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The effectiveness of primary care service models in or alongside emergency departments: a rapid realist review

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Manuscripts

The effectiveness of primary care service models in or alongside emergency departments: a rapid realist review

Cooper, A, Davies F, Edwards, M, Anderson, P, Carson-Stevens, A, Cooke, M, Donaldson, L, Dale J, Evans, B, Hibbert, P, Hughes, T, Porter, A, Rainer, T, Siriwardena, A, Snooks, H, Edwards, A

Corresponding author: Dr Alison Cooper, Division of Population Medicine, Cardiff University, 5th Floor Neuadd Meirionnydd, Heath Park, Cardiff CF14 4YS
CooperA8@cardiff.ac.uk 02920 870746

Dr Alison Cooper, Cardiff University, Cardiff, UK
Dr Freya Davies, Cardiff University, Cardiff, UK
Dr Michelle Edwards, Cardiff University, Cardiff, UK
A/Prof Pippa Anderson, Swansea University, Swansea, UK
Dr Andrew Carson-Stevens, Cardiff University, Cardiff, UK
Prof Matthew Cooke, Warwick University, Coventry, UK
Prof Sir Liam Donaldson, London School of Hygiene and Tropical Medicine. London, UK
Prof Jeremy Dale, Warwick University, Coventry, UK
Dr Bridie Evans, Swansea University, Swansea, UK
Mr Peter Hibbert, Macquarie University, Sydney, Australia
Dr Thomas Hughes, John Radcliffe Hospital, Oxford, UK
A/Prof Alison Porter, Swansea University, Swansea, UK
Prof Tim Rainer, Cardiff University, Cardiff, UK
Prof Aloysius Siriwardena, Lincoln University, UK
Prof Helen Snooks, Swansea University, Swansea, UK
Prof Adrian Edwards, Cardiff University, Cardiff, UK

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Abstract

Objectives

Worldwide, emergency healthcare systems are under intense pressure from ever-increasing demand and evidence is urgently needed to understand how this can be safely managed. An estimated 10-43% of emergency department patients could be treated by primary care services. In England, this has led to a policy proposal and £100million of funding (\$140million USD), for all emergency departments to stream appropriate patients to a co-

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2
3 located primary care facility. However, the research evidence to support this initiative is
4
5 weak. Our aim was to explain how and why general practitioners working in or alongside
6
7 emergency departments affect: patient flow, patient experience, patient safety and the
8
9 wider healthcare system

11 **Design**

12 Rapid realist literature review

13 **Setting**

14 Emergency departments

15 **Intervention**

16 General practitioners working in or alongside

17 **Inclusion criteria**

18 Articles contributing data to theory development

19 **Primary outcome measure**

20 Context-specific theories that explain how and why the intervention works and policy
21
22 implications

23 **Results**

24
25 Ninety-six articles contributed data to theory development sourced from earlier systematic
26
27 reviews, updated database searches (Medline, Embase, CINAHL, Cochrane DSR & CRCT,
28
29 DARE, HTA Database, BSC, PsycINFO and SCOPUS), and citation tracking. We developed
30
31 theories to explain: how staff interpret the streaming system, different roles general
32
33 practitioners adopt in the emergency department setting (traditional, extended, gatekeeper
34
35 or emergency clinician), and how these factors influence patient (experience and safety)
36
37 and organisational (demand and cost-effectiveness) outcomes.

38 **Conclusions**

1
2
3 Multiple factors influence the effectiveness of emergency department streaming to primary
4 care services; caution is needed in embedding the policy until further evaluation is available.
5
6 Service models that encourage the traditional general practitioner approach may have
7
8 shorter process times; however, there is little evidence on the safety implications or
9
10 whether this improves care for the sickest patients. Distinct primary care services offering
11
12 increased patient choice may result in provider-induced demand. Economic evaluation
13
14 requires further research.
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16

17 18 **Trial registration**

19 Prospero ID=CRD42017069741

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23 300/300
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28 29 **Strengths and limitations of this study**

- 30
31
- 32 • A realist approach to evidence synthesis leads to theory development that explains
33 how and why context links to outcome
34
 - 35 • Contextual factors can then be incorporated into the evidence base to inform
36 healthcare management and policy making
37
 - 38 • We utilised experts and stakeholders to streamline the process and produce a
39 context-specific product in response to emerging issues
40
 - 41 • We sought to inform United Kingdom policy regarding emergency department
42 provision which limits transferability of results
43
 - 44 • Some studies did not describe how the intervention operated in adequate depth to
45 identify key mechanisms that led to the outcomes
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The effectiveness of primary care service models in or alongside emergency departments: a rapid realist review

Background

Emergency healthcare systems, in most high-income countries, are under intense pressure from ever increasing demand. This is particularly so at colder times of year as an ageing and frail population is precipitated into crisis by acute illness.(1) Evidence is needed on how best to manage this demand whilst safely achieving the highest standards of care.(2) An estimated 10-43% of patients attending hospital emergency departments could be treated in primary care settings.(3–9) In the United Kingdom, this has led to a policy proposal, supported by £100million of funding (\$140million USD), that all emergency departments in England have a co-located primary care facility, so they are “free to care for the sickest patients”. (10–12)

The United Kingdom has a universal healthcare system, the National Health Service, funded through taxation.(13) Primary care is led by general practitioners, community-based doctors with generalist training. Three primary care service models associated with emergency departments are described: a) treatment in a unit alongside the emergency department; b) general practitioners redirecting patients with primary care problems out of the emergency department to the most appropriate healthcare setting; and c) general practitioners fully integrated into the hierarchy of emergency department provision.(14) There is little research evidence to guide decisions about which of these service models is most effective. The risk of provider-induced demand, potential patient safety issues and how to recruit a workforce for this initiative are also unclear. (15–19) Due to this uncertainty, the main standard-setting body in the National Health Service (NICE) does not currently recommend general practitioners work in emergency department settings.(20)

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3 Research studies addressing these questions are heterogeneous and few are
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5 conducted at scale.(15–17) This limits the results of traditional synthesis methods required
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7 to shape practice or policy. Realist methods offer an alternative approach, generating
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9 theories to explain why a particular intervention is likely to work, how, for whom, in what
10
11 circumstances, and why.(21) These methods incorporate contextual factors into the
12
13 evidence base to inform healthcare management and policy making.(22) Urgent and
14
15 emergency care settings vary in geographical location, the type of patients, the presenting
16
17 conditions and the experience and disciplines of the healthcare clinicians that treat them.
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19 We decided that a realist approach, aiming to explain how general practitioners work in or
20
21 alongside different emergency department settings and why the resultant successes or
22
23 failures occur, would be more informative than a traditional review approach.
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28 Our research question was, “Why and how do general practitioners working in or
29
30 alongside emergency departments affect: patient attendance and flow; patient experience;
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32 patient safety; and the wider healthcare system?”
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Box 1: Glossary of terms(21,23)

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|----------------------|---|
| Primary care problem | A condition that a typical general practitioner in a typical general practice would be expected to manage |
| Streaming | A system to allocate patients to the most appropriate healthcare provider within the emergency department setting |
| Triage | A system to identify seriously unwell patients to prioritise treatment |
| Context (C) | Pre-existing conditions which influence the success or failure of different interventions or programmes. |
| Mechanism (M) | The intervention and people's reaction to it; how does it influence their reasoning? |
| Outcome (O) | Intended and unintended results as a result of a mechanism operating within a context |
| Initial theory | An early theory informed by available evidence describing why, how and for whom the intervention is thought to work using a context-mechanism-outcome configuration |
| Refined theory | An initial theory that has been refined using primary or secondary evidence |

Method

We followed the realist review methodology to identify mechanisms (M) that explain how or why contexts (C) relate to outcomes (O), to generate *theories* described as context-mechanism-outcome configurations.(21) (Specific terminology is defined in Box 1.) Our focus was specifically on general practitioners working in or alongside emergency departments. We used the rapid realist review approach described by Saul et al. which utilises experts and stakeholders to streamline the process and to produce a context-specific product that is useful to policy makers and responsive to emerging issues; providing evidence and making explicit what is known on the given topic, also articulating the current research gaps.(24) We registered our protocol on the Prospero database (http://www.crd.york.ac.uk/PROSPERO/display_record.php?ID=CRD42017069741) and followed RAMESES publication standards for realist reviews.(25) The period of study was April – November 2017.

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3 Three reviewers (AC, FD and ME) conducted a scoping exercise with the four United
4
5 Kingdom papers identified in the review by Ramlakhan et al.(4,26–28) and two policy
6
7 documents,(14,29) to generate *initial theories*. We then developed and piloted data
8
9 extraction forms. Our theories were developed at the *micro-level* (the reasoning processes
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11 of general practitioners, emergency department staff and patients), *meso-level* (staff
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13 interactions resulting in department level outcomes) and *macro-level* (the impact on the
14
15 wider system).(30)

16
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18 We discussed these initial theories with the wider study team of 18 collaborators,
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20 including emergency department clinicians, policy makers, general practitioners, members
21
22 of the public and methodologists at a study meeting in May 2018. We used them as an
23
24 expert reference group, to contribute ideas for other possible initial theories and to identify
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26 further research papers in peer-reviewed journals and relevant reports in the grey
27
28 literature. Six members of this group, including two (AP, PA, BE, BH, JD, ACS) met via
29
30 teleconference every six weeks to discuss findings and guide priority search areas.
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34 We used papers referenced in three previous systematic reviews as a starting
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36 point.(15–17) To identify papers published since, we combined search terms used
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38 previously.(16,17) A combination of free text and Medical Subject Headings (MeSH) terms
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40 was used (see supplementary file 1 for Medline strategy which was adapted for other
41
42 databases). AC ran the searches on the following databases from 15th June – 4th July 2017:
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44 Medline via OVID, Embase, CINAHL, Cochrane DSR & CRCT, DARE, HTA Database, Business
45
46 Source Complete, PsycINFO and SCOPUS and used Endnote X8 (Clarivate analytics) to export
47
48 citations from the database searches and identify duplicates. AC screened the titles and
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50 abstracts of all identified papers using a checklist, developed and tested in collaboration
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52 with FD, which ranked abstracts according to relevance.
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3 We selected studies if they could contribute to the process of theory development at
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5 the level of individual data extracts rather than assessing the full text against a set
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7 checklist.^(25,31) We excluded papers that lacked relevance or explanatory power, or were
8
9 unavailable in English. AC and FD imported data extracts into NVivo 11 (QRS international)
10
11 that evidenced mechanisms (M) to explain how or why contexts (C) related to outcomes (O).
12
13 Quantitative, qualitative or contextual data were extracted from any part of a paper. We
14
15 continually considered the relevance and rigour of each included piece of evidence during
16
17 the data extraction and synthesis phases.⁽³¹⁾ We discussed weekly within the team (AC, FD,
18
19 ME, AE) how individual data extracts should be used to ensure appropriate inferences were
20
21 made.⁽³¹⁾ A quarter of all included articles was read by both reviewers, and the coding
22
23 process was discussed in detail, to ensure consistency of approach.
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28 We used snowballing techniques (such as searching companion papers and citation
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30 tracking) for all included articles. We also searched to identify additional relevant grey
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32 literature (including policy documents and opinion pieces) from a variety of sources. The
33
34 search process was iterative, overlapping with data extraction and analysis, and was
35
36 directed towards the evidence gaps and finding explanatory information.
37
38

39 We applied Pawson's reasoning processes,⁽²¹⁾ to synthesise the evidence and develop
40
41 our theories. We presented these context-specific *developing theories* to our expert
42
43 reference group in November 2017. At this stage, the group recognised that although the
44
45 review had been useful in theory development, there were limited opportunities for theory
46
47 testing and refinement due to evidence gaps. Rather than continuing to search the
48
49 literature for additional secondary data, we decided that gathering primary data from our
50
51 evaluation case study sites in the next phase of our wider ongoing study,⁽³²⁾ would give
52
53 more meaningful testing to derive *refined theories*.⁽²¹⁾
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Patient and public involvement

Three public contributors (BE, BH, JH) were co-applicants for the funded research and contributed to the conceptualisation of our wider study, including theory generation through the review.⁽³²⁾ They contributed in both meetings described above to ensure that the patient's perspective was acknowledged and at a stakeholder dissemination event in February 2018.

Results

Figure 1 shows the search strategy and results, a total of 96 articles contributed to the developing theories. The articles were largely primary research studies and involved patients with primary care problems, directed to general practitioners for treatment. Most articles were from the United Kingdom (n= 44 articles), with a large contribution from The Netherlands (n=17). Others were from Ireland, Belgium, Switzerland, Sweden, Italy, Finland, Australia, USA, Canada, Singapore and New Zealand.

We synthesised data to develop theories, described using Context (C) - Mechanism (M) - Outcome (O) configurations, to explain: how or why emergency department staff and general practitioners react to guidance to determine which patients are streamed to general practitioners; the role general practitioners may adopt in the emergency department setting (traditional general practitioner, extended general practitioner, gatekeeper or emergency clinician); and how these factors influence patient (experience and safety) and organisational (risk of provider-induced demand and cost-effectiveness) outcomes. These theories are summarised in Table 1 with an indication of supporting data, and how they link is shown in Figure 2. Full details of included articles are listed in supplementary file 2.

Table 1: Summary of *developing theories* and supporting evidence

| Theory | Context (C) – Mechanism (M) – Outcome (O) Configuration | Example of supporting extract | Evidence base |
|--|---|--|---|
| 1. Effectiveness of the streaming system | General practitioners and emergency department staff use their own personal experience and expectation (C) when interpreting streaming guidance (M) to influence which patients are streamed to general practitioners (O). | <i>“We’ve been underperforming really, from the amount we potentially thought we might be able to see and the number of patients we’re actually seeing ... if you actually talk to the GPs, they’re actually saying the cohort of patients that they’re getting through are not suitable because they’re minor injuries and we’re not trained in minor injuries.” (Consultant) (33)</i> | Data to support theory (4,14,40,41,26,33–39) |
| 2a. Traditional general practitioner role vs emergency clinician role | When general practitioners working in the emergency department maintain a ‘traditional role’ using the same approach taken in the primary care setting (M) to treat patients with primary care problems (C), investigations, admissions and process times will reduce (O). However, if general practitioners adopt an ‘emergency clinician role’ working as another pair of hands (‘going native’) because of their personal interest or experience or because they feel this is the correct way to work in this setting (M), there will be no difference in the rate of investigations and admissions (O). | <i>“I guess our emergency medicine approach is we’re looking for something dreadful and a GP approach is very different in that most of the time they know it’s minor stuff or ... moderate stuff that is self-limiting and so ... they’re looking to find symptomatic relief and how can we get this patient home and away from hospital.” (Consultant)(33)</i> <i>“Once they start becoming like everyone else then they stop being like a GP and they don’t necessarily work quickly and effectively which is supposed to be the whole benefit of having them there.” (Consultant)(33)</i> | Data to support traditional GP role theory (4,5,46–49,26,27,33,38,42–45) Limited data to support ED clinician role theory(33,50) |
| 2b. Extended general practitioner role | General practitioners in emergency departments can work in an ‘extended role’, outside the scope of usual practice, where their skills are directed at specific patient groups including non-urgent paediatric or elderly patients (C), to treat using the usual primary care approach (M), to reduce the use of hospital resources and admissions in these patient groups (O). | <i>“During a 6-month pilot scheme which co-located a primary care GP service in a busy paediatric ED, patients seen during the hours when the GP was available were significantly less likely to be admitted, exceed the 4-hour waiting target or leave before being seen, but more likely to receive antibiotics.”(5)</i> | Data to support theory for paediatric patients only (5,29,51–53) |

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|------------------------------------|--|--|--|
| 2c. Gatekeeper role | General practitioners can use their generalist skills and knowledge of community resources (M) to redirect patients presenting with primary care problems (C) back into the community for treatment thereby reducing emergency department attendances (O). | <i>"GPs and nurses based in triage identify patients who could be managed more appropriately in primary care as soon as they enter the Emergency Department, and re-direct them back to primary care services."</i> (54) | Limited data to support theory (54,55) |
| 3. Patient satisfaction | Patients with primary care problems that present to emergency departments (C) and are seen by general practitioners, are more satisfied with the care they receive (O) if the experience exceeds expectation (M), but if they do not perceive any difference in the care they received compared to what they expected (M), there is no difference in satisfaction (O). | <i>"There were no significant differences in (patient) satisfaction ratings between the three groups of doctors (GPs/SHOs/Registrars)"</i> (38) | Limited data to support theory (27,38,42,44,56–60) |
| 4. Safety implications | Patients with primary care problems that present to emergency departments (C) can be appropriately and safely managed by general practitioners (M) so that emergency department staff are free to appropriately and safely manage seriously unwell patients (O). | <i>"The attribution of overcrowding in ED to attendance by GP-type patients is simplistic; it does not address how patients are processed within ED or how they are transferred to wards later if required ('access block')."</i> (43) | No data to support, some opposing data |
| 5. Risk of provider-induced demand | If patients with primary care type problems present to emergency departments (C) and are streamed to indistinct primary care services, without patient awareness or choice (M), there is no provider-induced demand (O). However, distinct urgent primary care services may offer convenient access to primary care (M), resulting in provider-induced demand (O). | <i>"A and E [ED] has not seen any reduction in their patients. If there is a service, patient[s] will use it. You could have three walk-in centres in the city and all three would be used and you may still not see any dropping in A and E [ED] counts."</i> (Manager)(61) | Data to support theory (4,28,69–72,61–68) |
| 6. Cost-effectiveness | If there is demand for patients with primary care problems presenting to emergency departments (C), and they are streamed to an onsite primary care service and managed by a traditional general practitioner approach (M), the service is cost-effective due to fewer referrals, admissions, investigations and better outcomes compared to usual services (O). | <i>"Management of patients with primary care needs in accident and emergency department by general practitioners reduced costs with no apparent detrimental effect on outcome."</i> (27) | Limited data to support theory (27,42,48) |

Theory 1: Effectiveness of the streaming system

General practitioners and emergency department staff use their own personal experience and expectation (C) when interpreting streaming guidance (M) to influence which patients are streamed to general practitioners (O).(4,14,40,41,26,33–39)

Twelve articles supported this theory and indicated how the streaming process itself directly influenced the effectiveness of the general practitioner service in the department. Variable streaming rates were described due to the guidance itself and also how the guidance was interpreted by emergency department staff.(33,37,39,40) The triage nurse was sometimes described as being unclear which patients general practitioners could deal with,(4,26,33–37) or being more familiar with emergency department work so favouring emergency department referral,(14,33,35,37,38,41) even overruling the guidelines if he/she felt that the patient would require specific investigations,(35) or admission.(41) General practitioners were also noted to override nurse triage decisions to select patients that suited their own interests or perceived skills. (73) Increased referral rates were reported when there was a good relationship between the general practitioners and emergency department nurses.(39) General practitioners were directly involved in the streaming process in two studies resulting in high general practitioner referral rates.(52,74) The influence of commissioning or leadership was not described.

Theory 2a: Traditional general practitioner role vs emergency clinician role

When general practitioners working in the emergency department maintain a ‘traditional role’ using the same approach taken in the primary care setting (M) to treat patients with primary care problems (C),(33,38,42–45) investigations, admissions and process times will reduce (O).(4,5,49,26,27,42,44–48) However, if general practitioners adopt an ‘emergency

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3 *clinician role' working as another pair of hands ('going native') because of their personal*
4 *interest or experience or because they feel this is the correct way to work in this setting (M),*
5 *there will be no difference in the rate of investigations and admissions (O).(33,50)*
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10 The traditional general practitioner approach was described by many authors as a
11 different approach to risk management and diagnostic uncertainty, with less reliance on
12 acute investigations.(33,38,43–45) This approach was maintained in a variety of different
13 settings despite full access to investigations – when general practitioners were allocated a
14 separate consulting room mimicking usual general practice,(4,26) and also when general
15 practitioners worked in a more fully integrated model, alongside emergency department
16 clinicians.(42,44,45) Other articles supported general practitioners managing non-urgent
17 patients in this way to divert attendances from emergency department staff. (36,37,76–
18 83,40,52,53,62,63,68,74,75)
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30 There were limited qualitative data to support the 'emergency clinician role'
31 theory.(33) An Irish study described an “unstructured receptionist-based triage system” for
32 all patients attending the department (including referrals from primary care) which may
33 have influenced these relatively inexperienced general practitioners to adopt this role and
34 rely more on diagnostic tests.(50) The influence of general practitioners' special interests,
35 experience in emergency medicine or the effect of staff shortages were not described in the
36 literature to affect this potential role shift.
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48 **Theory 2b: Extended general practitioner role**

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52 *General practitioners in emergency departments can work in an 'extended role', outside the*
53 *scope of usual practice, where their skills are directed at specific patient groups including*
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3 *non-urgent paediatric or elderly patients (C) to treat using the usual primary care approach*
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5 *(M) to reduce the use of hospital resources and admissions in these patient groups*
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7 *(O).(5,29,51–53)*
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10 Several paediatric primary studies supported general practitioners treating children
11 triaged as ‘non-urgent’ to divert attendances from the emergency department,(52,53) and
12 reduce hospital admissions.(5,51) None of the included primary studies described general
13 practitioners specifically treating care home residents or the elderly, as suggested in a policy
14 document.(29)
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21 Smith et al. reported an increase in antibiotic prescribing for children by general
22 practitioners,(5) which could potentially be an unintended consequence of the ‘traditional
23 role’ approach, relying on clinical acumen and treating a suspected source of infection
24 rather than admitting, investigating and observing the patient to confirm the diagnosis. An
25 increase in prescribing by general practitioners was not described in other United Kingdom
26 studies,(4,26) but was reported (but not the drugs involved) in both Irish studies that
27 involved more junior general practitioners.(42,50)
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37 There was evidence that general practitioners working in or alongside emergency
38 departments see a different cohort of patients to that in usual general practice, with more
39 acutely unwell patients,(33,84) and minor injuries,(4,6,33,35–37,85,86) which could also be
40 described as an ‘extended role.’ There was no evidence in the included studies for the
41 implications of this on their skillset, learning needs, cognition processes or risk management
42 behaviour.
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Theory 2c: Gatekeeper role

General practitioners can use their generalist skills and knowledge of community resources (M) to redirect patients presenting with primary care problems (C) back into the community for treatment thereby reducing emergency department attendances (O). (54,55)

There were limited data to support this theory with two London case study reports identified in an “A&E avoidance” scheme document, describing 228 patients in total.(54,87) There was evidence that general practitioners were more likely to redirect patients after an initial assessment than senior emergency department nurses, but only from a sample of 384 patients that self-presented to a London emergency department.(55)

Due to a lack of evidence for general practitioners performing a redirection role, following realist methodology, we also included studies involving redirection of patients from the emergency department by a senior emergency department clinician or nurse to gain understanding about how and why the system worked. Many of these articles described reduced emergency department attendances.(88–94) Previous United Kingdom guidance has cautioned redirecting patients from emergency departments due to the risk of delayed assessment and treatment, especially in vulnerable patient groups including the homeless or those with mental health problems who may not go on to receive the care they need.(14,29) Studies from Scotland, Sweden and the United States that described a comprehensive assessment process involving measurement of vital signs and a focussed history, reported that their redirection policies were safe and worked well to reduce attendances.(66,89,91,93,94) Other United States studies, that did not describe the assessment process, reported adverse events when children were redirected without treatment.(95,96) The low sensitivity of triage criteria to identify those that needed urgent

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3 care,(97) especially infants,(98) and failure to validate a predictive model for refusal of
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5 care,(99) were highlighted in other studies.
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10 **Theory 3: Patient satisfaction**

11 *Patients with primary care problems that present to emergency departments (C) and are*
12 *seen by general practitioners, are more satisfied with the care they receive (O) if the*
13 *experience exceeds expectation (M), but if they do not perceive any difference in the care*
14 *they received compared to what they expected (M), there is no difference in satisfaction*
15 *(O).(27,38,42,44,56–60)*
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23 Data to support this theory were limited, with an increase in satisfaction by patients
24 seen by general practitioners generally associated with shorter waiting times,(44,56) rather
25 than expectation of investigation and treatment.(38) The general practitioners were
26 sometimes supernumerary which may have contributed towards this.(27,44) Other studies
27 demonstrated that general practitioners focused more on patient education and counselling
28 than emergency department clinicians with some improvement in satisfaction
29 rates.(100,101) In more fully integrated models, the patient was often unaware that they
30 had seen a general practitioner rather than an emergency department clinician and there
31 was no difference in patient satisfaction.(27,38,42,57)
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46 **Theory 4: Safety implications**

47 *Patients with primary care problems that present to emergency departments (C) can be*
48 *appropriately and safely managed by general practitioners (M), so that emergency*
49 *department staff are free to appropriately and safely manage seriously unwell patients (O).*
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3 There were minimal data on the safety implications of general practitioners working
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5 in the emergency department setting. Several studies used emergency department re-
6
7 attendance as a marker of safety, with no increase among patients seen by general
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9 practitioners compared to usual emergency department staff. (27,28,42,102,103) Annual
10
11 death rates were used as another crude marker in a Dutch study, with no significant
12
13 increase following the introduction of an out-of-hours primary care physician
14
15 cooperative.(63) Shared or separate governance systems between primary care and the
16
17 emergency department were rarely described in the primary studies, providing no evidence
18
19 for best practice. Single entry co-located emergency department models were reported to
20
21 promote good communication and integration in some studies,(4,27,33,84) with anecdotal
22
23 reports of communication positively and negatively affecting care quality in others.(33,53)
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28 There was a lack of evidence that co-located primary care services directly or
29
30 indirectly improved care for the sickest patients. A reduction in time spent in the
31
32 department for patients requiring emergency department level care was suggested in a
33
34 United Kingdom simulation and modelling study,(104) and an Australian study also reported
35
36 a reduced mean time taken to see more seriously ill patients but this was not seen on sites
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38 that described provider-induced demand.(105) A Canadian study of over 4 million patient
39
40 visits reported that low complexity emergency department patients did not increase time to
41
42 first physician contact for high-complexity patients.(106) Other studies also described how
43
44 diverting non-urgent patients did not improve the high level care required by others, and
45
46 that influences such as delayed transfer of patients to the ward were more likely to
47
48 contribute to overcrowding.(43,107–109) Staffing levels, staff attitude and the time of day
49
50 were independent factors described to affect emergency department flow.(110)
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Theory 5: The risk of provider-induced demand

If patients with primary care type problems present to emergency departments (C) and are streamed to indistinct primary care services, without patient awareness or choice (M), there is no provider-induced demand (O).(4,28,62,63) However, distinct urgent primary care services may offer convenient access to primary care (M), resulting in provider-induced demand (O).(61,64–72)

Four articles described fully integrated models, where non-urgent patients were streamed directly to primary care services without provider-induced demand.(4,28,62,63). Here, there was no patient choice offered and often a lack of patient awareness. Another 10 articles described distinct urgent primary care services as duplicating services and creating their own demand, increasing patient presentation rates directly or at nearby services, rather than relieving pressure on the emergency department.(61,64,112,113,65–67,69–72,111)

Theory 6: Cost-effectiveness

If there is demand for patients with primary care problems presenting to emergency departments (C), and they are streamed to an onsite primary care services and managed by a traditional general practitioner approach (M), the service is cost-effective due to fewer referrals, admissions, investigations and better outcomes compared to usual services (O).(27,42,48)

Data to support this theory were limited, but supported by three economic evaluations (UK, Ireland and The Netherlands) where non-urgent patients were streamed to general practitioners during normal daytime hours.(27,42,48) The comparator was 'business as usual' with no general practitioner service. The United Kingdom and Irish studies were

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3 published in 1996 and may not represent current emergency department staffing models.
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5 No articles were identified that studied the relative cost-effectiveness of general
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7 practitioners redirecting patients from the emergency department for care elsewhere. A 5-
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9 year USA redirection study calculated cost-effectiveness from the perspective of the
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11 institution but did not include costs for treatment incurred elsewhere,(91) whilst another
12
13 United States study calculated that marginal costs for non-urgent visits to the emergency
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15 department were low and that cost savings from diverting visits may be less than widely
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17 believed.(114) However the USA has a complex health system, with a significant majority of
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19 the population covered by private health insurance alongside state funded Medicare,
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21 Medicaid, the Federally-funded Veterans Health Administration, and a substantial uninsured
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23 population - all factors which could influence access to emergency departments and the
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25 type of care needed and delivered.
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31 Three other studies of 'out-of-hours' patients did not find the addition of a primary
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33 care service to be cost saving. One Dutch study, with an off-site general practitioner co-
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35 operative, reported parents refusing to take the child to a different location, or the triage
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37 nurse overruling the policy.(41) Another 12 year old Dutch study showed no change in costs,
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39 despite a substantial reduction in emergency department attendances, due to regulations
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41 dictating minimum staffing levels to cope with major trauma.(75) The Dutch health care
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43 system has a complex funding structure with a mix of social and private insurance and this
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45 may influence incentives and disincentives to access emergency departments. An Australian
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47 primary care out-of-hours service closed because patients chose to attend an equally
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49 accessible general practice service that existed nearby.(39)
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Wider system implications

Limited, largely anecdotal evidence from the included studies prevented us developing theories on wider system implications. There were no reports of emergency department clinicians encouraged to adopt a more conservative approach, as a result of working alongside general practitioners, but some reports of general practitioners in management positions influencing system changes.(115,116) The potential reduction in learning opportunities for junior doctors was highlighted in two articles.(49,84) There was limited evidence that working in an emergency department setting led to increased job satisfaction for some United Kingdom general practitioners with a special interest in emergency care.(33,116) However, reduced satisfaction was also described because the job was outside the scope of usual general practice,(33,47) possibly contributing towards recruitment problems.(33,117)

Discussion

Principal findings

We developed theories using data from 96 articles to explain how contextual factors are linked to outcomes: about the streaming process itself; the role general practitioners may adopt in the emergency department setting; and the effects of these on the patient (experience and safety) and the organisation (risk of provider-induced demand and costs). There was little evidence that general practitioners in emergency departments directly or indirectly affected the care and throughput of the sickest patients. Distinct services may offer an attractive alternative to primary care and result in provider-induced demand. The literature describing economic impacts of general practitioners in emergency departments

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3 comes from different countries, with different funding systems and spans over 20 years,
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5 limiting conclusions.
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8 **Strengths and limitations**

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10 Heterogeneous studies involving general practitioners working in or alongside
11 emergency departments do not suit traditional systematic review methods. We have
12 conducted the first realist review in this area, methods that are gaining prominence in
13 healthcare research.(118,119) Specifically, we adopted the “rapid realist review” method,
14 which includes a reference group of knowledge users and external experts, to provide policy
15 makers with context specific evidence, quantification of existing knowledge and a summary
16 of evidence gaps.(24) It identifies context, mechanisms and outcomes, including tensions in
17 the evidence base, to suggest how a service is likely to work, for whom, in what
18 circumstances and why.(21) The rapid realist review approach is appropriate in relation to
19 the rapidly evolving NHS policy on emergency department use of general practitioners, (10–
20 12) showing where such policies may be reinforced or refuted by the evidence available.(24)
21
22 A weakness of our study was the time constraints of our project but the expert opinion via
23 the reference group mitigated this, and enabled us to focus and direct our research.(24)
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25 Some studies did not describe the intervention in adequate depth to help facilitate the
26 identification of key mechanisms. Also, the nature of different healthcare and funding
27 systems limited international comparability.(21)
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50 **Comparison with other reviews**

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52 Before our review, the largest review to date by Ramlakhan et al. (2016) included 20
53 papers and described provider-induced demand, poor evidence for improved emergency
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3 department throughput and minimal economic impact.(17) The Goncalves-Bradley et al.
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5 Cochrane review of four studies, published in 2018, highlighted inconsistent results and a
6
7 lack of evidence on safety.(18) We also found evidence of provider-induced demand in
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9 distinct primary care units but less so in more fully integrated service models where patients
10
11 lacked awareness that they had been directed to primary care services.(4,62,63) We found
12
13 that patients with primary care problems may have reduced process times if treated by
14
15 general practitioners adopting a traditional role but there was a lack of evidence for the
16
17 improved care of seriously unwell patients in the department. There was also a lack of
18
19 evidence on the impact on general practitioners' cognition processes and risk-taking
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21 behaviour when treating a different group of patients to that seen in usual general practice
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23 and the safety implications of this.
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30 **Policy implications**

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32 The global health priority recently given to Universal Health Coverage,(120) and the
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34 attention being given to the 40th anniversary of the Alma Ata declaration,(121) moves to
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36 centre stage the design of primary healthcare systems, particularly their capacity and
37
38 capability to respond to urgent care needs. Internationally, emergency departments are
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40 exploring options on how to run more efficiently and safely. Our theories, informed by
41
42 literature from 13 high-income countries, allow policy makers to make more considered
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44 judgements about their relevance to their own contexts for service provision. The United
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46 Kingdom has already commissioned further research in this area, funded by the National
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48 Institute for Health Research (HS&DR Projects: 15/145/04(32) and 15/145/06(122)), the
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50 former collecting primary data to further test and refine these theories.
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Conclusion

The effectiveness of emergency department streaming to primary care services may be influenced by how staff interpret the streaming system and the roles general practitioners adopt. Caution is needed in embedding the policy until further evaluation is available. Service models that encourage the traditional general practitioner approach may have shorter process times; however, there is little evidence on the safety implications or whether this improves care for the sickest patients. Distinct primary care services offering increased patient choice may result in provider-induced demand. Economic evaluation requires further research.

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Contributors

All authors are co-applicants on the wider project and were involved in the conceptualisation of the study. AC and FD planned the synthesis approach with input from AE. The core review team AP, PA, BE, BH, JD and ACS then met via teleconference every 6 weeks to discuss findings and guide further searches. AC conducted the database searches. AC and FD extracted data extracts and were involved in the synthesis process, meeting weekly with AE and ME to discuss findings. AC prepared the first draft of the manuscript which was reviewed and critically appraised by all authors.

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Competing interests

None declared

Data sharing statement

No further data available

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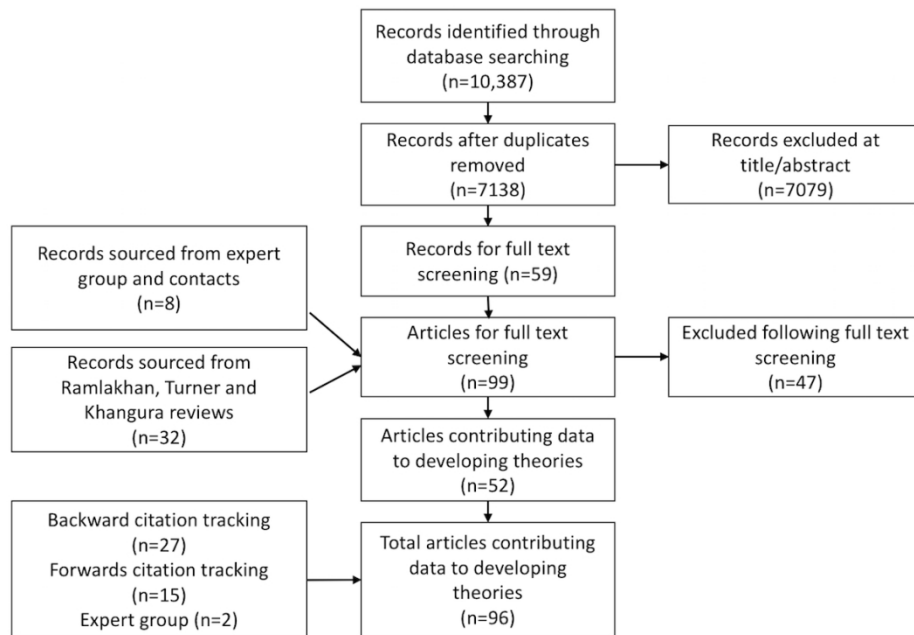


Figure 1: Search strategy and results

112x76mm (300 x 300 DPI)

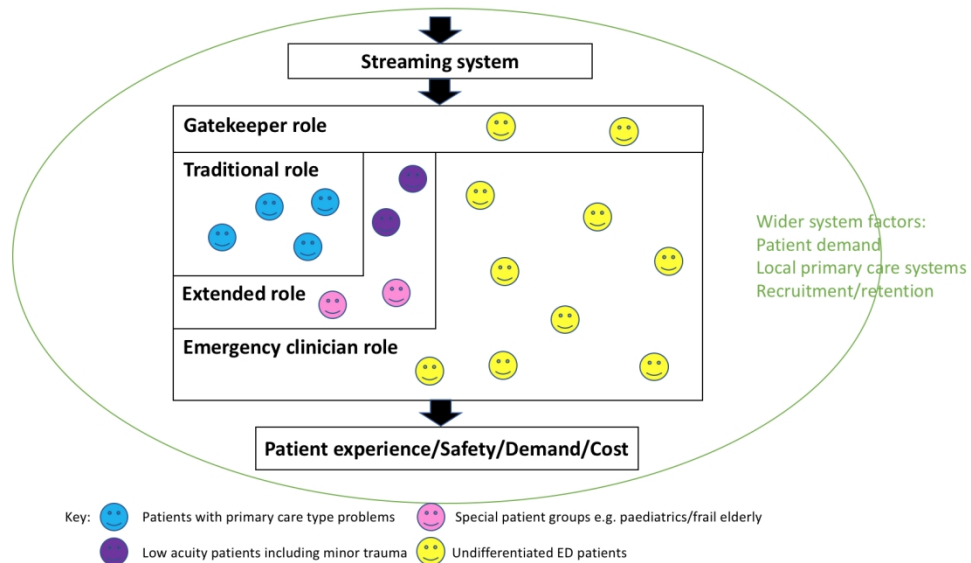


Figure 2: Potential roles general practitioners may adopt in the emergency department setting, influenced by the streaming system and impacting on outcomes

148x86mm (300 x 300 DPI)

Supplementary file 1: Search Strategy for Medline (adapted for other databases)

1. exp Primary Health Care/
2. primary care.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
3. exp Physicians, Family/
4. exp Physicians, Primary Care/
5. family physician*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
6. exp Family Practice/
7. family practic*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
8. GP.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
9. exp After-Hours Care/
10. (after-hours care or out of hours or out-of-hours or OOH).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
11. exp General Practitioners/
12. general practic*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
13. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12
14. exp Emergency Medical Services/
15. exp Emergency Service, Hospital/
16. emergency department*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
17. (accident and emergenc*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
18. casualt*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]

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4 19. emergency room.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword
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Supplementary file 2: Articles that contributed data to theory development (listed chronologically by Country)

| Lead author | Country | Title | Study Design |
|----------------|---------|--|---|
| Ablard 2017 | UK | Primary care services co-located with Emergency Departments across a UK region: early views on their development | Survey and semi-structured interviews |
| Bentley 2017 | UK | Emergency Department redirection to primary care: a prospective evaluation of practice | Prospective evaluation of the subsequent management and outcome of redirected non-urgent patients from a Scottish ED over 2 months |
| Dale 2017 | UK | Extended training to prepare GPs for future workforce needs: a qualitative investigation of a one-year fellowship in urgent care | Qualitative investigation of a one-year fellowship in urgent care |
| Tammes 2016 | UK | Exploring the relationship between general practice characteristics, and attendance at walk-in centres, minor injuries units and EDs in England 2012/2013: a cross-sectional study | Cross-sectional observational large data analysed using multivariable regression models |
| Proctor 2016 | UK | A&E Avoidance schemes across London: A rapid review of good practice examples | NHS report - 2 case studies involving redirection of non-urgent patients from the ED |
| Smith 2016 | UK | To GP or not TO GP: Evaluation of children triaged to see a GP in a tertiary paediatric emergency department | Retrospective cohort study of children classified as 'GP appropriate' seen by a GP between 14:00 and 22:00 and seen by ED staff outside these hours |
| Gnani 2016 | UK | Healthcare use among preschool children attending GP-led urgent care centres: a descriptive observational study | Retrospective observational study using routinely collected data |
| O'Cathain 2016 | UK | Variation in avoidable emergency admissions: multiple case studies of emergency and urgent care systems | Ethnographic residual analysis. Interviews with members of emergency care teams at 6 case study sites |

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| Begum 2016 | UK | Solving the A&E crisis using GP lead triage and redirection | Poster - Patient questionnaire of 150 patients over 5 weeks redirected back to the GP for treatment with an appointment made on the same day |
| Gritz 2016 | UK | More under fives now seen in urgent care centre than A&E should we shift our focus | Observational - retrospective analysis of routine operational data for attendances |
| Greenfield 2016 | UK | Staff perceptions on patient motives for attending GP-led urgent care centres in London: a qualitative study | Semi-structured interviews |
| Cowling 2015 | UK | Referral outcomes of attendances at general practitioner-led urgent care centres in London, England: retrospective analysis of hospital administrative data | Retrospective analysis of administrative data recorded at a London urgent care centre of 243042 attendances from October 2009 to December 2012 |
| Morton 2016 | UK | Describing team development within a novel GP-led urgent care centre model: a qualitative study | Staff semi-structured interviews at 2 GP-led urgent care centres in 2 London academic teaching hospitals |
| Arain 2015a | UK | Perceptions of healthcare professionals and managers regarding the effectiveness of GP-led walk-in centres in the UK | Qualitative using a phenomenological approach using semi structured interviews |
| Arain 2015b | UK | Impact of a GP-led walk-in centre on NHS emergency departments | Patient survey over a 3-week period and analysis of attendances at the local children's hospital and minor injuries unit a year before and after the WIC opened |
| Johnson 2015 | UK | Evidence of primary care services at A&E | Letter (opinion piece) Provider of 4 UCC in London supporting co-located GPs services with emergency departments |

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| NHS ECIST 2015 | UK | Primary care in emergency departments: a guide to good practice | NHS policy document - Overview of factors to be considered when planning how best to use primary care clinicians in emergency departments, monitoring and refining the service |
| Harris 2014 | UK | How do clinicians with different training backgrounds manage walk-in patients in the ED setting? | Retrospective case note review of a random sample of 384 patients that self-presented to the ED and were initially assessed by GPs or ED staff |
| Thompson 2013 | UK | Suitability of emergency department attenders to be assessed in primary care: survey of general practitioner agreement in a random sample of triage records analysed in a service evaluation project | Four GPs independently used data extracted from 765 clinical notes to rate the appropriateness for management in primary care |
| Arain 2013 | UK | Patients' experience and satisfaction with GP led walk-in centres in the UK; a cross sectional study. | Patient survey over 3 weeks in 2 GP-led WICs |
| Hunter 2013 | UK | A qualitative study of patient choices in using emergency health care for long-term conditions: The importance of candidacy and recursivity. | Questionnaire and semi-structured interviews |
| Lengu 2012 | UK | Application of simulation and modelling in managing unplanned healthcare demand | Conference paper - Simulation and modelling to assess the impact of primary care clinicians deflecting patients with non-urgent needs away from A&E |
| Carson 2010 | UK | Primary care and emergency departments | Report based on results of a literature review, web-based survey and ED visits |
| Clancy 2009 | UK | Launching a social enterprise see-and-treat service | Report outlining the service, number of patients seen and referred on in a 4-month period |
| Maheswaren 2009 | UK | Repeat attenders at national health service walk in centres | Descriptive study using routine data from 4 walk-in centres in England |

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| Sandhu 2009 | UK | Emergency nurse practitioners and doctors consulting with patients in an emergency department: a comparison of communication skills and satisfaction | Observation study with a stratified sample of 296 video-taped consultations |
| Dale 2008 | UK | The patient, the doctor and the emergency department: A cross-sectional study of patient-centeredness in 1990 and 2005 | Observational study with a stratified sample of 430 video-taped consultations with data collection in May–July 1990 and May–July 2005. |
| Salisbury 2007 | UK | The impact of co-located NHS walk-in centres on emergency departments | Controlled before and after study |
| Chalder 2007 | UK | Comparing care at walk-in centres and at accident and emergency departments: an exploration of patient choice, preference and satisfaction | A controlled, mixed-method study comparing 8 EDs with co-located WICs with the same number of “traditional” EDs. |
| Pope 2005 | UK | What do other local providers think of NHS walk-in centres? Results of a postal survey | Postal survey |
| Bickerton 2005 | UK | Streaming A&E patients to walk-in centre services | Analysis of all patients attending a London hospital over 24 hours for suitability for WIC treatment |
| Chew-Graham 2004 | UK | A new role for the general practitioners? Reframing inappropriate attenders to inappropriate services | Qualitative semi-structured staff interviews |
| Hsu 2003 | UK | Effect of NHS walk-in centre on local primary healthcare services | Before and after observational study of consultation rate in 12 general practices after the implementation of a walk-in centre |
| Salisbury 2002 | UK | What is the role of walk-in centres in the NHS? | Analysis of routinely collected data, questionnaire completed by managers followed by semi-structured interviews and site visits |
| Grant 2002 | UK | An observational study comparing quality of care in walk-in centres with general practice and NHS Direct using standardised patients | Observational study involving assessment of clinicians by standardised patients at 20 walk in centres, 20 general practices and 11 NHS direct sites |

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| Coleman 2001 | UK | Will alternative immediate care services reduce demands for non-urgent treatment at accident and emergency? | Questionnaire survey and notes review of non-urgent patients to assess the suitability of management by an alternative care service |
| McGugan 2000 | UK | Primary care or A&E? | Prospective study over 2 months of a redirection policy |
| Rajpar 2000 | UK | Study of choice between accident and emergency departments and general practice centres for out of hours primary care problems | Interview of patients attending A&E and GP out-of-hours |
| Freeman 1999 | UK | Primary care units in A and E departments in North Thames in the 1990s: Initial experience and future implications | Postal questionnaire to ED staff and local GPs with follow up staff interviews |
| Dale 1998 | UK | Primary care in accident and emergency departments: the cost effectiveness and applicability of a new model of care | PhD thesis – Includes data for included papers and additional analysis of 163 video-taped consultations |
| Ward 1996 | UK | Primary care in London: an evaluation of general practitioners working in an inner-city accident and emergency department | Prospective survey over 6 weeks |
| Dale 1996 | UK | Cost effectiveness of treating primary care patients in accident and emergency: a comparison between GPs, senior house officers and registrars | Prospective intervention study which was retrospectively costed |
| Dale 1995a | UK | Primary care in the accident and emergency department I: Prospective identification of patients | 1 year prospective study at a London ED to compare patient characteristics and consultation activities for attenders assessed by nurse triage to have 'primary care' or 'accident and emergency' type problems |
| Dale 1995b | UK | Primary care in the accident and emergency department: II. Comparison of general practitioners and hospital doctors | 1 year prospective study at a London ED to compare patient characteristics and consultation activities for attenders assessed by nurse triage to have 'primary care' or 'accident and emergency' type problems |

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| O'Kelly 2010 | Ireland | Impact of a GP cooperative on lower acuity emergency department attendances | A retrospective review of all attendances at the 'Dubdoc' service was compared with attendances at the ED for triage categories 4 and 5 of the same hospital over a 9-year period |
| Murphy 2000 | Ireland | Effect of patients seeing a general practitioner in accident and emergency on their subsequent attendance: cohort study | Analysis of reattendance of non-urgent patients that had been allocated to general practitioners or usual accident and emergency staff depending on time of registration |
| Gibney 1999 | Ireland | Randomized controlled trial of general practitioner versus usual medical care in a suburban accident and emergency department using an informal triage system | Patients 'randomised' at time of registration to either GP or ED care. Case note review |
| Murphy 1996 | Ireland | Randomised controlled trial of general practitioner versus usual medical care in an urban accident and emergency department: process, outcome and comparative cost | Randomised controlled trial of care provided by general practitioners to non-emergency patients in an accident and emergency department differs significantly from care by usual emergency staff in terms of process, outcome and cost |
| van Veelen 2016 | Netherlands | Effects of a general practitioner cooperative co-located with an emergency department on patient throughput | Pre-post comparison before and after implementation of a GP cooperative at an ED |
| Schols 2016 | Netherlands | Access to diagnostic tests during GP out-of-hours care: A cross sectional study of all GP out-hours services in the Netherlands | Cross-sectional survey of all 117 GP out of hours services in the Netherlands |
| Van-Gils-van Rooij 2016 | Netherlands | Is patient flow more efficient in urgent care collaborations? | Observational study, compared usual care with UCCs (single point of access for ED and GP OOH) |

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| van Gils-van Rooij 2015 | Netherlands | Out-of-Hours Care Collaboration between General Practitioners and Hospital Emergency Departments in the Netherlands | Observational study - comparing attendance and patient characteristics between EDs with standard care and EDs with co-located primary care and single joint triage |
| Thijssen 2013 | Netherlands | The impact on emergency department utilization and patient flows after integrating with a general practitioner cooperative: an observational study | Observational study - routinely collected data over 6 years |
| Huibers 2013 | Netherlands | GP cooperative and emergency department: an exploration of patient flows | Retrospective record review of patients who had visited GPC or ED |
| Van der Straten 2012 | Netherlands | Safety and efficiency of triaging low urgent self-referred patients to a general practitioner at an acute care post: an observational study | Prospective observational study |
| Bosmans 2012 | Netherlands | Addition of a general practitioner to the accident and emergency department: a cost-effective innovation in emergency care | Observational study before and after implementation of new service |
| Van Veen 2012 | Netherlands | Van Veen referral of non-urgent children from the emergency department to general practice: compliance and cost savings | Prospective observational before after study |
| Van Veen 2011 | Netherlands | Safety of the Manchester Triage System to identify less urgent patients in paediatric emergency care: a prospective observational study | Analysis of the hospitalisation rate of self referred children triaged as non-urgent |
| Boeke 2010 | Netherlands | Effectiveness of GPs in accident and emergency departments | Observational study before and after implementation of new service |
| Kool 2008 | Netherlands | Towards integration of general practitioner posts and accident and emergency departments: a case study of two integrated emergency posts in the Netherlands | Observational study comparing contacts, patient satisfaction and staff satisfaction pre-and post set up of a 2 co-located GP OOHs and 2 control sites |

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| Giesen 2006 | Netherlands | Patients either contacting a general practice cooperative or accident and emergency department out of hours: a comparison | Retrospective record review |
| Van Uden 2006 | Netherlands | Out-of-hours primary care. Implications of organisation on costs | Annual reports of 2 GP co-operatives (1 co-located, 1 separate) analysed together with ED costs |
| Van Uden 2005 | Netherlands | The Impact of a Primary Care Physician Cooperative on the Caseload of an Emergency Department: The Maastricht Integrated Out-of-Hours Service | Observational study, patient characteristics collected for 3 weeks in Jan/Fen 1998 and March 2001 (co-operative set up in 2000) |
| Van Uden 2004 | Netherlands | Does setting up out of hours primary care cooperatives outside a hospital reduce demand for emergency care? | Before and after observational study |
| Van Uden 2003 | Netherlands | Use of out of hours services: a comparison between two organisations | Observational study of patient contacts at 2 different OOH centres and their associated EDs (1 co-located, 1 not) |
| Colliers 2017 | Belgium | Implementation of a general practitioner cooperative adjacent to the emergency department of a hospital increases the caseload for the GPC but not for the emergency department | Quasi-experimental study analysing the implementation of 2 out of hours general practitioner co-operatives one adjacent to the ED, the other not and 2 control sites |
| Van den Heede 2016 | Belgium | The 2016 proposal for the reorganisation of urgent care provision in Belgium: A political struggle to co-locate primary care providers and emergency departments | Outline of the 2016 political proposal for the reorganisation of urgent care provision toned down due to GP opposition |
| Ellbrant 2015 | Sweden | Paediatric emergency department management benefits from appropriate early redirection of non-urgent visits | Prospective observational study using ED records and case notes |
| Krakau 1999 | Sweden | Provision for clinic patients in the ED produces more nonemergency visits | Before and after observational study |

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| Hansagi 1987 | Sweden | Trial of a method of reducing inappropriate demands on a hospital emergency department. | Prospective observational study of 454 patients classified as non-urgent by the ED and redirected to alternative care over a 3-month period |
| Chmiel 2016 | Switzerland | Implementation of a hospital-integrated general practice – a successful way to reduce the burden of inappropriate emergency-department use | Longitudinal observational study |
| Hess 2015 | Switzerland | Satisfaction of health professionals after implementation of a primary care hospital emergency centre in Switzerland: A prospective before-after study | Questionnaire study of job satisfaction before and after a new emergency care model was implemented in Switzerland |
| Wang 2014 | Switzerland | Hospital integrated general practice: a promising way to manage walk in patients | Pre and post comparison study before and after implementation of a new hospital-integrated general practice model |
| Chmiel 2011 | Switzerland | Walk-ins seeking treatment at an emergency department or general practitioner out-of-hours service: a cross-sectional comparison | Analysis of routinely collected data of 2974 patient encounters attending a GPC or ED |
| Posocco 2017 | Italy | Role of out of hours primary care service in limiting inappropriate access to emergency department | Retrospective analysis of 408 ED referrals from a local OOH service |
| Kork 2016 | Finland | Improving access and managing healthcare demand with walk in clinic: convenient but at what cost? | Observational study over 48 months of the characteristics of 107 frequent attenders at a WIC from electronic patient records |
| Allen 2015 | Australia | Low acuity and general practice type presentations to emergency departments: A rural perspective | Analysis of GP type presentations to 2 rural EDs over a 4-month period |
| Desborough 2013 | Australia | Development and implementation of a nurse-led walk-in centre: evidence lost in translation? | Evaluation of the first 12 months of operation of the first Australian public nurse-led primary care walk-in centre compared to the English NHS model. |

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| Nagree 2013 | Australia | Quantifying the proportion of general practice and low-acuity patients in the emergency department | Four methods for calculating general practice-type patients were compared for 3 tertiary EDs in Perth, Australia in 2009-2011 |
| Sharma 2011 | Australia | Impact of co-located general practitioner (GP) clinics and patient choice on duration of wait in the emergency department | Mathematical modelling of wait times using routine ED data |
| Richardson 2009 | Australia | Myths versus facts in emergency department overcrowding and hospital access block. | Report referencing previous work |
| Bolton 2001 | Australia | The reasons for, and lessons learned from, the closure of the Canterbury GP After-Hours Service. | Report describing why a 12-month trial of GP staffed after hours service with an ED was not continued because the opportunity cost was greater than existing alternative services |
| Doran 2013 | USA | An intervention connecting low acuity emergency department patients with primary care: Effect on future primary care linkage | Analysis of primary care follow up of patients presenting to ED assessed to have non-urgent problem and referred to an onsite primary care clinic |
| Williams 1996 | USA | The costs of visits to emergency departments. | Analysis of emergency department charges and costs based on data from 6 community hospitals |
| Gadomski 1995 | USA | Diverting managed care Medicaid patients from pediatric emergency department use. | 6-month follow up of Medicaid children with non-emergent conditions not authorised to be seen in the Pediatric Emergency Department by their primary care provider |
| Derlet 1995 | USA | Prospective identification and triage of nonemergency patients out of an emergency department - 5 year study | 5 year study to analyse the outcome of adult patients refused care in the ED |
| Derlet 1992 | USA | Triage of patients out of the emergency department: three year experience. | 3 year study to analyse the outcome of adult patients refused care in the ED |

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| Birnbaum 1994 | USA | Failure to validate a predictive model for refusal of care to emergency-department patients. | Analysis of the outcome of 534 patients that met the pre-established criteria for refusal of care |
| Lowe 1994 | USA | Refusing care to emergency department patients: evaluation of published triage guidelines. | Case note review of 106 patients who would have been refused care according to triage guidelines |
| Shaw 1990 | USA | Indigent children who are denied care in the emergency department. | Six-month prospective study of 588 children denied care in the emergency department |
| Rivara 1986 | USA | Pediatric nurse triage: its efficacy, safety and implications for care. | Evaluation of emergency room triage of 748 children over a 6-week period at a large urban children's hospital that routinely referred outside of the institution for care |
| Schull 2007 | Canada | The Effect of Low-Complexity Patients on Emergency Department Waiting Times | Analysis of 4.1 million patient visits over a 1 year period (2002-3) and 110 EDs of the effect of low-complexity patients on time of physician contact of high complexity patients |
| Vertesi 2004 | Canada | Does the Canadian Emergency Department Triage and Acuity Scale identify non-urgent patients who can be triaged away from the emergency department? | Retrospective database audit in an urban referral hospital ED. |
| Hutchison 2003 | Canada | Patient satisfaction and quality of care in walk-in clinics, family practices and emergency departments: the Ontario Walk-In Clinic Study. | Prospective cohort study of the quality of care of 8 common acute conditions and patient satisfaction |
| Anantharaman 2008 | Singapore | Impact of health care system interventions on emergency department utilisation and overcrowding in Singapore | Retrospective analysis of attendances at six main public EDs over 32 years |
| Wilson 2005 | New Zealand | Co-locating primary care facilities within emergency departments: brilliant innovation or unwelcome intervention into clinical care? | Report reviewing a proposal to co-locate a primary care facility within the local emergency department |

For peer review only

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Research checklist: RAMESES publication standards for realist syntheses(25)

List of items to be included when reporting a realist synthesis

| TITLE | | | Reported on page |
|--------------|---------------------------------------|---|------------------|
| 1 | | In the title, identify the document as a realist synthesis or review - | 1 |
| ABSTRACT | | | |
| 2 | | While acknowledging publication requirements and house style, abstracts should ideally contain brief details of: the study's background, review question or objectives; search strategy; methods of selection, appraisal, analysis and synthesis of sources; main results; and implications for practice. | 1-2 |
| INTRODUCTION | | | |
| 3 | Rationale for review | Explain why the review is needed and what it is likely to contribute to existing understanding of the topic area. | 3-4 |
| 4 | Objectives and focus of review | State the objective(s) of the review and/or the review question(s). Define and provide a rationale for the focus of the review. | 3-4 |
| METHODS | | | |
| 5 | Changes in the review process | Any changes made to the review process that was initially planned should be briefly described and justified. | n/a |
| 6 | Rationale for using realist synthesis | Explain why realist synthesis was considered the most appropriate method to use. | 5-6 |

| TITLE | | | Reported on page |
|---------|--------------------------------------|---|------------------|
| 7 | Scoping the literature | Describe and justify the initial process of exploratory scoping of the literature. | 7 |
| 8 | Searching processes | While considering specific requirements of the journal or other publication outlet, state and provide a rationale for how the iterative searching was done. Provide details on all the sources accessed for information in the review. Where searching in electronic databases has taken place, the details should include, for example, name of database, search terms, dates of coverage and date last searched. If individuals familiar with the relevant literature and/or topic area were contacted, indicate how they were identified and selected. | 7 |
| 9 | Selection and appraisal of documents | Explain how judgements were made about including and excluding data from documents, and justify these. | 8 |
| 10 | Data extraction | Describe and explain which data or information were extracted from the included documents and justify this selection. | 8 |
| 11 | Analysis and synthesis processes | Describe the analysis and synthesis processes in detail. This section should include information on the constructs analyzed and describe the analytic process. | 8 |
| RESULTS | | | |
| 12 | Document flow diagram | Provide details on the number of documents assessed for eligibility and included in the review with reasons for exclusion at each stage as well as an indication of their | Figure 1 |

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| | | source of origin (for example, from searching databases, reference lists and so on). You may consider using the example templates (which are likely to need modification to suit the data) that are provided. | |
| 13 | Document characteristics | Provide information on the characteristics of the documents included in the review. | 9 And supplementary file 2 |
| 14 | Main findings | Present the key findings with a specific focus on theory building and testing. | 9-20 |
| DISCUSSION | | | |
| 15 | Summary of findings | Summarize the main findings, taking into account the review's objective(s), research question(s), focus and intended audience(s). | 20 |
| 16 | Strengths, limitations and future research directions | Discuss both the strengths of the review and its limitations. These should include (but need not be restricted to) (a) consideration of all the steps in the review process and (b) comment on the overall strength of evidence supporting the explanatory insights which emerged. The limitations identified may point to areas where further work is needed. | 21 |
| 17 | Comparison with existing literature | Where applicable, compare and contrast the review's findings with the existing literature (for example, other reviews) on the same topic. | 21-22 |
| 18 | Conclusion and | List the main implications of the findings and place these in the context of other | 23 |

| TITLE | | | Reported on page |
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| | recommendations | relevant literature. If appropriate, offer recommendations for policy and practice. | |
| 19 | Funding | Provide details of funding source (if any) for the review, the role played by the funder (if any) and any conflicts of interests of the reviewers. | 24 |

BMJ Open

The impact of general practitioners working in or alongside emergency departments: a rapid realist review

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| Journal: | <i>BMJ Open</i> |
| Manuscript ID | bmjopen-2018-024501.R1 |
| Article Type: | Research |
| Date Submitted by the Author: | 14-Dec-2018 |
| Complete List of Authors: | Cooper, Alison; Cardiff University, Division of Population Medicine Davies, Freya; Cardiff University, Division of Population Medicine Edwards, Michelle; Cardiff University, Division of Population Medicine Anderson, Pippa; Swansea University, Centre for Health Economics Carson-Stevens, Andrew; Cardiff University, Division of Population Medicine Cooke, Matthew; University of Warwick Warwick Medical School Donaldson, Liam; London School of Hygiene and Tropical Medicine Dale, Jeremy; University of Warwick, Warwick Medical School Evans, Bridie; Swansea University, Medicine Hibbert, Peter; Macquarie University Faculty of Medicine and Health Sciences, Faculty of Medicine and Health Sciences; University of South Australia Division of Health Sciences, Hughes, Thomas; John Radcliffe Hospital, Emergency Department Porter, Alison; University of Swansea, College of Medicine Rainer, Tim; Cardiff University, Division of Population Medicine Siriwardena, Aloysius; University of Lincoln, School of Health and Social Care Snooks, Helen; Swansea University Edwards, Adrian; Cardiff University, Division of Population Medicine |
| Primary Subject Heading: | Emergency medicine |
| Secondary Subject Heading: | General practice / Family practice, Health services research |
| Keywords: | Emergency Service, Hospital, Primary Health Care, General practitioners, Health Services Research |
| | |

SCHOLARONE™
Manuscripts

The impact of general practitioners working in or alongside emergency departments: a rapid realist review

Cooper A, Davies F, Edwards M, Anderson P, Carson-Stevens A, Cooke M, Donaldson L, Dale J, Evans B, Hibbert P, Hughes T, Porter A, Rainer T, Siriwardena A, Snooks H, Edwards A

Corresponding author: Dr Alison Cooper, Division of Population Medicine, Cardiff University, 5th Floor Neuadd Meirionnydd, Heath Park, Cardiff CF14 4YS

CooperA8@cardiff.ac.uk 02920 870746

Dr Alison Cooper, Cardiff University, Cardiff, UK

Dr Freya Davies, Cardiff University, Cardiff, UK

Dr Michelle Edwards, Cardiff University, Cardiff, UK

A/Prof Pippa Anderson, Swansea University, Swansea, UK

Dr Andrew Carson-Stevens, Cardiff University, Cardiff, UK

Prof Matthew Cooke, Warwick University, Coventry, UK

Prof Sir Liam Donaldson, London School of Hygiene and Tropical Medicine. London, UK

Prof Jeremy Dale, Warwick University, Coventry, UK

Dr Bridie Evans, Swansea University, Swansea, UK

Mr Peter Hibbert, Macquarie University, Sydney, Australia

Dr Thomas Hughes, John Radcliffe Hospital, Oxford, UK

A/Prof Alison Porter, Swansea University, Swansea, UK

Prof Tim Rainer, Cardiff University, Cardiff, UK

Prof Aloysius Siriwardena, Lincoln University, UK

Prof Helen Snooks, Swansea University, Swansea, UK

Prof Adrian Edwards, Cardiff University, Cardiff, UK

Keywords: Emergency Service, Hospital; Primary Health Care; General practitioners; Health Services Research

Word count: 4256

Abstract

Objectives

Worldwide, emergency healthcare systems are under intense pressure from ever-increasing demand and evidence is urgently needed to understand how this can be safely managed. An estimated 10-43% of emergency department patients could be treated by primary care services. In England, this has led to a policy proposal and £100million of funding (\$130million USD), for emergency departments to stream appropriate patients to a co-located primary care facility so they are “free to care for the sickest patients”. However, the research evidence to support this initiative is weak.

Design

Rapid realist literature review.

Setting

Emergency departments.

Inclusion criteria

Articles describing general practitioners working in or alongside emergency departments

Aim

To develop context-specific theories that explain how and why general practitioners working in or alongside emergency departments affect: patient flow; patient experience; patient safety; and the wider healthcare system.

Results

Ninety-six articles contributed data to theory development sourced from earlier systematic reviews, updated database searches (Medline, Embase, CINAHL, Cochrane DSR & CRCT, DARE, HTA Database, BSC, PsycINFO and SCOPUS), and citation tracking. We developed theories to explain: how staff interpret the streaming system; different roles general

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3 practitioners adopt in the emergency department setting (traditional, extended, gatekeeper
4 or emergency clinician); and how these factors influence patient (experience and safety)
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6 and organisational (demand and cost-effectiveness) outcomes.
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10 **Conclusions**

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12 Multiple factors influence the effectiveness of emergency department streaming to general
13 practitioners; caution is needed in embedding the policy until further research and
14
15 evaluation are available. Service models that encourage the traditional general practitioner
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17 approach may have shorter process times for non-urgent patients; however, there is little
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19 evidence that this frees up emergency department staff to care for the sickest patients.
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21 Distinct primary care services offering increased patient choice may result in provider-
22
23 induced demand. Economic evaluation and safety requires further research.
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30 **Trial registration**

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32 Prospero ID=CRD42017069741

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38 **Strengths and limitations of this study**

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- A realist approach to evidence synthesis leads to theory development that explains how and why context links to outcome; contextual factors can then be incorporated into the evidence base to inform healthcare management and policy making.
 - We used experts and stakeholders to facilitate the process, help confirm findings and produce a context-specific document in response to emerging issues.
 - Some studies did not describe how general practitioners worked in adequate depth to identify key mechanisms that led to the outcomes.

- We have focussed on general practitioners treating patients in emergency department settings relevant to the UK healthcare system; patient demographics and other healthcare professionals working in primary care services may vary and influence the effectiveness of these services.

For peer review only

The impact of general practitioners working in or alongside emergency departments: a rapid realist review

Background

Worldwide, emergency healthcare systems are under intense pressure from ever increasing demand. (1) Evidence is urgently needed to understand how best to manage this demand whilst safely achieving the highest standards of care.(2) An estimated 10-43% of patients attending hospital emergency departments could be treated in primary care settings.(3–9) In England, this has led to a policy proposal, supported by £100million of funding (\$130million USD), that all emergency departments have a co-located primary care facility, so they are “free to care for the sickest patients”. (10–12)

The United Kingdom (UK) has a universal healthcare system, the National Health Service (NHS), funded through taxation.(13) Primary care is led by general practitioners, community-based doctors with generalist training. General practitioners are described as working in or alongside emergency departments in three main ways: treating patients identified as having primary care type problems in a unit alongside the emergency department including walk-in centres, urgent care centres or out-of-hours services; treating patients inside the emergency department which may include patients presenting with a wider range of conditions; or working at the front door of the emergency department, redirecting patients with primary care type problems to an alternative primary care service off site (including pharmacists, opticians, or back to their own general practitioner).(14) There is little research evidence to guide decisions about how general practitioners most effectively work within these service models. The risk of provider-induced demand, potential patient safety issues and how to recruit a workforce for this initiative are also unclear.(15–19) Due to this uncertainty, the main standard setting body of the NHS (NICE),

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3 does not currently recommend general practitioners work in emergency department
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6 settings.(20)
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8 Research studies addressing these questions are heterogeneous and few are
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10 conducted at scale.(15–17) This limits the results of traditional synthesis methods to shape
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12 practice or policy. Realist methods offer an alternative approach, generating theories to
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14 explain why a particular intervention is likely to work, how, for whom, in what
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16 circumstances, and why.(21) These methods identify the important contextual factors that
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18 facilitate or inhibit desired intervention outcomes to inform healthcare management and
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20 policy making.(22) Urgent and emergency care settings vary in geographical location, the
21
22 type of patients, the presenting conditions and the experience and disciplines of the
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24 healthcare professionals that treat them. We decided that a realist approach, aiming to
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26 explain how general practitioners work in or alongside different emergency department
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28 settings and why the resultant successes or failures occur, would be more informative than
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30 a traditional review approach.
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37 Our research question was, “Why and how do general practitioners working in or
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39 alongside emergency departments affect: patient attendance and flow; patient experience;
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41 patient safety; and the wider healthcare system?”
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Box 1: Glossary of terms

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| Primary care type problem | A condition that a typical general practitioner in a typical general practice would be expected to manage. |
| Streaming | A system, following brief clinical assessment, to allocate patients to the most appropriate healthcare provider within the emergency department setting.(23) |
| Triage | Identifying acuity, and prioritising patients on that basis.(23) |
| Redirection | “Sending people away” to an appropriate off site or separately managed service.(23) |
| Context (C) | Pre-existing conditions which influence the success or failure of different interventions or programmes. (21,24) |
| Mechanism (M) | The intervention and people’s reaction to it; how does it influence their reasoning? (21,24) |
| Outcome (O) | Intended and unintended results as a result of a mechanism operating within a context. (21,24) |
| Initial theory | An early theory informed by available evidence describing why, how and for whom the intervention is thought to work using a context-mechanism-outcome configuration. (21,24) |
| Refined theory | An initial theory that has been refined using primary or secondary evidence. (21,24) |

Method

We followed the realist review methodology to identify mechanisms (M) that explain how or why contexts (C) relate to outcomes (O), to generate *theories* described as context-mechanism-outcome configurations.(21) (Specific terminology is defined in Box 1.) Our focus was specifically on general practitioners working in or alongside emergency departments. We used the rapid realist review approach described by Saul et al. which utilises experts and stakeholders to streamline the process and to produce a context-specific product that is useful to policy makers and responsive to emerging issues; providing evidence and making explicit what is known on the given topic, also articulating the current research gaps.(25) We registered our protocol on the Prospero database (http://www.crd.york.ac.uk/PROSPERO/display_record.php?ID=CRD42017069741) and

1
2
3 followed RAMESES publication standards for realist reviews.(26) The period of study was
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5 April – November 2017.
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8 Three reviewers (AC, FD and ME) conducted a scoping exercise with the four United
9
10 Kingdom papers identified in the review by Ramlakhan et al.(4,27–29) and two policy
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12 documents,(14,30) to generate *initial theories*. We then developed and piloted data
13
14 extraction forms. Our theories were developed at the *micro-level* (the reasoning processes
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16 of general practitioners, emergency department staff and patients), *meso-level* (staff
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18 interactions resulting in department level outcomes) and *macro-level* (the impact on the
19
20 wider system).(31)
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25 We discussed these initial theories with the wider study team of 18 collaborators,
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27 including emergency department clinicians, policy makers, general practitioners, members
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29 of the public and methodologists at a study meeting in May 2017. We used them as an
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31 expert reference group, to contribute ideas for other possible initial theories and to identify
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33 further research papers in peer-reviewed journals and relevant reports in the grey
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35 literature. Six members of this group (AP, PA, BE, BH, JD, ACS) met via teleconference every
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37 six weeks to discuss findings and guide priority search areas.
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42 We used papers referenced in three previous systematic reviews as a starting
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44 point,(15–17) and to identify papers published since, we combined search terms used
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46 previously.(16,17) A combination of free text and Medical Subject Headings (MeSH) terms
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48 was used (see supplementary file 1 for Medline strategy which was adapted for other
49
50 databases). AC ran the searches on the following databases from 15th June – 4th July 2017:
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52 Medline via OVID, Embase, CINAHL, Cochrane DSR & CRCT, DARE, HTA Database, Business
53
54 Source Complete, PsycINFO and SCOPUS and used Endnote X8 (Clarivate analytics) to export
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56 citations from the database searches and identify duplicates. AC screened the titles and
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3 abstracts of all identified papers using a checklist, developed and tested in collaboration
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5 with FD, which ranked abstracts according to relevance.
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8 We selected studies if they could contribute to the process of theory development at
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10 the level of individual data extracts rather than assessing the full text against a set
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12 checklist.(26,32) We excluded papers that lacked relevance or explanatory power, or were
13
14 unavailable in English. AC and FD imported data extracts into NVivo 11 (QRS international)
15
16 that evidenced how mechanisms (M), influenced by local contexts (C), related to outcomes
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18 (O). Quantitative, qualitative or contextual data were extracted from any part of a paper.
19
20 We continually considered the relevance and rigour of each included piece of evidence
21
22 during the data extraction and synthesis phases.(32) We discussed weekly within the team
23
24 (AC, FD, ME, AE) how individual data extracts should be used to ensure appropriate
25
26 inferences were made.(32) A quarter of all included articles was read by both reviewers,
27
28 and the coding process was discussed in detail, to ensure consistency of approach.
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35 We used snowballing techniques (such as searching companion papers and citation
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37 tracking) for all included articles. We also searched to identify additional relevant grey
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39 literature (including policy documents and opinion pieces) from a variety of sources. The
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41 search process was iterative, overlapping with data extraction and analysis, and was
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43 directed towards the evidence gaps and finding explanatory information.
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47 We applied Pawson's reasoning processes,(21) to synthesise the evidence and develop
48
49 our theories. We presented these context-specific *developing theories* to our expert
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51 reference group in November 2017. At this stage, the group recognised that although the
52
53 review had been useful in theory development, there were limited opportunities for theory
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55 testing and refinement due to evidence gaps. Rather than continuing to search the
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57 literature, we decided that gathering primary data from our evaluation case study sites in
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3 the next phase of our wider ongoing study,(33) would give more meaningful testing to
4
5 derive *refined theories*.(21)
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10 **Patient and public involvement**

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12 Three public contributors (BE, BH, JH) were co-applicants for the funded research
13 and contributed to the conceptualisation of our wider study, including theory generation
14 through the review.(33) They contributed in both meetings described above to ensure that
15 the patient's perspective was acknowledged and at a stakeholder dissemination event in
16 February 2018.
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26 **Results**

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28 Figure 1 shows the search strategy and results. A total of 96 articles contributed to
29 the developing theories. The articles were largely primary research studies, most from the
30 UK (n= 44 articles), with a large contribution from The Netherlands (n=17). Others were
31 from Ireland, Belgium, Switzerland, Sweden, Italy, Finland, Australia, USA, Canada,
32 Singapore and New Zealand. Most described patients identified by the emergency
33 department as having primary care type problems, appropriate for treatment by a general
34 practitioner.
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46 We synthesised data to develop theories, described using Context (C) - Mechanism
47 (M) - Outcome (O) configurations, to explain: how or why emergency department staff and
48 general practitioners react to guidance to determine which patients are streamed to general
49 practitioners; the role general practitioners may adopt in the emergency department setting
50 (traditional general practitioner, extended general practitioner, gatekeeper or emergency
51 clinician); and how these factors influence patient (experience and safety) and
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3 organisational (risk of provider-induced demand and cost-effectiveness) outcomes. These
4 theories are summarised in Table 1 with an indication of supporting data. Full details of
5 included articles are listed in supplementary file 2.
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Table 1: Summary of *developing theories* and supporting evidence

| Theory | Context (C) – Mechanism (M) – Outcome (O) Configuration | Example of supporting extract | Evidence base |
|--|---|--|--|
| 1. Effectiveness of the streaming system | General practitioners and emergency department staff use their own personal experience and expectation (C) when interpreting streaming guidance (M) to influence which patients are streamed to general practitioners (O). | <i>“It seems that patients are difficult to classify (for A&E, WiC GP or WiC NP) on limited information for several reasons: serious conditions can sound minor, and vice versa; conditions can present in various ways; and complaints can have several underlying causes.”(37)</i> | Data to support theory (4,14,27,34–42) |
| 2a. Traditional general practitioner role vs emergency clinician role | When general practitioners working in the emergency department maintain a ‘traditional role’ using the same approach taken in the primary care setting (M) to treat patients with primary care problems (C), investigations, admissions and process times will reduce (O). However, if general practitioners adopt an ‘emergency clinician role’ working as another pair of hands (‘going native’) because of their personal interest or experience or because they feel this is the correct way to work in this setting (M), there will be no difference in the rate of investigations and admissions (O). | <i>“I guess our emergency medicine approach is we’re looking for something dreadful and a GP approach is very different in that most of the time they know it’s minor stuff or ... moderate stuff that is self-limiting and so ... they’re looking to find symptomatic relief and how can we get this patient home and away from hospital.” (Consultant)(40)</i> <i>“Once they start becoming like everyone else then they stop being like a GP and they don’t necessarily work quickly and effectively which is supposed to be the whole benefit of having them there.” (Consultant)(40)</i> | Data to support traditional GP role theory (4,5,27,28,40,41,43–50) Limited data to support ED clinician role theory (40,51) |
| 2b. Extended general practitioner role | General practitioners in emergency departments can work in an ‘extended role’ where their skills are directed at specific patient groups including non-urgent paediatric or elderly patients (C), to treat using the usual primary care approach (M), to reduce the use of hospital resources and admissions in these patient groups (O). | <i>“During a 6-month pilot scheme which co-located a primary care GP service in a busy paediatric ED, patients seen during the hours when the GP was available were significantly less likely to be admitted, exceed the 2-hour waiting target or leave before being seen, but more likely to receive antibiotics.”(5)</i> | Data to support theory for paediatric patients only (5,30,52–54) |

| | | | |
|------------------------------------|--|--|--|
| 2c. Gatekeeper role | General practitioners can use their generalist skills and knowledge of community resources (M) to redirect patients presenting with primary care problems (C) out of the emergency department to alternative primary care services off site for treatment thereby reducing emergency department attendances (O). | <i>"GPs and nurses based in triage identify patients who could be managed more appropriately in primary care as soon as they enter the Emergency Department, and re-direct them back to primary care services."</i> (55) | Limited data to support theory (55,56) |
| 3. Patient satisfaction | Patients with primary care problems that present to emergency departments (C) and are seen by general practitioners, are more satisfied with the care they receive (O) if the experience exceeds expectation (M), but if they do not perceive any difference in the care they received compared to what they expected (M), there is no difference in satisfaction (O). | <i>"There were no significant differences in (patient) satisfaction ratings between the three groups of doctors (GPs/SHOs/Registrars)"</i> (41) | Limited data to support theory (28,41,43,45,57–61) |
| 4. Safety implications | In emergency departments where there are delayed patient transfers to wards or inadequate staffing (C) general practitioners seeing patients with primary care type problems (M), may not free up emergency department staff to care for the sickest patients (O). | <i>"The attribution of overcrowding in ED to attendance by GP-type patients is simplistic; it does not address how patients are processed within ED or how they are transferred to wards later if required ('access block')."</i> (44) | Limited data to support theory (44,62–68) |
| 5. Risk of provider-induced demand | If patients with primary care type problems present to emergency departments (C) and are streamed to indistinct primary care services, without patient awareness or choice (M), there is no provider-induced demand (O). However, distinct urgent primary care services may offer convenient access to primary care (M), resulting in provider-induced demand (O). | <i>"A and E [ED] has not seen any reduction in their patients. If there is a service, patient[s] will use it. You could have three walk-in centres in the city and all three would be used and you may still not see any dropping in A and E [ED] counts."</i> (Manager)(69) | Data to support theory (4,29,69–80) |
| 6. Cost-effectiveness | If there is demand for patients with primary care problems presenting to emergency departments (C), and they are streamed to on site general practitioners and managed using a traditional general practitioner approach (M), the service is cost-effective due to fewer referrals, admissions, investigations and better outcomes compared to usual services (O). | <i>"Management of patients with primary care needs in accident and emergency department by general practitioners reduced costs with no apparent detrimental effect on outcome."</i> (28) | Limited data to support theory (28,43,49) |

Theory 1: Effectiveness of the streaming system

General practitioners and emergency department staff use their own personal experience and expectation (C) when interpreting streaming guidance (M) to influence which patients are streamed to general practitioners (O).(4,14,27,34–42)

Twelve articles supported this theory and indicated how the streaming process itself directly influenced the effectiveness of the general practitioner service in the department. Variable streaming rates were described due to differences in guidelines and also how the guidance was interpreted by emergency department clinical and non-clinical staff of varying experience.(34,39,40,42,51) The (streaming) nurse was sometimes described as being unclear which patients general practitioners could deal with,(4,27,36–40) or being more familiar with emergency department work so favouring emergency department referral,(14,35,37,39–41) even overruling the guidelines if he/she felt that the patient would require specific investigations,(37) or admission.(35) General practitioners were also noted to override nurse decisions to select patients that suited their own interests or perceived skills.(81) Increased general practitioner streaming rates were reported when there was a good relationship between the general practitioners and emergency department nurses,(42) and when the general practitioners were directly involved in the streaming process.(53,82) The influence of commissioning or leadership was not described.

Theory 2a: Traditional general practitioner role vs emergency clinician role

When general practitioners working in the emergency department maintain a 'traditional role' using the same approach taken in the primary care setting (M) to treat patients with primary care problems (C),(40,41,43–46) investigations, admissions and process times will reduce (O).(4,5,27,28,43,45–50) However, if general practitioners adopt an 'emergency

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3 *clinician role' working as another pair of hands ('going native') because of their personal*
4 *interest or experience or because they feel this is the correct way to work in this setting (M),*
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6 *there will be no difference in the rate of investigations and admissions (O).(40,51)*
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10 The traditional general practitioner approach was described by many authors as a
11 different approach to risk management and diagnostic uncertainty, with less reliance on
12 acute investigations.(40,41,44–46) This approach was maintained in a variety of different
13 settings despite full access to investigations – when general practitioners were allocated a
14 separate consulting room mimicking usual general practice,(4,27) and also when general
15 practitioners worked in a more fully integrated model, alongside emergency department
16 clinicians.(43,45,46) Other articles reported general practitioners managing non-urgent
17 patients in this way to divert attendances from emergency department staff.
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30 (34,38,39,53,54,74,75,80,82–91)
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32 There were limited qualitative data to support the 'emergency clinician role'
33 theory.(40) An Irish study described an "unstructured receptionist-based triage system" for
34 all patients attending the department (including referrals from primary care) which may
35 have influenced relatively inexperienced general practitioners to adopt a 'diagnosis driven'
36 emergency clinician approach.(51) The influence of general practitioners' special interests,
37 experience in emergency medicine or the effect of staff shortages were not described in the
38 literature to affect this potential role shift.
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Theory 2b: Extended general practitioner role

General practitioners in emergency departments can work in an 'extended role' where their skills are directed at specific patient groups including non-urgent paediatric or elderly patients (C) to treat using the usual primary care approach (M) to reduce the use of hospital resources and admissions in these patient groups (O).(5,30,52–54)

Several paediatric primary studies supported general practitioners treating children triaged as 'non-urgent' to divert attendances from the emergency department,(53,54) and reduce hospital admissions.(5,52) None of the included primary studies described general practitioners specifically treating care home residents or the elderly, as suggested in a policy document.(30)

Smith et al. reported an increase in antibiotic prescribing for children by general practitioners,(5) which could potentially be an unintended consequence of the 'traditional role' approach; relying on clinical acumen and treating a suspected source of infection rather than admitting, investigating and observing the patient to confirm the diagnosis. An increase in prescribing by general practitioners was not described in other UK studies,(4,27) but was reported (but not the drugs involved) in both Irish studies that involved more junior general practitioners.(43,51)

There was evidence that general practitioners working in or alongside emergency departments see a different cohort of patients to that in usual general practice, with more acutely unwell patients,(40,92) and minor injuries,(4,6,37–40,93,94) which could also be described as an 'extended role.' There was no evidence in the included studies for the implications of this on their skillset, learning needs, cognition processes or risk management behaviour.

Theory 2c: Gatekeeper role

General practitioners can use their generalist skills and knowledge of community resources (M) to redirect patients presenting with primary care problems (C) out of the emergency department to alternative primary care services off site for treatment thereby reducing emergency department attendances (O). (55,56)

There were limited data to support this theory with two London case study reports identified in an “A&E avoidance” scheme document, describing 228 patients in total.(55,95) There was evidence that general practitioners were more likely to redirect patients after an initial assessment than senior emergency department nurses, but only from a sample of 384 patients that self-presented to a London emergency department.(56)

Due to a lack of evidence for general practitioners performing a redirection role, following realist methodology, we also included studies involving redirection of patients from the emergency department by a senior emergency department clinician or nurse to gain understanding about how and why the system worked. Many of these articles described reduced emergency department attendances.(96–102) Previous UK guidance has cautioned against redirecting patients from emergency departments due to the risk of delayed assessment and treatment, especially in vulnerable patient groups including the homeless or those with mental health problems who may not go on to receive the care they need.(14,30) Studies from Scotland, Sweden and the United States that described a comprehensive assessment process, including measurement of vital signs and a focussed history, reported that their redirection policies were safe and worked well to reduce attendances.(78,97,99,101,102) Other United States studies, that did not describe the assessment process, reported adverse events when children were redirected without treatment.(103,104) The low sensitivity of triage criteria to identify those that needed

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3 urgent care,(105) especially infants,(106) and failure to validate a predictive model for
4 refusal of care,(107) were highlighted in other studies. The influence of governance
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6 processes restricting redirection of patients by some staff to services off site was not
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8 described in these articles.
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15 **Theory 3: Patient satisfaction**

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17 *Patients with primary care problems that present to emergency departments (C) and are*
18 *seen by general practitioners, are more satisfied with the care they receive (O) if the*
19 *experience exceeds expectation (M), but if they do not perceive any difference in the care*
20 *they received compared to what they expected (M), there is no difference in satisfaction*
21 *(O).(28,41,43,45,57–61)*
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30 Data to support this theory were limited, with an increase in satisfaction by patients
31 seen by general practitioners generally associated with shorter waiting times,(45,57) rather
32 than expectation of investigation and treatment.(41) The general practitioners were
33 sometimes supernumerary which may have contributed towards this.(28,45) Other studies
34 demonstrated that general practitioners focused more on patient education and counselling
35 than emergency department clinicians with some improvement in satisfaction
36 rates.(108,109) In more fully integrated models, the patient was often unaware that they
37 had seen a general practitioner rather than an emergency department clinician and there
38 was no difference in patient satisfaction.(28,41,43,58)
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55 **Theory 4: Safety implications**

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57 *In emergency departments where there are delayed patient transfers to wards or*
58 *inadequate staffing (C) general practitioners seeing patients with primary care type*
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3 *problems (M), may not free up emergency department staff to care for the sickest patients*
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5
6 *(O).(44,62–68)*
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8 There was a lack of evidence that general practitioners working in or alongside
9
10 emergency departments directly or indirectly improved care and safety for the sickest
11
12 patients. A reduction in time spent in the department for patients requiring emergency
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14 department level care was suggested in a UK simulation and modelling study,(62) and an
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16 Australian study also reported a reduced mean time taken to see more seriously ill patients
17
18 but this was not seen on sites that described provider-induced demand.(63) A Canadian
19
20 study of over 4 million patient visits reported that low complexity emergency department
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22 patients did not increase time to first physician contact for high-complexity patients.(64)
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24 Other studies also described how diverting non-urgent patients did not improve the high
25
26 level care required by others, and that influences such as delayed transfer of patients to the
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28 ward were more likely to contribute to overcrowding.(44,65–67) Staffing levels, staff
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30 attitude and the time of day were independent factors described to affect emergency
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32 department flow.(68)
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40 There were minimal data on the safety implications of general practitioners working
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42 in emergency department settings. Several studies used emergency department re-
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44 attendance as a marker of safety, with no increase among patients seen by general
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46 practitioners compared to usual emergency department staff. (28,29,43,110,111) Annual
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48 death rates were used as another crude marker in a Dutch study, with no significant
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50 increase following the introduction of an out-of-hours primary care physician
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52 cooperative.(75) Shared or separate governance systems between general practitioners and
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54 the emergency department were rarely described in the primary studies, providing no
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56 evidence for best practice. For general practitioners working inside the emergency
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3 department good communication and integration were described in some
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5 studies,(4,28,40,92) with anecdotal reports of poor communication negatively affecting care
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7 quality in others.(34)
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10 11 12 13 **Theory 5: The risk of provider-induced demand**

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15 *If patients with primary care type problems present to emergency departments (C) and are*
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17 *streamed to indistinct primary care services, without patient awareness or choice (M), there*
18
19 *is no provider-induced demand (O).(4,29,74,75) However, distinct urgent primary care*
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21 *services may offer convenient access to primary care (M), resulting in provider-induced*
22
23 *demand (O).(69–73,76–80)*
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28 Four articles described fully integrated models, where non-urgent patients were
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30 streamed directly to general practitioners inside the emergency department without
31
32 provider-induced demand.(4,29,74,75). Here, there was no patient choice offered and often
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34 a lack of patient awareness. Another 10 articles described distinct urgent primary care
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36 services, often in separate buildings outside the emergency departments, as duplicating
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38 services and creating their own demand, increasing patient presentation rates directly or at
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40 nearby services, rather than relieving pressure on the emergency department.(69–73,76–
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42 79,112–114)
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48 49 **Theory 6: Cost-effectiveness**

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51 *If there is demand for patients with primary care problems presenting to emergency*
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53 *departments (C), and they are streamed to on site general practitioners and managed using*
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55 *a traditional general practitioner approach (M), the service is cost-effective due to fewer*
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3 *referrals, admissions, investigations and better outcomes compared to usual services*

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6 (O).(28,43,49)

7
8 Data to support this theory were limited, but supported by three economic
9
10 evaluations (UK, Ireland and The Netherlands) where non-urgent patients were streamed to
11
12 general practitioners during normal daytime hours.(28,43,49) The comparator was 'business
13
14 as usual' with no general practitioner service. The UK and Irish studies were published in
15
16 1996 and may not represent current emergency department staffing models. No articles
17
18 were identified that studied the relative cost-effectiveness of general practitioners
19
20 redirecting patients from the emergency department for care elsewhere. A 5-year USA
21
22 redirection study calculated cost-effectiveness from the perspective of the institution but
23
24 did not include costs for treatment incurred elsewhere,(99) whilst another United States
25
26 study calculated that marginal costs for non-urgent visits to the emergency department
27
28 were low and that cost savings from diverting visits may be less than widely believed.(115)
29
30 However the USA has a complex health system, with a significant majority of the population
31
32 covered by private health insurance alongside state funded Medicare, Medicaid, the
33
34 Federally-funded Veterans Health Administration, and a substantial uninsured population -
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36 all factors which could influence access to emergency departments and the type of care
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38 needed and delivered.
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47 Three other studies of 'out-of-hours' patients did not find the addition of a primary
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49 care service to be cost saving. One Dutch study, with an off-site general practitioner co-
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51 operative, reported parents refusing to take the child to a different location, or the
52
53 (streaming) nurse overruling the policy.(35) Another 12 year old Dutch study showed no
54
55 change in costs, despite a substantial reduction in emergency department attendances, due
56
57 to regulations dictating minimum staffing levels to cope with major trauma.(91) The Dutch
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3 health care system has a complex funding structure with a mix of social and private
4
5 insurance and this may influence incentives and disincentives to access emergency
6
7 departments. An Australian primary care out-of-hours service closed because patients
8
9 chose to attend an equally accessible general practice service that existed nearby.(42)
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15 **Wider system implications**

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17 Limited evidence from the included studies prevented us developing theories on
18
19 wider system implications. There were no reports of emergency department clinicians
20
21 encouraged to adopt a more conservative approach, as a result of working alongside
22
23 general practitioners, but some reports of general practitioners in management positions
24
25 influencing system changes.(116,117) The potential reduction in learning opportunities for
26
27 junior doctors was highlighted in two articles.(50,92) There was limited evidence that
28
29 working in an emergency department setting led to increased job satisfaction for some UK
30
31 general practitioners with a special interest in emergency care.(40,117) However, reduced
32
33 satisfaction was also described because the job was outside the scope of usual general
34
35 practice,(40,48) possibly contributing towards recruitment problems.(40,118)
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46 **Discussion**

47 **Principal findings**

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49 We developed theories using data from 96 articles to describe the mechanisms by
50
51 which general practitioner services are linked to outcomes: about the streaming process
52
53 itself; the role general practitioners may adopt in the emergency department setting; and
54
55 the effects of these on the patient (experience and safety) and the organisation (risk of
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3 provider-induced demand and costs). There was little evidence that general practitioners in
4
5 emergency departments directly or indirectly affected the care and throughput of the
6
7 sickest patients. Distinct units, advertising these services, may offer an attractive alternative
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9 to primary care and result in provider-induced demand. The literature describing economic
10
11 impacts of general practitioners in emergency departments comes from different countries,
12
13 with different funding systems and spans over 20 years, limiting conclusions.
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19 **Strengths and limitations**

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21 Heterogeneous studies involving general practitioners working in or alongside
22
23 emergency departments do not suit traditional systematic review methods. We have
24
25 conducted the first realist review in this area, using methods that are gaining prominence in
26
27 healthcare research.(119,120) The rapid realist review approach is appropriate in relation to
28
29 the rapidly evolving NHS policy on emergency department use of general practitioners, (10–
30
31 12) showing where such policies may be reinforced or refuted by the evidence available.(25)
32
33 A weakness of our study was the time constraint on our project but the expert group
34
35 mitigated this, and enabled us to focus and direct our research.(25) Some studies did not
36
37 describe the intervention in adequate depth to help facilitate the identification of key
38
39 mechanisms. Single site heterogeneous studies and the nature of different healthcare and
40
41 funding systems limited international comparability.(21)
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49 The wide estimates of patients presenting with primary care type problems to
50
51 emergency departments highlights the difficulty in defining and identifying this target
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53 patient group and therefore the effectiveness of these services in different local contexts.
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55 We have focussed on general practitioners working in or alongside emergency departments
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57 but in the UK this role has evolved to include nurses and advanced care practitioners from
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3 other disciplines, often due to staffing and recruitment challenges. These challenges may be
4 mirrored in emergency department based services, affecting variation between services and
5
6 need to be considered in further research.
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10 11 12 13 **Comparison with other reviews** 14

15 Before our review, the largest review to date by Ramlakhan et al. (2016) included 20
16 papers and described provider-induced demand, poor evidence for improved emergency
17 department throughput and minimal economic impact.(17) The Goncalves-Bradley et al.
18
19 Cochrane review of four studies, published in 2018, highlighted inconsistent results and a
20 lack of evidence on safety.(18) We also found evidence of provider-induced demand in
21 distinct primary care units but less so in more fully integrated service models where patients
22 lacked awareness that they had been directed to primary care services.(4,74,75) We found
23 that patients with primary care problems may have reduced process times if treated by
24 general practitioners adopting a traditional role but there was a lack of evidence for an
25 improvement in overall throughput for patients in the department. There was also a lack of
26 evidence on the impact on general practitioners' cognition processes and risk-taking
27 behaviour when treating a different group of patients to that seen in usual general practice
28 and the safety implications of this.
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50 **Policy implications** 51

52 The global health priority recently given to Universal Health Coverage,(121) and the
53 attention being given to the 40th anniversary of the Alma Ata declaration,(122) moves to
54 centre stage the design of primary healthcare systems, particularly their capacity and
55 capability to respond to urgent care needs. Internationally, emergency departments are
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3 exploring options on how to run more efficiently and safely. Our theories, informed by
4 literature from 13 countries, allow policy makers to make more considered judgements
5
6 about their relevance to their own contexts for service provision. The UK has already
7
8 commissioned further research in this area, funded by the National Institute for Health
9
10 Research (HS&DR Projects: 15/145/04(33) and 15/145/06(123)), the former collecting
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12 primary data to further test and refine these theories.
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21 **Conclusion**

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23 The effectiveness of emergency department streaming to primary care services may
24 be influenced by how staff interpret the streaming system and the roles general
25 practitioners adopt. Caution is needed in embedding the policy until further research and
26
27 evaluation are available. Service models that encourage the traditional general practitioner
28
29 approach may have shorter process times for non-urgent patients; however, there is little
30
31 evidence that this frees up emergency department staff to care for the sickest patients.
32
33 Distinct primary care services offering increased patient choice may result in provider-
34
35 induced demand. Economic evaluation and safety requires further research.
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45 **Figure 1: Search Strategy and Results**

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Contributors

Authors AC, FD, PA, ACS, MC, LD, JD, BE, PH, TH, AP, TR, AS, HS and AE are co-applicants on the wider project and were involved in the conceptualisation of the study. AC, FD, ME, PA, ACS, MC, JD, BE, PH, TH, AP, TR, AS, HS and AE contributed as part of the expert group in team meetings in May and/or November 2017. AC and FD planned the synthesis approach with input from AE. ME contributed to data analysis and interpretation in the pilot work and weekly team meetings. The core review team (AP, PA, BE, JD and ACS) met via teleconference every 6 weeks to discuss findings and guide further searches. AC conducted the database searches. AC and FD extracted data extracts and were involved in the synthesis process, meeting weekly with AE and ME to discuss findings. AC prepared the first draft of the manuscript which was reviewed and critically appraised by all authors, who approved the final version and agree to be accountable for this work.

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Competing interests

None declared

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Data sharing statement

No further data available

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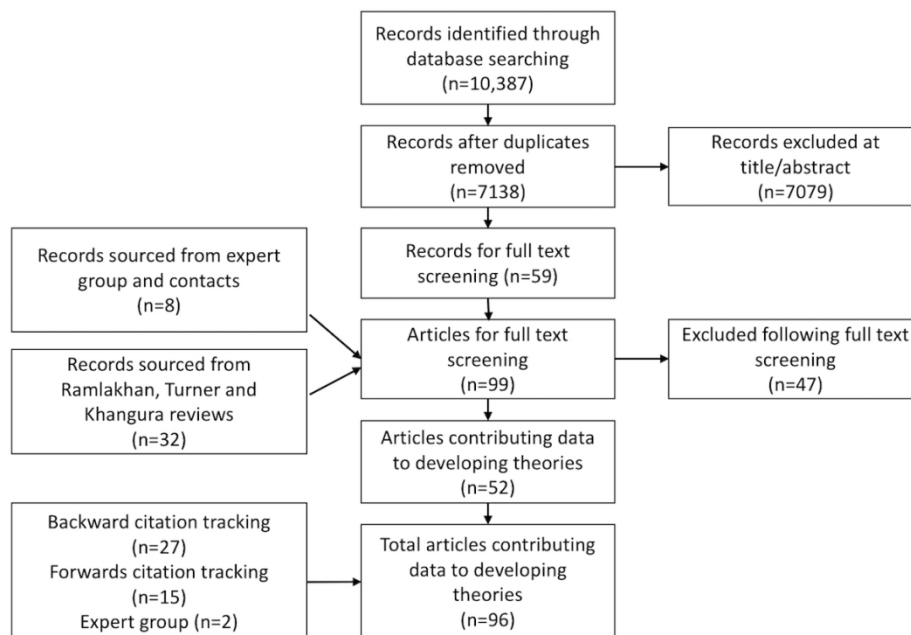


Figure 1: Search strategy and results

112x76mm (300 x 300 DPI)

Supplementary file 1: Search Strategy for Medline (adapted for other databases)

1. exp Primary Health Care/
2. primary care.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
3. exp Physicians, Family/
4. exp Physicians, Primary Care/
5. family physician*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
6. exp Family Practice/
7. family practic*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
8. GP.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
9. exp After-Hours Care/
10. (after-hours care or out of hours or out-of-hours or OOH).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
11. exp General Practitioners/
12. general practic*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
13. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12
14. exp Emergency Medical Services/
15. exp Emergency Service, Hospital/
16. emergency department*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
17. (accident and emergenc*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
18. casual*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]

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4 19. emergency room.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword
5 heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier,
6 synonyms]
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8 20. A&E.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word,
9 protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
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11 21. urgent care centre*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword
12 heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier,
13 synonyms]
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15 22. (walkin or walk in or walk-in).mp. [mp=title, abstract, original title, name of substance word, subject heading word,
16 keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique
17 identifier, synonyms]
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19 23. 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22
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Supplementary file 2: Articles that contributed data to theory development (listed chronologically by Country)

| Lead author | Country | Title | Study Design |
|----------------|---------|--|---|
| Ablard 2017 | UK | Primary care services co-located with Emergency Departments across a UK region: early views on their development | Survey and semi-structured interviews |
| Bentley 2017 | UK | Emergency Department redirection to primary care: a prospective evaluation of practice | Prospective evaluation of the subsequent management and outcome of redirected non-urgent patients from a Scottish ED over 2 months |
| Dale 2017 | UK | Extended training to prepare GPs for future workforce needs: a qualitative investigation of a one-year fellowship in urgent care | Qualitative investigation of a one-year fellowship in urgent care |
| Tammes 2016 | UK | Exploring the relationship between general practice characteristics, and attendance at walk-in centres, minor injuries units and EDs in England 2012/2013: a cross-sectional study | Cross-sectional observational large data analysed using multivariable regression models |
| Proctor 2016 | UK | A&E Avoidance schemes across London: A rapid review of good practice examples | NHS report - 2 case studies involving redirection of non-urgent patients from the ED |
| Smith 2016 | UK | To GP or not TO GP: Evaluation of children triaged to see a GP in a tertiary paediatric emergency department | Retrospective cohort study of children classified as 'GP appropriate' seen by a GP between 14:00 and 22:00 and seen by ED staff outside these hours |
| Gnani 2016 | UK | Healthcare use among preschool children attending GP-led urgent care centres: a descriptive observational study | Retrospective observational study using routinely collected data |
| O'Cathain 2016 | UK | Variation in avoidable emergency admissions: multiple case studies of emergency and urgent care systems | Ethnographic residual analysis. Interviews with members of emergency care teams at 6 case study sites |

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| Begum 2016 | UK | Solving the A&E crisis using GP lead triage and redirection | Poster - Patient questionnaire of 150 patients over 5 weeks redirected back to the GP for treatment with an appointment made on the same day |
| Gritz 2016 | UK | More under fives now seen in urgent care centre than A&E should we shift our focus | Observational retrospective analysis of routine operational data for attendances |
| Greenfield 2016 | UK | Staff perceptions on patient motives for attending GP-led urgent care centres in London: a qualitative study | Semi-structured interviews |
| Cowling 2015 | UK | Referral outcomes of attendances at general practitioner-led urgent care centres in London, England: retrospective analysis of hospital administrative data | Retrospective analysis of administrative data recorded at a London urgent care centre of 243042 attendances from October 2009 to December 2012 |
| Morton 2016 | UK | Describing team development within a novel GP-led urgent care centre model: a qualitative study | Staff semi-structured interviews at 2 GP-led urgent care centres in 2 London academic teaching hospitals |
| Arain 2015a | UK | Perceptions of healthcare professionals and managers regarding the effectiveness of GP-led walk-in centres in the UK | Qualitative using a phenomenological approach using semi structured interviews |
| Arain 2015b | UK | Impact of a GP-led walk-in centre on NHS emergency departments | Patient survey over a 3-week period and analysis of attendances at the local children's hospital and minor injuries unit a year before and after the WIC opened |
| Johnson 2015 | UK | Evidence of primary care services at A&E | Letter (opinion piece) Provider of 4 UCC in London supporting colocated GPs services with emergency departments |

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| NHS ECIST 2015 | UK | Primary care in emergency departments: a guide to good practice | NHS policy document - Overview of factors to be considered when planning how best to use primary care clinicians in emergency departments, monitoring and refining the service |
| Harris 2014 | UK | How do clinicians with different training backgrounds manage walk-in patients in the ED setting? | Retrospective case note review of a random sample of 384 patients that self-presented to the ED and were initially assessed by GPs or ED staff |
| Thompson 2013 | UK | Suitability of emergency department attenders to be assessed in primary care: survey of general practitioner agreement in a random sample of triage records analysed in a service evaluation project | Four GPs independently used data extracted from 765 clinical notes to rate the appropriateness for management in primary care |
| Arain 2013 | UK | Patients' experience and satisfaction with GP led walk-in centres in the UK; a cross sectional study. | Patient survey over 3 weeks in 2 GP-led WICs |
| Hunter 2013 | UK | A qualitative study of patient choices in using emergency health care for long-term conditions: The importance of candidacy and recursivity. | Questionnaire and semi-structured interviews |
| Lengu 2012 | UK | Application of simulation and modelling in managing unplanned healthcare demand | Conference paper - Simulation and modelling to assess the impact of primary care clinicians deflecting patients with non-urgent needs away from A&E |
| Carson 2010 | UK | Primary care and emergency departments | Report based on results of a literature review, web-based survey and ED visits |
| Clancy 2009 | UK | Launching a social enterprise see-and-treat service | Report outlining the service, number of patients seen and referred on in a 4-month period |
| Maheswaren 2009 | UK | Repeat attenders at national health service walk in centres | Descriptive study using routine data from 4 walk-in centres in England |

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| Sandhu 2009 | UK | Emergency nurse practitioners and doctors consulting with patients in an emergency department: a comparison of communication skills and satisfaction | Observation study with a stratified sample of 296 video-taped consultations |
| Dale 2008 | UK | The patient, the doctor and the emergency department: A cross-sectional study of patient-centeredness in 1990 and 2005 | Observational study with a stratified sample of 430 video-taped consultations with data collection in May–July 1990 and May–July 2005. |
| Salisbury 2007 | UK | The impact of co-located NHS walk-in centres on emergency departments | Controlled before and after study |
| Chalder 2007 | UK | Comparing care at walk-in centres and at accident and emergency departments: an exploration of patient choice, preference and satisfaction | A controlled, mixed-method study comparing 8 EDs with co-located WICs with the same number of “traditional” EDs. |
| Pope 2005 | UK | What do other local providers think of NHS walk-in centres? Results of a postal survey | Postal survey |
| Bickerton 2005 | UK | Streaming A&E patients to walk-in centre services | Analysis of all patients attending a London hospital over 24 hours for suitability for WIC treatment |
| Chew-Graham 2004 | UK | A new role for the general practitioners? Reframing inappropriate attenders to inappropriate services | Qualitative semi-structured staff interviews |
| Hsu 2003 | UK | Effect of NHS walk-in centre on local primary healthcare services | Before and after observational study of consultation rate in 12 general practices after the implementation of a walk-in centre |
| Salisbury 2002 | UK | What is the role of walk-in centres in the NHS? | Analysis of routinely collected data, questionnaire completed by managers followed by semi-structured interviews and site visits |
| Grant 2002 | UK | An observational study comparing quality of care in walk-in centres with general practice and NHS Direct using standardised patients | Observational study involving assessment of clinicians by standardised patients at 20 walk in centres, 20 general practices and 1 NHS direct sites |

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| Coleman 2001 | UK | Will alternative immediate care services reduce demands for non-urgent treatment at accident and emergency? | Questionnaire survey and notes review of non-urgent patients to assess the suitability of management by an alternative call service |
| McGugan 2000 | UK | Primary care or A&E? | Prospective study over 2 months of a redirection policy |
| Rajpar 2000 | UK | Study of choice between accident and emergency departments and general practice centres for out of hours primary care problems | Interview of patients attending A&E and GP out-of-hours |
| Freeman 1999 | UK | Primary care units in A and E departments in North Thames in the 1990s: Initial experience and future implications | Postal questionnaire to ED staff and local GPs with follow up staff interviews |
| Dale 1998 | UK | Primary care in accident and emergency departments: the cost effectiveness and applicability of a new model of care | PhD thesis – Includes data for included papers and additional analysis of 16 video-taped consultations |
| Ward 1996 | UK | Primary care in London: an evaluation of general practitioners working in an inner-city accident and emergency department | Prospective survey over 6 weeks |
| Dale 1996 | UK | Cost effectiveness of treating primary care patients in accident and emergency: a comparison between GPs, senior house officers and registrars | Prospective intervention study which was retrospectively costed |
| Dale 1995a | UK | Primary care in the accident and emergency department I: Prospective identification of patients | 1 year prospective study at a London ED to compare patient characteristics and consultation activities for attenders assessed by nurse triage to have 'primary care' or 'accident and emergency' type problems |
| Dale 1995b | UK | Primary care in the accident and emergency department: II. Comparison of general practitioners and hospital doctors | 1 year prospective study at a London ED to compare patient characteristics and consultation activities for attenders assessed by nurse triage to have 'primary care' or 'accident and emergency' type problems |

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| O'Kelly 2010 | Ireland | Impact of a GP cooperative on lower acuity emergency department attendances | A retrospective review of all attendances at the 'Dubdoc' service was compared with attendances at the ED for triage categories 4 and 5 of the same hospital over a 9-year period |
| Murphy 2000 | Ireland | Effect of patients seeing a general practitioner in accident and emergency on their subsequent attendance: cohort study | Analysis of reattendance of non-urgent patients that had been allocated to general practitioners or usual accident and emergency staff depending on time of registration |
| Gibney 1999 | Ireland | Randomized controlled trial of general practitioner versus usual medical care in a suburban accident and emergency department using an informal triage system | Patients 'randomised' at time of registration to either GP or ED care. Case note review |
| Murphy 1996 | Ireland | Randomised controlled trial of general practitioner versus usual medical care in an urban accident and emergency department: process, outcome and comparative cost | Randomised controlled trial of care provided by general practitioners to non-emergency patients in an accident and emergency department differs significantly from care by usual emergency staff in terms of process, outcome and cost |
| van Veelen 2016 | Netherlands | Effects of a general practitioner cooperative co-located with an emergency department on patient throughput | Pre-post comparison before and after implementation of a GP cooperative at an ED |
| Schols 2016 | Netherlands | Access to diagnostic tests during GP out-of-hours care: A cross sectional study of all GP out-hours services in the Netherlands | Cross-sectional survey of all 117 GP out of hours services in the Netherlands |
| Van-Gils-van Rooij 2016 | Netherlands | Is patient flow more efficient in urgent care collaborations? | Observational study, compared usual care with UCCs (single point of access for ED and GP OOH) |

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| van Gils-van Rooij 2015 | Netherlands | Out-of-Hours Care Collaboration between General Practitioners and Hospital Emergency Departments in the Netherlands | Observational study - comparing attendance and patient characteristics between EDs with standard care and EDs with co-located primary care and single joint triage |
| Thijssen 2013 | Netherlands | The impact on emergency department utilization and patient flows after integrating with a general practitioner cooperative: an observational study | Observational study - routinely collected data over 6 years |
| Huibers 2013 | Netherlands | GP cooperative and emergency department: an exploration of patient flows | Retrospective record review of patients who had visited GPC or ED |
| Van der Straten 2012 | Netherlands | Safety and efficiency of triaging low urgent self-referred patients to a general practitioner at an acute care post: an observational study | Prospective observational study |
| Bosmans 2012 | Netherlands | Addition of a general practitioner to the accident and emergency department: a cost-effective innovation in emergency care | Observational study before and after implementation of new service |
| Van Veen 2012 | Netherlands | Van Veen referral of non-urgent children from the emergency department to general practice: compliance and cost savings | Prospective observational before after study |
| Van Veen 2011 | Netherlands | Safety of the Manchester Triage System to identify less urgent patients in paediatric emergency care: a prospective observational study | Analysis of the hospitalisation rate of self referred children triaged as non urgent |
| Boeke 2010 | Netherlands | Effectiveness of GPs in accident and emergency departments | Observational study before and after implementation of new service |
| Kool 2008 | Netherlands | Towards integration of general practitioner posts and accident and emergency departments: a case study of two integrated emergency posts in the Netherlands | Observational study comparing contacts, patient satisfaction and staff satisfaction pre-and post set up of a 2 co-located GP OOHs and control sites |

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| Giesen 2006 | Netherlands | Patients either contacting a general practice cooperative or accident and emergency department out of hours: a comparison | Retrospective record review |
| Van Uden 2006 | Netherlands | Out-of-hours primary care. Implications of organisation on costs | Annual reports of 2 GP co-operatives (1 co-located, 1 separate) analysed together with ED costs |
| Van Uden 2005 | Netherlands | The Impact of a Primary Care Physician Cooperative on the Caseload of an Emergency Department: The Maastricht Integrated Out-of-Hours Service | Observational study, patient characteristics collected for 3 weeks in Jan/Feb 1998 and March 2001 (co-operative set up in 2000) |
| Van Uden 2004 | Netherlands | Does setting up out of hours primary care cooperatives outside a hospital reduce demand for emergency care? | Before and after observational study |
| Van Uden 2003 | Netherlands | Use of out of hours services: a comparison between two organisations | Observational study of patient contacts at 2 different OOH centres and their associated EDs (1 co-located, 1 not) |
| Colliers 2017 | Belgium | Implementation of a general practitioner cooperative adjacent to the emergency department of a hospital increases the caseload for the GPC but not for the emergency department | Quasi-experimental study analysing the implementation of 2 out of hours general practitioner co-operatives one adjacent to the ED, the other not and 2 control sites |
| Van den Heede 2016 | Belgium | The 2016 proposal for the reorganisation of urgent care provision in Belgium: A political struggle to co-locate primary care providers and emergency departments | Outline of the 2016 political proposal for the reorganisation of urgent care provision toned down due to GP opposition |
| Ellbrant 2015 | Sweden | Paediatric emergency department management benefits from appropriate early redirection of non-urgent visits | Prospective observational study using ED records and case notes |
| Krakau 1999 | Sweden | Provision for clinic patients in the ED produces more nonemergency visits | Before and after observational study |

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| Hansagi 1987 | Sweden | Trial of a method of reducing inappropriate demands on a hospital emergency department. | Prospective observational study of 454 patients classified as non-urgent by the ED and redirected to alternative care over a 3-month period |
| Chmiel 2016 | Switzerland | Implementation of a hospital-integrated general practice – a successful way to reduce the burden of inappropriate emergency-department use | Longitudinal observational study |
| Hess 2015 | Switzerland | Satisfaction of health professionals after implementation of a primary care hospital emergency centre in Switzerland: A prospective before-after study | Questionnaire study of job satisfaction before and after a new emergency care model was implemented in Switzerland |
| Wang 2014 | Switzerland | Hospital integrated general practice: a promising way to manage walk in patients | Pre and post comparison study before and after implementation of a new hospital-integrated general practice model |
| Chmiel 2011 | Switzerland | Walk-ins seeking treatment at an emergency department or general practitioner out-of-hours service: a cross-sectional comparison | Analysis of routinely collected data of 2974 patient encounters attending a GPC or ED |
| Posocco 2017 | Italy | Role of out of hours primary care service in limiting inappropriate access to emergency department | Retrospective analysis of 408 ED referrals from a local OOH service |
| Kork 2016 | Finland | Improving access and managing healthcare demand with walk in clinic: convenient but at what cost? | Observational study over 48 months of the characteristics of 107 frequent attenders at a WIC from electronic patient records |
| Allen 2015 | Australia | Low acuity and general practice type presentations to emergency departments: A rural perspective | Analysis of GP type presentations to 2 rural EDs over a 4-month period |
| Desborough 2013 | Australia | Development and implementation of a nurse-led walk-in centre: evidence lost in translation? | Evaluation of the first 12 months of operation of the first Australian public nurse-led primary care walk-in centre compared to the English NHS model. |

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| Nagree 2013 | Australia | Quantifying the proportion of general practice and low-acuity patients in the emergency department | Four methods for calculating general practice-type patients were compared for 3 tertiary EDs in Perth, Australia in 2009-2011 |
| Sharma 2011 | Australia | Impact of co-located general practitioner (GP) clinics and patient choice on duration of wait in the emergency department | Mathematical modelling of wait times using routine ED data |
| Richardson 2009 | Australia | Myths versus facts in emergency department overcrowding and hospital access block. | Report referencing previous work |
| Bolton 2001 | Australia | The reasons for, and lessons learned from, the closure of the Canterbury GP After-Hours Service. | Report describing why a 12-month trial of GP staffed after hours service with an ED was not continued because the opportunity cost was greater than existing alternative services |
| Doran 2013 | USA | An intervention connecting low acuity emergency department patients with primary care: Effect on future primary care linkage | Analysis of primary care follow up of patients presenting to ED assessed to have non-urgent problem and referred to an onsite primary care clinic |
| Williams 1996 | USA | The costs of visits to emergency departments. | Analysis of emergency department charges and costs based on data from 6 community hospitals |
| Gadomski 1995 | USA | Diverting managed care Medicaid patients from pediatric emergency department use. | 6-month follow up of Medicaid children with non-emergent conditions not authorised to be seen in the Pediatric Emergency Department by their primary care provider |
| Derlet 1995 | USA | Prospective identification and triage of nonemergency patients out of an emergency department - 5 year study | 5 year study to analyse the outcome of adult patients refused care in the ED |
| Derlet 1992 | USA | Triage of patients out of the emergency department: three year experience. | 3 year study to analyse the outcome of adult patients refused care in the ED |

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| Birnbaum 1994 | USA | Failure to validate a predictive model for refusal of care to emergency-department patients. | Analysis of the outcome of 534 patients that met the pre-established criteria for refusal of care |
| Lowe 1994 | USA | Refusing care to emergency department patients: evaluation of published triage guidelines. | Case note review of 106 patients who would have been refused care according to triage guidelines |
| Shaw 1990 | USA | Indigent children who are denied care in the emergency department. | Six-month prospective study of 588 children denied care in the emergency department |
| Rivara 1986 | USA | Pediatric nurse triage: its efficacy, safety and implications for care. | Evaluation of emergency room triage of 748 children over a 6-week period at a large urban children's hospital that routinely referred outside of the institution for care |
| Schull 2007 | Canada | The Effect of Low-Complexity Patients on Emergency Department Waiting Times | Analysis of 4.1 million patient visits over a 1 year period (2002-3) and 10 EDs of the effect of low-complexity patients on time of physician contact of high complexity patients |
| Vertesi 2004 | Canada | Does the Canadian Emergency Department Triage and Acuity Scale identify non-urgent patients who can be triaged away from the emergency department? | Retrospective database audit in an urban referral hospital ED. |
| Hutchison 2003 | Canada | Patient satisfaction and quality of care in walk-in clinics, family practices and emergency departments: the Ontario Walk-In Clinic Study. | Prospective cohort study of the quality of care of 8 common acute conditions and patient satisfaction |
| Anantharaman 2008 | Singapore | Impact of health care system interventions on emergency department utilisation and overcrowding in Singapore | Retrospective analysis of attendances at six main public EDs over 32 years |
| Wilson 2005 | New Zealand | Co-locating primary care facilities within emergency departments: brilliant innovation or unwelcome intervention into clinical care? | Report reviewing a proposal to co-locate a primary care facility within the local emergency department |

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For peer review only

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Research checklist: RAMESES publication standards for realist syntheses(25)

List of items to be included when reporting a realist synthesis

| TITLE | | | Reported on page |
|--------------|---------------------------------------|---|------------------|
| 1 | | In the title, identify the document as a realist synthesis or review - | 1 |
| ABSTRACT | | | |
| 2 | | While acknowledging publication requirements and house style, abstracts should ideally contain brief details of: the study's background, review question or objectives; search strategy; methods of selection, appraisal, analysis and synthesis of sources; main results; and implications for practice. | 2 |
| INTRODUCTION | | | |
| 3 | Rationale for review | Explain why the review is needed and what it is likely to contribute to existing understanding of the topic area. | 5 |
| 4 | Objectives and focus of review | State the objective(s) of the review and/or the review question(s). Define and provide a rationale for the focus of the review. | 6 |
| METHODS | | | |
| 5 | Changes in the review process | Any changes made to the review process that was initially planned should be briefly described and justified. | n/a |
| 6 | Rationale for using realist synthesis | Explain why realist synthesis was considered the most appropriate method to use. | 6-7 |

| TITLE | | | Reported on page |
|---------|--------------------------------------|--|------------------|
| 7 | Scoping the literature | Describe and justify the initial process of exploratory scoping of the literature. | 8 |
| 8 | Searching processes | While considering specific requirements of the journal or other publication outlet, state and provide a rationale for how the iterative searching was done. Provide details on all the sources accessed for information in the review. When searching in electronic databases has taken place, the details should include, for example, name of database, search terms, dates of coverage and date last searched. If individuals familiar with the relevant literature and/or topic area were contacted, indicate how they were identified and selected. | 8 |
| 9 | Selection and appraisal of documents | Explain how judgements were made about including and excluding data from documents, and justify these. | 9 |
| 10 | Data extraction | Describe and explain which data or information were extracted from the included documents and justify this selection. | 9 |
| 11 | Analysis and synthesis processes | Describe the analysis and synthesis processes in detail. This section should include information on the constructs analyzed and describe the analytic process. | 9 |
| RESULTS | | | |
| 12 | Document flow diagram | Provide details on the number of documents assessed for eligibility and included in the review with reasons for exclusion at each stage as well as an indication of their | Figure 1 |

| TITLE | | | Reported on page |
|------------|---|---|--------------------------------|
| | | source of origin (for example, from searching databases, reference lists and so on). You may consider using the example templates (which are likely to need modification to suit the data) that are provided. | |
| 13 | Document characteristics | Provide information on the characteristics of the documents included in the review. | 10 And supplementary file 2 |
| 14 | Main findings | Present the key findings with a specific focus on theory building and testing. | 10-23 |
| DISCUSSION | | | |
| 15 | Summary of findings | Summarize the main findings, taking into account the review's objective(s), research question(s), focus and intended audience(s). | 24 |
| 16 | Strengths, limitations and future research directions | Discuss both the strengths of the review and its limitations. These should include (but need not be restricted to) (a) consideration of all the steps in the review process and (b) comment on the overall strength of evidence supporting the explanatory insights which emerged. The limitations identified may point to areas where further work is needed. | 24 |
| 17 | Comparison with existing literature | Where applicable, compare and contrast the review's findings with the existing literature (for example, other reviews) on the same topic. | 25 |

| TITLE | | | Reported on page |
|-------|--------------------------------|--|------------------|
| 18 | Conclusion and recommendations | List the main implications of the findings and place these in the context of other relevant literature. If appropriate, offer recommendations for policy and practice. | 27 |
| 19 | Funding | Provide details of funding source (if any) for the review, the role played by the funder (if any) and any conflicts of interests of the reviewers. | 28 |