benefited from care in their home, particularly vulnerable patients who could deteriorate with transfer.
Evaluation of initiative	Scheme needed to ensure better access to appropriate support services reducing the risk of future crisis by: ▯ Linking to community services that can build a suitable package of care, ▯ Use of mobile directory of services commissioned by NHS London ▯ Ensuring a more comprehensive induction for staff. Activity could have been higher, facilitated by: ▯ Increasing awareness within the Ambulance

	Service control Centre • Running the service seven days a week • Running the service across SW London • Agreeing a KPI for activity with LAS.
Where next?	Taking into account lessons learnt the South West London Out of hospital Delivery Group agreed to collectively implement scheme across SWL, for six months over winter 2015/16, with a view to informing future commissioning intentions.
Headline message	

Author and Date	Connor (2015)
Name	**#10. Urgent Visiting Service**
Setting (location)	Primary Care
Setting (geographical)	Beacon Medical Group (South West Region)
Aim of initiative	To provide a GP-led, rapid assessment service for patients unwell at home who might otherwise call an ambulance.
Initiative details	Adopting a pilot approach, Beacon deployed locums to back-fill sessions in order to free-up GPs to lead the service, and utilised the mobile SystemOne application to enable access to records.
Reported outcomes	• Of 100 visits undertaken, 36 resulted in avoidance of unplanned admission to hospital • 36 unplanned admissions avoided
Evaluation of initiative	Outcomes achieved by the pilot were: Improved awareness of, and utilisation of, community services The effective reinforcing of treatment escalation plans The early use of ambulance services where necessary
Where Next?	NA
Headline Messages	

Author and Date	Anonymous (Bridlington)
Name	**#11. High Intensity User programme**
Setting (location)	ED
Setting (geographical)	Blackpool
Aim of initiative	To tackle the problems of patients with complex psychosocial problems as an alternative to A&E presentation.
Initiative details	Frequent callers are those who call at least five times/month, or at least 12 times in three months, and cost the NHS millions of pounds a year. An advanced paramedic in Blackpool noticed that a small group of people took up a disproportionate amount of NHS resources and staff time. Drew up list of patients, many suffering from mental health problems or loneliness, who had visited A&E 703 times in the previous three months, mostly by ambulance. Tried to tackle their problems by meeting them for a coffee and a chat. Through personal mentoring and one-to-one coaching, as well as getting them involved with community activities and encouraging them to phone her rather than call 999, she helped A&E attendances, emergency calls and hospital admissions to drop among the group. Patients became more able to cope for themselves and came to call less often.
Reported outcomes	Innovation reduced A&E visits from “frequent callers” by up to 90 per cent; being rolled out across the country.
Evaluation of initiative	The High Intensity User programme was scaled up to cover about 300 patients in Blackpool over three years, saving the NHS more than £2 million.
Where next?	The High Intensity User programme has been rolled out to around a fifth of the country, with 36 local health teams adopting the scheme. NHS England wants clinical commissioning groups to adopt the idea through the RightCare programme. About 5,000 people attend major A&E units around the country more than 20 times each year and in 2016 they accounted for 0.05% of A&E visitors, but about 3% of spending (£53 million).

Headline message	Paramedic single-handedly cut A&E visits by 90%

Author and Date	Anonymous (Northern Echo)
Name	**#12. Positive Lives**
Setting (location)	ED
Setting (geographical)	Durham County Council, Durham Dales, Easington and Sedgefield Clinical Commissioning Group (DDES CCG) and North Durham CCG
Aim of initiative	To reduce the number of patients who regularly attend accident and emergency services.
Initiative details	Positive Lives is a pilot scheme which focuses on individuals who present at A&E with a need which cannot be treated medically, such as anxiety, unemployment, homelessness or depression and aims to change the way they are supported. A Positive Lives lead works one-to-one with these individuals to uncover the underlying cause of their crisis and they will then be offered access to the appropriate support in order to address their issues and improve well-being. Ongoing support provided if needed and those involved are able to access services appropriate to their needs.

Reported outcomes	
Evaluation of initiative	Model demonstrated in Blackpool which saw a 92 per cent reduction in A&E attendances for those assessed as requiring this level of support.
Where next?	N/A
Headline message	

Author and Date	Ford et al (2012); Ford et al (2013)
Name	**13. Health Diversity Initiative**
Setting (location)	Multiple
Setting (geographical)	South West London
Aim of initiative	To address confusion over GP out-of-hours services and a rise in migrant populations, being less likely to register with a GP and more likely to use A&E services.
Initiative details	Programme includes community education sessions, six-week courses, and bilingual advocacy and interpretation services. Its success relied heavily on the team getting to know local communities, working in partnership and making time to develop trust. Programme included: • Bilingual advocacy service to signpost people to NHS services, run education workshops, identify ambassadors in the community and provide interpreting and translating services in GP practices and at home visits. • Programme run over 6 weeks using a multidisciplinary team of nurses, health coaches, paramedics, pharmacists, midwives, nutritionists and falls specialists. Aims were for participants to set health goals and become mentors in their communities
Reported outcomes	Health Diversity Initiative has helped to address rising A&E attendances: •Since the programme began in 2010, overall A&E usage rates have declined by 3% •This reduction is more marked in five practices serving the most deprived areas, which have received targeted support and achieved reductions in A&E usage of around 10% •More patients from migrant groups are registering at GP practices and a new migrant registration policy has been developed

Evaluation of initiative	Migrant communities report feeling more educated and empowered to use GP and pharmacy services, rather than always relying on A&E. •Colleges, health fairs, YMCA, homeless charities and heads of education are rolling out education strategies to help younger migrants, who are less likely to register with a GP, understand how to access services
Where next?	N/A
Headline message	Nurses, community workers, GPs and others work together on a programme to support migrant communities, resulting in a reduction in their use of accident and emergency services.

Author and Date	Khan (2015); Gregory (2017); Iacobucci (2017); Wickware (2017); Edwards (2018)
Name	**#14. Front of A&E General Practice/ "Front-door streaming model"**
Setting (location)	ED
Setting (geographical)	Surrey; Bedfordshire; Rolled out across UK by end of 2017.
Aim of initiative	To provide alternative primary care-based services to patients not requiring ED admission
Initiative details	Hospital has co-located urgent GP centre, open from 8am to midnight, every day of the year. Between two and three GPs work in the centre daily, with a minimum of two GPs working there at any one time. GPs at the centre see an average 120 patients a day.
Reported outcomes	Health secretary praised the model, saying it worked 'spectacularly at hospitals like Luton and Dunstable', which was able to admit or discharge 95% of its patients within four hours last winter despite pressures. No details of costs are available.
Evaluation of initiative	GP leaders have challenged the feasibility of this plan given a 'chronic lack of GPs'. Rolling out Luton and Dunstable University Hospital's model across all trusts in England, would need between 278 and 417 GPs working in A&Es on any one day. Pulse analysis of hospital plans for GP streaming found some trusts planned to have three GPs in A&E at any one time in winter 2017, with CCGs taking diverse approaches to recruitment.
Where next?	Needs further exploration of (i) under which contexts the model is most likely to work and (ii) whether needs are best served by involvement of GPs in front door (admission) or back door (discharge) services.

Headline message	Approach seems suited to hospitals serving populations that use A&E extensively for primary care concerns but not likely to be as effective where GPs see high proportion of emergency cases on the same day. Frimley Park Hospital, which piloted the scheme, argued that high proportion of patients with complex needs arriving in their A&E department meant that GPs would be more effectively employed managing patient discharge at the 'back door' of the hospital.

Author and Date	Lee et al (2015); Lee et al (2016); Pickstone & Lee (2019)
Name	**#15. Guy's and St Thomas's NHS Foundation Trust @home service**
Setting (location)	Community
Setting (geographical)	London
Aim of initiative	(1) Identifying people at risk of a hospital admission and providing care that prevents their condition from worsening; (2) allowing people to receive high level care in their homes instead of being admitted unnecessarily to hospital and; (3) allowing for advanced discharge from hospital so that patients can recuperate in the comfort of their home while receiving high quality care.
Initiative details	Multi-disciplinary team aimed at preventing some Emergency Department (ED) attendances, facilitating early discharges, and preventing acute admissions. Designed for 260–280 referrals per month from acute hospitals, GPs, community nurse specialists (e.g. heart failure nurses, community matrons or specialist palliative care), emergency departments and London Ambulance Service staff. Service operates 24/7 with overnight service mainly focused on acute medical emergencies (e.g. blocked urinary catheter). Referral criteria are: adults aged 18 years and over, acute onset of illness (including acute exacerbations of chronic conditions). Most patients are: early discharge/admission avoidance (patient at high risk of admission). Referrals triaged by GSTT@home duty clinician (matron or GP)/ GSTT@home in-reach nurse. GSTT@home duty clinician/in-reach nurse determine if referral is appropriate. Patient is then transferred to the appropriate team for initial assessment by a senior nurse/GP. Patients' GPs are informed that patient has been seen by GSTT@home team and are sent intervention summary on discharge.
Reported outcomes	1084 patients were referred to @home over 3 months. @home prevented 387 patients from attending ED.

Evaluation of initiative	Initial evaluation indicates service is meeting its aims with positive feedback from patients/relatives and attainment of clinical outcomes. Clinical benefits include effective and efficient integrated partnerships, reduction in ED attendances, reduction in length of hospital stays/associated costs, reduced conveyance times and a reduction in inappropriate hospital admissions, reduced risk of hospital acquired infections and reduced delirium/confusion. Patient benefits include improved health outcomes, a preference for treatment at home rather than in hospital, reduced pain/anxiety and psychological/social benefits of treatment in their own home. Although @home team reduces a small number of ED attendances each month (1 in 300), this number is not high enough to make a significant impact on average performance against the 4-h target at the local EDs alone.
Where next?	N/A
Headline message	Care for acute episodes can be provided in people's homes using a multidisciplinary approach.

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Notes from the PPI meeting

The PI representatives expressed great interest in the review, in particular the focus on vulnerable groups which stimulated an interesting discussion.

The group discussed vulnerability in terms of whether it related to circumstances over which individuals had no control, for example, being made unemployed, or whether there were situations over which people did have control and choice, such as excessive drinking or substance misuse. The group decided that it was important not to stigmatise people based on their life decisions.

They also discussed the temporal nature of vulnerability – to go from being homeless and without a job to being housed and employed reduced vulnerability. The group commented that there were levels of vulnerability and that people were likely to move up and down these levels as well as being either vulnerable or not vulnerable.

They discussed how vulnerable groups were generally under-researched and how it was clear how the mechanisms worked for some groups in terms of their poorer health and poorer health outcomes e.g. socioeconomically deprived people but also how for other groups e.g. LGBT+ groups it was less clear how vulnerability lead to discrimination and poorer health outcomes.

The group cautioned that it would be important to think about the impact of austerity on these populations, both in terms of a general decrease in wealth in society and the differential impact that this might have on these groups but also in terms of the cuts to services, particularly those upstream that might impact on increased use of the EUC.

The group asked us to look for examples of interventions that had failed as well as those that had been successful and we suggested that the grey literature searching might be more fruitful in identifying interventions that were stopped. They also mentioned that the criminal justice system, in particular the police were often having to take a role in health and social services so it might be worth looking at interventions delivered to these groups in emergency settings by the police.

We asked the group to identify people that they considered “vulnerable”. The following responses were given:

- Women who have been subject to a harmful sexual practice
- Travellers
- People from the LGBT+ community
- Recipients of intimate partner violence
- Poverty

- Homeless
- Suffering PTSD
- Frail older people
- People with mental health problems
- People who are lonely or isolated.

Actions taken as a result of the meeting

- Consider the three groups that were mentioned in the meeting that were not either included or specifically excluded from the review – women who have been subject to a harmful sexual practice, travellers and people from the LGBT+ community. Another group, of veterans or people with PTSD was mentioned, but these are likely to fall into the category of poor mental illness which was excluded from the review.
- Consider the role of policing and social services in delivering emergency care interventions
- Look for published or documented reports of failed interventions
- Consider the impact of service cuts and austerity more generally on how services are delivered.