EMJ Online First, published on April 11, 2016 as 10.1136/emermed-2015-204900

Primary care services located with EDs: a review of effectiveness

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► Additional material is published online only. To view please visit the journal online (http://dx.doi.org/10.1136/emermed-2015-204900).

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Received 2 April 2015
Revised 20 November 2015
Accepted 26 December 2015

ABSTRACT

Background Primary care focused unscheduled care centres (UCC) co-located with major EDs have been proposed as a solution to the rise in ED attendances. They aim to reduce the burden of primary care patients attending the ED, hence reducing crowding, waits and cost.

This review analysed available literature in the context of the impact of general practitioner (GP) delivered, hospital-based (adjacent or within the ED) unscheduled care services on process outcomes, cost-effectiveness and patient satisfaction.

Methods A narrative literature review of studies published between 1980 and 2015 was undertaken. All study types were reviewed and included if they reported a service model using hospital-based primary care clinicians with a control consisting of standard ED clinician-delivered care.

Results The electronic searches yielded 7544 citations, with 20 records used in the review. These were grouped into three main themes: process outcomes, cost-effectiveness and satisfaction. A paradoxical increase in attendances has been described, which is likely to be attributable to provider-induced demand, and the evidence for improved throughput is poor. Marginal savings may be realised per patient, but this is likely to be overshadowed by the overall cost of introducing a new service.

Conclusions There is little evidence to support the implementation of co-located UCC models. A robust evaluation of proposed models is needed to inform future policy.

INTRODUCTION

ED attendances have steadily increased over the last decade in the UK[1] and internationally. One theory explaining this increased demand suggests that this is attributable mainly to patients with problems more suited to primary care[2] and that diverting such patients away from the ED may improve access and care across the system. To this end, several models of hospital-based unscheduled care services have been developed that primarily use a workforce consisting of general practitioners (GPs) or other primary care clinicians. These have been implemented at significant cost in many cases, but with little evaluation of effectiveness in the context of local health services. In many instances, the introduction of alternative and untested forms of urgent care has failed to reduce ED attendances.[3]

This review will seek to analyse the available literature in the context of the impact of GP delivered, hospital-based (adjacent or within the ED) unscheduled care services on process outcomes, cost-effectiveness and patient satisfaction.

METHODS

In order to explore the evidence supporting a hospital-based urgent care model, we undertook a literature review of existing research. The search strategy was based on the variables upon which the theoretical benefits of an UCC are premised.

A search strategy was designed with the following three-part question based on the study objectives.

For patients presenting to an ED with non-urgent problems (population) and managed by hospital-based primary care professionals (intervention) or emergency physicians (control), are there systematic differences in cost-effectiveness, process outcomes and patient satisfaction (outcomes)?

We searched for specific process outcomes related to the time from arrival to first diagnostic contact with a clinician (waiting time (WT)), time to treatment or intervention (treatment time (TT)) and total time in the ED (length of stay (LOS)).

We searched the following databases for articles between 1980 and February 2015: Business Source Premier, CINAHL, Cochrane Library, DARE, EMBASE, HTA, MEDLINE, NHS Evidence, NHS EED, PsycINFO and SCOPUS. We chose the lower date limit as the concept of ED patients being better suited for primary care only became topical around the mid-1980s. This was supported by a PubMed 'Results by Year' keyword scoping search, which demonstrated a low annual publication rate until 1989.

In addition, Google Scholar was searched along with OpenGrey, UK Economic and Social Research Council registry, National Centre for Primary Care Research and Development, King's Fund, Nuffield Trust, NHS Commissioning Board (NHS England), Primary Care Foundation, College of Emergency Medicine, Agency for Healthcare Research and Quality and NHS Institute for Innovation and Improvement.

References from key publications were hand searched and the urgent care leads from local commissioning groups were asked for any other key articles or unpublished data/reports.

Broad search terms were used as this has been shown to increase search sensitivity.[4]

The heterogeneity and largely theoretical basis of many existing or proposed service configurations resulted in an evolving literature base that reported variable outcomes. An approach loosely based on a realist approach to evidence synthesis was undertaken. This method is described elsewhere,[5] and we have used some of its basic underlying theory in

To cite: Ramlakhan S, Mason S, O'Keeffe C, *et al*. *Emerg Med J* Published Online First: [*please include* Day Month Year] doi:10.1136/emermed-2015-204900

preference to a traditional systematic review. In particular, our searches were purposive and hinged on the theoretical basis and proposed outcomes of service models. We included all types of evidence and attempted to search for explanations of why models worked or not. This approach is appropriate for interventions where knowledge of the theoretical basis of models is key to developing contextually effective services.

All article types were retrieved and reviewed. No formal quality assessment was undertaken. While our searches were not confined to UK models, studies were excluded if the setting was not broadly comparable to a UK setting; free at the point of access and similar in terms of outcomes or theoretical basis for the service. No language restrictions were used. (The full search strategy is appended as an online supplementary file.)

RESULTS

The electronic searches yielded 7544 citations, with 68 further citations from conference abstracts and unpublished reports. Also, 42 records were retrieved from hand searching references and 38 records from searches of organisational sites, reports and experts. And, 82 records remained after screening by title and abstract of which 20 were used in the review. Four studies were reported in two or more records. The study flow diagram is appended as an online supplementary diagram (Appendix 2).

The majority of studies (eight) were undertaken in the Netherlands with four from England. The rest were carried out in Australia, Ireland, Spain, Sweden and Switzerland.

Results have been presented according to three key theoretical outcomes identified during the review; process outcomes, patient satisfaction and cost-effectiveness.

The review found significant heterogeneity in the models and methodology used in their evaluation. Four broad service configurations emerged (box 1), which mirrored those identified in another review[6] with variable overlap between configurations. The majority of models were not available for the same periods as the ED, and most models operated primarily outside of the usual opening times of GP practices. Triage of suitable patients was undertaken by ED nurses in the majority of studies.

Process outcomes

Studies that reported outcomes of interventions using primary care in or adjacent to an ED are summarised in table 1.

Box 1 Current UCC models

Within the ED footprint
Patients attend the ED and are triaged into separate streams (urgent or non-urgent/primary care). The primary care stream is staffed by primary care clinicians.

Alongside the ED
The primary care service is distinctly available next to/close to the ED. Patients choose themselves or are redirected from the ED towards the primary care service and vice versa.

Primary care front-end screening/filtering ED patients
Primary care practitioners triage or filter non-emergency (non-ambulance) patients at the front end of the ED, either in person or telephone, thus limiting ED access.

Integrated
Care provided within the ED jointly with ED staff to all patients who attend. Some overlap with primary care front-end filtering model.

Adapted from Carson *et al*.[6]

The majority of studies described the addition of a GP to manage minor health conditions, with direct substitution for usual ED staff only explicitly described in one paper. One study evaluated eight EDs with co-located primary care/walk-in centre (WiC) services using traditional EDs as the control.[7] Two studies evaluated an integrated GP/ED model, although these functioned only out of hours and the level of integration was variable.[8 9]

Most of the included citations were variations on an uncontrolled before and after study, with one quasi-randomised evaluation,[10] two randomised controlled trials (RCTs)[11 12] and one pragmatic prospective evaluation.[13]

Impact on attendances

A Swedish study found that the introduction of a GP surgery adjacent to an ED increased the proportion of patients presenting to the ED with non-urgent complaints from 22% to 33%, with a 27% overall increase in the number of visits.[14]

Two multisite studies reported on the effect of the introduction of new service configurations on attendances. The first, by Kool *et al*,[8] compared traditional Dutch EDs and integrated emergency posts (IEPs)—staffed additionally with a GP, GP assistant or nurse with patients triaged to the appropriate clinician. They found that the proportion of self-referred patients (patients bypassing telephone triage) in the usual ED increased from 53% to 58% ($p<0.05$), while in the IEP group, there was a reduction from 62% to 46% ($p<0.05$). When the total attendances for the system (ED and GP) were considered, there was an 11% increase in attendances at the IEPs. Notably, for the same period, there was a 5% reduction in attendances at the control sites.

Other studies examining similar reconfigurations in GP collaboratives (GPCs) with EDs also demonstrated a reduction in self-presenting ED patients.[9 15 16 17] However, this may be explained by the gatekeeper role adopted in these models. An increase in overall attendances (ED and GPC) across the system was consistently observed.

The second multisite study was undertaken by Salisbury *et al* in England. They examined the impact of co-located WiCs and found that the number of patients increased during the study period at hospitals, independently of the presence of a co-located WiC (813/month at intervention sites; 95% CI −30.3 to 1655, $p=0.06$, and 270/month at control sites; 95% CI −114 to 655, $p=0.17$). The authors suggested that there was a greater increase in patient numbers at sites with co-located WiCs but there was wide variability between individual sites.[7]

Process time measures

Five studies reported the effect of the introduction of a primary care service or stream (staffed by GPs) on process times. The outcome measures of relevance to this review were LOS, WT and TT.

Length of stay

An English study, conducted by Salisbury *et al*,[7] reported compliance with the English 4 h target, which measures the proportion of patients with an ED transit time under 4 h.[22] In this study comparing eight EDs with co-located WiCs and eight traditional EDs, there was no significant difference in compliance with the 4 h target or patient LOS. The authors commented that the WiC concept was implemented in a limited fashion and with much variability between sites.

Table 1 Studies of process outcomes

Study details and country	Design	Control	Intervention	Results
Dale *et al*[10] England 1995	Quasi-randomised 419 nurse triage sessions—allocation of patients to either primary care (n=215) or ED sessions (n=204) (10:00–13:00; 14:00–17:00; 18:00–21:00)	Control n=2382 managed by ED SHOs n=557 managed by ED registrars	n=1702 managed by sessional GPs 3 h sessions sampled	ED doctors more likely to order X-rays and to refer (p<0.05) Investigations for problems unrelated to injuries—40% of primary care, 74.5% ED patients (p<0.001) Follow-up (3-months) n=1458. 23% contacted own GP at least once for same condition Patients that had seen a GP in the ED made more visits to own GP, underwent more subsequent investigations and were referred more
Murphy *et al*[12] Ireland 1996	Randomised controlled trial All new patients attending with conditions that were classified as semi-urgent or 'delay acceptable', when GP available. Sequential self-allocation of patients	N=2381 usual ED care	N=2303 3 sessional GPs (two 4 h sessions/week each)	GP investigated fewer patients (relative difference 20%; 95% CI 16% to 25%), referred to other hospital services less (39%; 95% CI 28% to 47%), admitted fewer patients (45%; 95% CI 32% to 56%) and prescribed more often (41%; 95% CI 30% to 54%) No significant effect for 30-day re-attendances; 17% (95% CI 15.7% to 18.8%) of patients seen by GP. 18% (95% CI 16.3% to 19.5%) of patients seen by an ED clinician
Ward *et al*[13] England 1996	Prospective survey Nurse triage of primary care patients using decision tool	N=404 Patients screened as minor/primary care were seen by ED staff	N=566 Minor/primary care seen by GP weekdays (14:00–17:00; 18:00–21:00) weekends (10:00–13:00; 14:00–17:00)	ED doctors undertook more investigations (p<0.001) No significant difference in those requiring advice or prescribed medication ED doctors more likely to refer to on-call teams (10.6% vs 4.5%; p<0.05), ED review clinic (11.7% vs 5.4%; p<0.05) or outpatient referral (22.3% vs 11.2%; p<0.05) GPs more likely to advise follow-up with community GP (70.9% vs 55.3%; p<0.05)
Gibney *et al*[11] Ireland 1999	Randomised controlled trial Untrained receptionist screening of non-ambulance patients as urgent/non-urgent Patients randomised when GPs available to ED or GP teams by sequential self-allocation of patients	n=1107 Control ED team: 1 consultant, 2 registrars, 5 SHOs	n=771 Intervention—GP team 3 GPs	GPs prescribed significantly more often (% RD=12 (95% CI 1 to 23)) and referred more patients to hospital (% RD=21 (95% CI 9 to 33)) No difference in investigations ordered. 6 (95% CI 13 to 0)
Krakau and Hassler[14] Sweden 1999	Interventional trial with historical control. The separate weeks sampled. 3806 visits Comparative attendance data for 19 months pre-intervention and post- intervention	Pre-intervention (1 week)	Post-intervention (a GP surgery established in the ED (GP only) (2 weeks)	The addition of GPs increased the number of visits to the ED by 27% Percentage of patients managed in the ED who had primary health care needs increased from 22% (95% CI 19% to 25%) to 33% (95% CI 30% to 37%) Average WT for patients with urgent or emergent complaints increased from 35 min to 40 min (14%). WT for non-urgent complaints reduced from 50 min to 37 min
Van Uden *et al*[15] Netherlands 2003	Comparison of out-of-hours models in two cities over a 3-week period	Stand-alone EDs and GPCs	Integrated ED and GPC	No significant difference between ED contacts/1000 population/year (p=0.184) Higher GPC contacts/1000/year in co-located setting (p=0.036) with lower ED self-referrals (p<0.001)
Van Uden and Crebolder[16] Netherlands 2004	Before and after comparison of out-of-hours use. Unclear if GPC were co-located or adjacent/near to ED.	4-Week period (2001) before reorganisation to establish GPC	4-Week period (2002) after establishment of GPC	8.9% reduction in ED attendances 9.8% increase in primary care attendances and 4.6% increase in over all attendances During out of hours, 3.6% shift from patients using emergency care to primary care (p=0.001; 95% CI 2.5 to 4.7)
Van Uden *et al*[17] Netherlands 2005	3-Week pre-intervention and post-intervention comparison	Stand-alone ED and GPC during out of hours	Integrated ED and GPC during out of hours	52% reduction in ED contacts 25% increase in primary care contacts 3.6% overall increase in patients seeking out-of-hours care (p<0.001 for all measures)
Jiménez *et al*[18] Spain 2005	Prospective interventional study Adult and paediatric low-acuity patients triaged to fast-track area	N=100 Control: resident ED physicians, 08:00–24:00	N=100 GP resident in fast-track area, 16:00–24:00 substituting for ED resident	Reduction in number of tests ordered (41% less; 95% CI −78 to −5) Significant reduction in time to be seen (20% less; 95% CI −4 to −5), time to treatment (25% less; 95% CI −49 to −4), length of stay (36% less; 95% CI −53 to −19) Reduction in patients sent to observation ward (78% less; 95% CI −147 to −12). Re-attendance rate reduced (75% less; 95% CI −6 to −140) No difference in referral rate or treatment

Continued

Table 1 Continued

Study details and country	Design	Control	Intervention	Results
Salisbury *et al*[7] England 2007	Before and after Random sample over a 2-week period	N=200 8 Traditional/stand-alone EDs	N=200 8 EDs with co-located walk-in centres	No evidence of any effect on attendance rates, process or outcome of care The proportion of patients managed within 4 h was 94.8% at both intervention and control sites
Kool *et al*[8] Netherlands 2008	Controlled before and after	Traditional separate primary and emergency care.	IEPs Integrated primary and emergency care Triage/telephone triage according to protocol by GP assistant. Allocate patients to ED doctor, GP or nurse specialist	Waiting/consultation times decreased from 116 min before the IEPs were established to 102 min (p<0.05) In control settings, waiting/consultation times increased from 94 min to 2 h (p<0.05) Proportion of self-referrals decreased from 62% before the IEPs were established to 46% (p<0.05) In the control settings, the proportion of self-referrals increased from 53% to 58% (p<0.05). Number of patients visiting the ED in the control settings increased from 3985 to 4321. 10 195 patients visited a GP post before the IEPs were established, 12 940 were seen by a GP, GP assistant or nurse after the IEPs were established In the control settings, the number of patients visiting a GP post decreased from 14 011 to 12 719 All of these changes in throughput were significant (p<0.05)
Boeke *et al*[19] Netherlands 2010	Before and after comparative study Self-referrers who attended the ED on weekdays (10:00–17:00)	Control n=832 Seen in usual ED	N=695 Allocated to GP (additional resource)	The mean process time in the ED decreased from 93 min to 69 min during the intervention (GP) period (p<0.001) Mean treatment times decreased from 60 min to 35 min (p<0.001) The new care method resulted in 13% decrease in additional investigations 48.5% received no treatment compared with 40.5% in the control 17% more were referred to GP for aftercare;17% less referred to an OPD
Sharma and Inder[20] Australia 2011	Statistical modelling using Victorian Emergency Minimum Dataset	EDs without co-located GP clinic	EDs with co-located GP clinic	WT for emergency (category 2) patients in hospitals with co-located GP clinics was 19% less (1.5 min less at the sample mean) than in hospitals without co-located GP clinics
Thijssen *et al*[9] Netherlands 2013	Observational pre-comparison and post-comparison during out-of-hours periods Change in triage system and closure of one ED during study period	Stand alone ED and GPC	Co-located integrated ED and GPC ECAP (emergency care access point)	13% reduction in ED patients 26% increase in regional GPC patients GP referral (213.4% increase from 10.876% to 34.089%) to service, Increase in hospital admission (20.2%) and follow up (5.8%) rates after integrated model. (all statistically significant)
Wang *et al*[21] Switzerland 2014	Pre–post comparison of HGP and traditional ED Patients with no immediate life-saving intervention and no or only one resource needed, routed to the HGP by ED nurse	Traditional ED 451 walk-in patients	HGP 342 walk-in patients HGP staffed by ED resident 09:00–17:00 (weekday). GP 17:00–22:30 (weekday), 10:00–22:30 (weekend) HGP-shared infrastructure, medical supervision and administration with ED. GP as additional resource Unclear if resident also additional	Additional diagnostics for 70.5% of patients (traditional ED) vs 55.6% (HGP) (ie, GPs and residents together), p<0.001 Median admission to discharge time 120 min (ED) (IQR 80–165) vs 60 min (HGP) (IQR 40–90) (p<0.001) Adjusted OR for diagnostics 1.86 (95% CI 1.06 to 3.27; p=0.032) for ED doctors vs GPs Higher specialist consultation for HGP (p<0.001)

GP, general practitioner; GPC, GP collaborative; HGP, hospital-integrated general practice; IEP, integrated emergency posts; RD, relative difference; % RD, percentage relative difference; SHO, senior house officer; WT, waiting time.

Jiménez *et al*[18] evaluated the substitution of a GP for the usual ED clinician for low-acuity patients in a Spanish ED. They found a reduction in mean LOS for these patients of 36% (95% CI −53% to −19%) (119 min to 76 min, p<0.01) with the intervention. A Dutch study, conducted by Kool *et al*,[8] reported a 14 min reduction in LOS from 116 min to 102 min (p<0.05) after introduction of an IEP (GP service along with the ED). Interestingly, the authors also reported a 26 min rise in LOS at the control ED (p<0.05) during the same period. In a later Dutch study, Boeke *et al* looked at the addition of a GP to the ED for patients who did not require emergency help. They reported a 24 min reduction in mean process time (93 min to 69 min, p<0.001).[19] A study comparing a new hospital integrated general practice (HGP) in a Swiss ED with a historical control found that LOS was halved (120 min to 60 min, p<0.001) with the new HGP.[21] This reduction was independent

of whether the HGP was staffed by ED (general medicine) residents or GPs, who were an additional resource compared with the historical control.

Waiting time

Three studies specifically reported WT as an outcome, although several included the perception of WT as a measure of patient satisfaction. Jiménez *et al*[18] found a 20% reduction in WT (95% CI −40 to −5) from a mean of 84 min to 67 min ($p<0.05$) in a low-acuity area when staffed by GPs compared with ED residents. Wang *et al*[21] found no difference in WT after the introduction of a GP service for low-acuity patients (25 min in both, $p=0.065$). This contrasts with an earlier study where the addition of GPs to the ED increased the average WT for admitted patients and those with urgent or emergent complaints from 35 min to 40 min (14%), while reducing the WT for non-urgent cases from 50 min to 37 min.[14] This was attributed to the increase in demand resulting from the introduction of GPs. More recently, a statistical model used on an Australian ED data set found that emergency patients waited 1.5 min less in EDs with a co-located GP clinic.[20]

Treatment time

Jiménez *et al*[18] found no difference between ED clinicians and GPs in the proportion of patients receiving any type of treatment. There was, however, a 25% reduction in the time to treatment (TT) with the introduction of a GP (95% CI −40 to −5). Boeke *et al*[19] found that 48.5% of the patients in the GP group (intervention) received no treatment compared with 40.5% in the usual care (ED) method ($p=0.0013$). The reduction in mean TT between usual ED care and GP care was 25 min ($p<0.001$). In the usual care system, 20.1% of all ED patients had been treated within 20 min, and 57% had been treated within 1 h. In the intervention group, 55.8% of all patients received treatment within 20 min, and 80.1% received treatment within 1 h. In the interpretation of the time differences, the GP was an addition and not a substitution for ED clinicians.

Resource utilisation

Six studies[10 12 13 18 19 21] reported more diagnostic testing (predominantly radiography and blood tests) by ED clinicians than GPs in the ED or adjacent service. One study using GPs within the ED[11] found no difference in the use of investigations (RR 1.06; 95% CI 1.00 to 1.13) between ED and GP clinicians. Two studies were RCTs and, while Gibney *et al*[11] reported similar baseline patient characteristics for GP and ED groups, there were some differences in characteristics between groups in the study by Murphy *et al*[12] despite the same randomisation methodology. This was also evident in the non-randomised studies although the effects were unclear.

Radiography

Considering radiography alone, GPs ordered significantly fewer X-rays than emergency physicians (EPs)[10 12 13 19 21] in all but one study,[11] which found a tendency to more X-ray requesting by GPs, although this was not significant (% relative difference −7, 95% CI −15 to 1).

Laboratory use

Similar results were found for blood investigations (haematology and biochemistry predominantly) with GPs ordering significantly less than EPs in all[10 12 18 21] but two studies.[11 19] In the two studies reporting microbiology separately, there was a trend to less ordering by GPs in one[10] with no difference in the other.[13]

Medication

There was no statistically significant difference in prescribing behaviours between sessional GPs and regular EPs in two studies.[10 13] The RCTs, however, reported marginally more prescribing by GPs in one[11] and significantly more in the other.[12]

Follow up rates

Seven studies reported disposal outcomes ranging from referral to inpatient teams, admission and outpatient follow-up.[9 11 12 13 18 23] Complete data sets were missing from one study, which reported that the number of patients referred to their GPs for aftercare increased by 17% in the GP group, and the number of patients referred to outpatient clinics decreased by 17%.[19] One study examined the effect of an integrated ED/GPC and found an increased follow-up rate of 5.8% (OR 1.015, 95% CI 1.013 to 1.017).[9]

Admission

GPs admitted significantly fewer non-urgent patients to hospital than EPs in three studies.[10 12 13] Two authors found that the proportion of admissions made by either type of clinician was not significantly different,[11 18] while one study found a 20.2% increase in admission rate ($p<0.05$) after implementation of an integrated GPC/ED emergency care access point model.[9]

Referral

Three studies demonstrated that GPs made significantly fewer referrals to hospital specialists/consultants,[10 12 13] with one reporting the converse.[11] An integrated GP/ED service resulted in a 6.5% increase (from 3.5% to 10%, $p<0.001$) in specialist consultations.[21]

Re-attendance/re-consultation

One study reported no difference in ED re-attendance rate by patients seen by GPs versus EPs.[12] A more recent paper reported a reduction in overall re-attendance rate from 2% to 0.5% (95% CI −6% to −14%) with a fast-track area in the ED for low-acuity patients but no difference in re-attendances by patients seen by a GP (3.1%) compared with an ED resident (3.4%) (95% CI −90 to 73). None of the re-attendances resulted in admission.[18]

Between 18% and 50% of patients attended their GP surgery for the same problem within 7–30 days of their index ED attendance.[12 13 23] This proportion did not differ significantly if the patient was seen by a GP or ED clinician on the ED attendance.

Cost-effectiveness

Six studies reported cost-effectiveness or provided an estimate of costs associated with primary care services in an ED (table 2). The only multisite study, published in 2007 by Salisbury *et al* in the UK, reported a year-on-year total cost increase of 22% in the intervention group (co-located ED/WiC) and 10% in the control group. This difference was mainly due to the expected increase in clinician cost. There was no significant difference in costs per patient, even when admission costs were included in a sensitivity analysis.[7]

A study by Van Uden *et al* in the Netherlands calculated a higher per capita cost of an integrated primary care/ED out-of-hours model than the previously separate services (€11.47 and €10.54, respectively). They also reported a reduction in funding to the ED due to reduced activity despite unchanged overall ED costs.[24]

Table 2 Studies of cost-effectiveness

Study details and country	Design	Control	Intervention	Results
Murphy *et al*[12] Ireland 1996	RCT All new patients attending classified as semi-urgent or delay acceptable	N=2381 usual care	N=2303 sessional GPs	For all patients seen by GPs during the study, estimated marginal and total savings were £1427 and £117 005, respectively. (£95 125 with GP salary)
Dale *et al*[23] England 1996	Quasi-randomised Nurse triage—allocate patients to primary care or ED n=419, 3 h sessions (10:00–13:00; 14:00–17:00; 18:00–21:00)	n=2382 managed by ED SHO n=557 managed by ED registrars n=204 ED doctor sessions	n=1702 managed by sessional GPs n=215 GP sessions	Cost per patient SHO—£19.30 Registrar—£17.97 GP—£11.70 Follow-up costs not explicit but 23% contacted their own GP at least once for the same condition Patients that had seen by a GP in the ED made more visits to own GP, underwent more subsequent investigations and were referred more
Jiménez *et al*[18] Spain 2005	Prospective Before and after study. Adult and paediatric patients triaged to fast-track area	N=100 Resident physicians, 08:00–24:00	N=100 GP resident in fast-track area for 8 h 16:00–24:00	Cost-effectiveness analysis clearly supported the study period, showing a decrease in CE indices for WTs, opening times and perceived WT (55% less, 95% CI −100 to −11) (33% less; −60 to −11) and (6% less; −42 to −48), respectively Cost/visit €237 intervention, €300 control Variable costs (€930 to €1440) Fixed costs (€5118 to €4510)
Van Uden *et al*[24] Netherlands 2006	Economic analysis and before and after comparison	Stand-alone ED and GPC	Integrated ED and GPC	Per capita costs of the integrated model were higher (€11.47 and €10.54, respectively) ED costs were constant; however, a loss of €1.36 million was realised due to reduced activity
Salisbury *et al*[7] England 2007	Before and after Random sample over a 2-week period	N=200 8 traditional/ stand-alone EDs	N=200 8 EDs with co-located walk-in centres	No change in overall cost per patient (−£3.06; 95% CI −16.50 to 10.39) or for admitted patients (−£20.97; 95% CI −64.98 to 23.04 per patient) The year-on-year total cost increased by 22% in the intervention group and by 10% in the control group The differential between the two groups was largely due to the difference in the increase in clinical staff costs of 28% in the intervention group and 15% in the control group
Bosmans *et al*[25] Netherlands 2012	Before and after intervention Self-referrers who attended the ED on weekdays (10:00–17:00)	n=832 Standard ED care	N=695 Allocated to GP (additional resource)	Total mean costs per patient in the new care (GP) period were lower than in the usual care period (mean difference −€71, 95% CI −121 to −23) Medical costs were the largest contributor to this difference in total costs (mean difference −€68, 96% of total cost difference) Process time costs in the new care period were significantly lower than in the usual care period (mean difference −€4, 95% CI −4 to −3) Diagnostics −€10 (−21 to 1) Therapeutic −€39 (−81 to −6)

GPs, general practitioners; GPC, GP collaboratives; RCT, randomised controlled trial; SHO, senior house officer; WT, waiting time.

Two older UK studies[12 23] suggested some cost benefit with the introduction of a GP/primary care stream. As these were carried out two decades ago, the cost estimates are likely to be different to the present; however, the authors suggested only marginal cost savings of between £0.58 and £7.60 per patient, excluding admission costs.

A 2005 Spanish study showed that the average cost per patient was €116.99 lower with a GP staffed low-acuity area compared with usual ED care (p=0.005).[18]

A 2012 Dutch study by Bosmans *et al* reported direct (TT, treatment/investigation and outcomes after discharge) and indirect costs associated with process times. The authors calculated incremental cost-effectiveness ratios associated with process time, patient satisfaction and correct diagnosis. Total costs per patient were €71 lower in a model with lower-acuity patients streamed to a GP (95% CI −121 to −23) and based on GP staffing between 1000 and 1700. Process time costs in the GP model were lower than in the usual ED model (mean difference −€4, 95% CI −4 to −3). The cost-effectiveness analysis showed that the GP streaming model was dominant (more effective, less expensive) in comparison with usual ED care for process time and patient satisfaction. The GP model was considered cost-effective in comparison with usual ED care for ceiling ratios between €0 and €1363 for the number of correct diagnoses.[25]

Patient satisfaction

Eleven studies were identified that included patient satisfaction as an outcome measure; however, only six of these actually reported any detail of measuring or recording differences between control and intervention groups (table 3).[8 18 19 23 25 26] One study reported patient satisfaction in two papers.[19 25] Four studies found no difference in satisfaction between usual ED care and addition of a GP/primary care stream.[8 18 23 26] One study found that the triage telephone contact prior to being seen resulted in higher patient satisfaction than self-referral. Of note, this study also reported significantly lower staff satisfaction.[8]

The two linked Dutch studies by Boeke *et al*[19] and Bosmans *et al*[25] found marginally increased patient satisfaction in patients allocated to a GP compared with standard ED care.

Table 3 Studies of patient satisfaction

Study details and country	Design	Control	Intervention	Results
Dale *et al*[23] England 1996	Quasi-randomised Nurse triage—allocate patients to primary care or ED n=419, 3 h sessions (10:00–13:00; 14:00–17:00; 18:00–21:00)	n=2382 managed by ED SHO n=557 managed by ED registrars n=204 ED doctor sessions	n=1702 managed by sessional GPs n=215 GP sessions	No difference reported in satisfaction with assessment (p=0.73), treatment (p=0.7) or doctor's manner (p=0.6) Slight, non-significant differences between the types of doctor (ED or GP) in the reported levels of dissatisfaction ('dissatisfied' or 'very dissatisfied)', (p=0.1 1)
Jiménez *et al*[18] Spain 2005	Prospective Before and after study Adult and paediatric low-acuity patients triaged to fast-track area	N=100 resident physicians, 08:00–24:00	N=100 GP resident in fast-track area for 8 h 16:00–24:00	Reported an index of satisfaction as a function of perceived care quality and WT No difference reported (10% change between control and intervention) (−34 to 54)
Chalder *et al*[26] England 2007	Controlled mixed-methods Cross-sectional survey questionnaire N=704	8 'traditional' EDs (39.7% of respondents)	Patients attending 8 EDs with co-located walk-in centres (32.9% of respondents)	High percentage of patients expressing a preference for care in an established ED compared with that in a new walk-in centre facility No difference in satisfaction between control and intervention Re-coded dissatisfaction scores suggested patients were more dissatisfied by ED in relation to visit duration, cleanliness of the facility, time given to discuss healthcare problems, involvement in decision-making, discussion of fears and anxieties and privacy during the consultation
Kool *et al*[8] Netherlands 2008	Controlled before and after	Traditional primary and emergency care	IEP Integrated primary and emergency care Triage/telephone triage according to protocol by GP assistant. Allocated patients to: ED doctor, GP or nurse specialist	No difference in satisfaction with accessibility, WT, reception, information and communication, autonomy, discharge and aftercare, interpretation of the question, treatment Significant staff dissatisfaction with IEP for autonomy, social climate, being informed, culture, use of personal capabilities/skills (p<0.05)
Boeke *et al*[19] Netherlands 2010	Before and after evaluation Self-referrers who attended the ED on weekdays during the day (10:00–17:00)	Control n=832	Allocated to GP N=695	Patient satisfaction in the new care period (GP) was significantly higher than in the usual care (ED) period (mean difference 0.4, 95% CI 0.3 to 0.6) No difference in access; 0.07 (95% CI −0.12 to 0.27)

GP, general practitioner; IEP, integrated emergency posts; SHO, senior house officer; WT, waiting time.

DISCUSSION

Input or demand

An understanding of the demand profile and number of patients with primary care conditions expected to attend an ED is fundamental to forecasting the resources they require and its associated cost. There is significant variation in the reported estimates of primary care suitable patients attending EDs.[27 28 29] This difference may also be due to the increasing proportion of primary care cases over time.[2] Some of the variation is undoubtedly due to the conceptual issue of what could be treated by a GP or ED clinician and what is best treated by a specific specialty. A review of the literature on methods for categorising ED visits as either urgent or non-urgent found 51 methods of doing so (17 conducted prospectively in triage). Comparisons of methods of categorisation in the same population showed variability in levels of agreement, further highlighting a lack of reliability and reproducibility.[30]

Supply (provider)-induced demand

In health economics, supplier-induced demand describes the amount of demand that exists beyond what would have occurred in a market in which patients are fully informed.[31] In the context of unscheduled care in a health system that is free at the point of access, it is perhaps more accurate to describe 'provider-induced demand'; it can be simply put as—'if you build it they will come'. In other words, once resources or services are available, overutilisation will occur even if outcomes or quality is uncertain.[32] Although this term is more often used to describe the behaviour of clinicians when faced with professional uncertainty or financial targets, it can also describe health-seeking behaviour and demand for unscheduled healthcare; for example, when barriers to access are removed.

In a study of the impact of a WiC on demand on other services, an increase in attendances at a minor injury unit (MIU) was attributed to the fact that the MIU was co-located with the WiC.[33] Point estimates in another study of co-located WiC found a non-significant increase in throughput at sites with EDs co-located with a WiC.[7] Aggregate data would support this theory with a significant increase in total attendances at all types of unscheduled care facilities since the introduction of WiCs, but with no change in the trend of ED attendances.[34]

Increased system demand as a result of integrating or including primary care practitioners and services with EDs has consistently been demonstrated in European studies.[9 14 17]

Caution must be exercised, therefore, in estimating the proportion of patients suitable for screening out into a primary care service as this is likely to increase once the service is operational. This effect is likely to be compounded if any new service does not accept patients 24 h/day as the additional patients attending out of hours may worsen the burden on the ED.

Throughput and process

Much of the theoretical basis for removing primary care-type patients from the ED is predicated on their use of resources,

which are better directed towards emergencies. This idea appears intuitively robust since as input into the system is reduced, the amount of resources per patient increases. This reduction, therefore, should have a positive impact on WTs and throughput times. Although the evidence suggests that a reduction in these indices is apparent with the addition of primary care service/clinician,[18 20] this finding is not universal. A large multisite Canadian study by Schull *et al*[35] analysed four million ED visits and demonstrated that low-complexity ED patients are associated with a negligible increase in ED LOS and WT for other ED patients. It follows that reducing the number of low-complexity (primary care) ED patients is unlikely to reduce waiting or throughput times for other patients. A Cochrane review based on three of the UK studies in this review concluded that there was insufficient evidence of any effectiveness on crowding or flow by provision of care to non-urgent patients by GPs rather than ED clinicians.[36]

The risk of bias being introduced is greater in single-site studies, for example, due to the Hawthorne effect,[37] where simply the knowledge of being evaluated increases productivity. However, a simpler reason for the improved performance by the addition of a primary care service was because of the extra clinicians introduced. Arguably, this has the same effect, regardless of the type of clinician, and occurs simply because there are more clinicians managing the same input.

Assuming that any new service is resource neutral (in order to fulfil the overall mandate of long-term cost savings), there is little evidence of improvement in throughput from streaming primary care attendances out of the general ED population.

Cost-effectiveness

Although there is some evidence of increased resource utilisation when primary care patients are seen in an ED, the magnitude of this overuse is questionable. The Primary Care Foundation reported that most UCCs stated a cost per case of £28–40; however, they could not obtain reliable data to determine a true cost comparison with the ED.[6]

Although there is evidence of cost-effectiveness of using primary care clinicians in two European studies,[18 25] their reference costs were significantly different from UK costs, and from each other. In the most recent multicentre English study, no difference in costs per patient was found,[7] while the savings reported by two earlier studies were for processes only and used variable and ill-defined reference costs.[12 23] The ED operates with high fixed costs and relatively low marginal costs. The average cost would, therefore, decrease as the number of patients increases.[38] This variability in the magnitude of any cost saving is consistent with findings in the North American and Australian literature, with the suggestion that the true costs of non-urgent care in the ED are relatively low.[39 40]

Capital and recurrent costs add significantly to the stated cost per case in any new service. The potential savings from a diversion of non-urgent visits to primary care are, therefore, likely to be much less than is widely believed.

Some consideration of the destabilising economic impact of removing work from the ED is important. In settings in which ED budgets are based on activity, lower ED volume may result in reduced income but with little or no change in operational cost as these are relatively fixed.[24]

Patient choice and satisfaction

There is little evidence of increased patient satisfaction from ED-based primary care services, with one study finding that a high percentage of patients actually expressed a preference for care in an established ED compared with that in a new co-located WiC.[26] Dissatisfaction was mainly related to the environment, pace and case-mix of the ED, which understandably is not conducive to less urgent needs. Of note, the only study looking at a fully integrated ED/primary care system found no change in patient satisfaction, but significantly reduced staff satisfaction associated with the new service.[8] Although this could be explained by the natural response to change,[41] it emphasises the importance of ensuring that the new model is sound and does not risk alienating the workforce. Disengaged staff can potentially result in lower productivity and higher patient dissatisfaction.

By blurring the line between emergency and primary care by co-locating services, there is a risk of losing the continuity of care that primary care provides and encouraging ad hoc health-seeking behaviour. This is likely to lead to confusion, longer pathways and lower degrees of satisfaction with the services being used.[42]

LIMITATIONS

The review was not undertaken as a systematic review as it was apparent that the variability and context of interventions and outcomes became lost in the rigidity of the method. This may have led to some bias in the selection and use of retrieved articles. However, the broad, purposive search strategy allowed a more inclusive range of citations to be used and ensured that the developing evidence was framed within context and reported outcomes. We undertook no formal assessment of quality due to the marked variability in study design, setting and outcomes. This allowed a fuller understanding of the individual components of the models presented.

Unfortunately, this review has no proposed solution to the problem of increasing unscheduled care demand and the system-wide effects this has. There is a suggestion that the solution of a co-located UCC has not taken into account the complexity of the underlying issues[43] and perhaps the focus should be on other contributory factors. This review could not consider all of these issues, but supports a fuller exploration of some of the assumptions and theoretical benefits of UCCs in the broader context of the issues facing the health community, such as the aging population, access and integrating health and social/community care for example.

CONCLUSIONS

There are significant and unexpected consequences of simply transferring interventions that work in one setting without an understanding of context and the process of change.[44] Much of the impetus for implementing co-located UCCs stems from an accepted theoretical basis supported by individual examples of success in other settings. The evidence base, however, suggests that the expected benefits of the introduction of such a service are not a given, with variable outcomes reported.

There is evidence of the unexpected consequence of a paradoxical increase in demand driven by co-locating services that are meant to reduce such demand. Similarly, the theoretical cost savings are not as expected when subject to closer scrutiny, particularly as most reported savings are based on marginal costs without consideration of capital or indirect expenditure. Evidence for a model that is cost neutral across the health community is lacking. Any proposed model, therefore, requires robust evaluation before implementation.

Patients are generally good at deciding where to access care, and inappropriate choices are generally a function of complex socioeconomic factors and shortcomings in the unscheduled care system.[3] People attend the ED by choice—removing this

option may be unacceptable and more readily addressed by simplifying, adapting and resourcing unscheduled care to manage all potential service users across the system.

Contributors SR conceived the idea and wrote the first draft manuscript. SR and AR conducted the literature searches. SM,SA, CO and AR contributed substantially to subsequent content and drafts.

Competing interests None declared.

Provenance and peer review Not commissioned; externally peer reviewed.

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Primary care services located with EDs: a review of effectiveness

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Emerg Med J published online April 11, 2016