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What do we know about demand, use and outcomes in primary care out-of-hours services? A systematic scoping review of international literature

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Abstract

Objective To synthesise international evidence for demand, use and outcomes of primary care out-of-hours health services (OOHS).

Design Systematic scoping review.

Data sources CINAHL; Medline; PsyARTICLES; PsychINFO; SocINDEX; and Embase from 1995 –2019.

Study selection English language studies in UK or similar international settings, focused on services in or directly impacting primary care.

Results 105 studies included: 54% from mainland Europe/Republic of Ireland; 37% from UK. Most focused on general practitioner-led out-of-hours co-operatives. Evidence for increasing patient demand over time was weak due to data heterogeneity, infrequent reporting of population denominators and little adjustment for population socio-demographics. There was consistent evidence of higher OOHS use in the evening compared to overnight, at weekends and by certain groups (children aged <5, adults aged >65, women, those from socioeconomically deprived areas, with chronic diseases or mental health problems). Contact with OOHS was driven by problems perceived as urgent by patients. Respiratory, musculoskeletal, skin and abdominal symptoms were commonest reasons for contact in adults; fever and gastrointestinal symptoms were commonest in the under-5s. Frequent users of daytime services were also frequent OOHS users; difficulty accessing daytime services was also associated with OOHS use. There is some evidence to suggest that OOHS co-located in emergency departments can reduce demand in EDs.

Conclusions Policy changes have impacted on OOHS over the past two decades. While there are generalisable lessons, a lack of comparable data makes it difficult to judge how demand has changed over time. Agreement on collection of OOHS data would allow robust comparisons within and across countries and across new models of care**.** Future developments in OOHS should also pay more attention to the relationship with daytime primary care and other services.

Strengths and limitations of this study

- Systematic scoping review of six medical, psychological and sociological databases and including a diverse range of study designs.
- Searches covering a timeframe of recognised international change in the provision of out-of-hours health services from 1995 to 2019.
- A focus on English language papers and on health systems broadly similar to UK primary care may have led to some relevant papers from other health systems being missed.
- The inclusion of 105 papers reporting on demand, use and outcomes of OOHS is the largest review to date of OOHS use and provision.

Introduction

Out-of-hours primary care is a key element of many health care systems. It is defined as care delivered outside 'normal working hours', when daytime family or general practice is closed; typically between 17:00 or 18:00 and 08:00 on weekdays, all weekend and public holidays.[1 2] However, the provision of out-of-hours care continues to face challenges, in particular rising demand and difficulties in recruiting general practitioners/family doctors to work in out-of-hours health services (OOHS).[2]

These difficulties have led to numerous attempts at both re-organising out-of-hours health care and implementing new models of care. Policy change in many European countries supported a switch from personal or small rota-based systems of family doctors/general practitioners (GPs) providing care for their own patients on a practice list or using a commercial deputising services, to regional co-operatives of GPs providing OOHS for all patients within a geographical region.[2-4] In the UK, a shift in funding arrangements for OOHS in 1995 encouraged GPs to work collaboratively in out-of-hours co-operatives.[5] In 2004, contractual changes to the General Medical Services contract then gave GPs the option of transferring responsibility for OOHS to local health authorities. This change, however, presented major challenges for health authorities, with an increasing lack of GPs to run services. As a result, there has been on-going development of new models of OOHS such as out-of-hours primary care centres (OOHC), walk-in-centres (WIC), minor injuries units (MIU), and national or centralised telephone triage and advice services (TTA).[6] Based in the primary care setting, these models of care are staffed by a range of professionals, including nurse practitioners, call handlers, and emergency care practitioners as well as GPs.[6 7] Similar re-organisations have been documented in other high income countries.[2 8] In the Netherlands, for example, around half of the primary care co-operatives have now integrated with hospital emergency departments to offer a single access point to emergency and out-of-hours primary care, with the suggestion that attendances at emergency departments decreased by about 13%. [8]

However, to date, little is known about the impact of these different models on demand for, and use of, OOHS across different health care systems. Nor is it clear how demand might have changed over this period of service reorganisation. Such information may help policy makers design and provide services that meet population need and demand. As part of a wider scoping review of OOHS commissioned by the Scottish Government to inform their strategy for OOHS nationally,[9] we report here on the international evidence of demand, use and outcomes of care associated with OOHS.

Method

The work reported here was part of a wider systematic scoping review designed to identify the international literature relating to the provision of out-of-hours primary medical care. Scoping reviews are particularly suited to research designed to inform policy, where the research aims are broad in scope and the studies included encompass a range of research approaches and designs.[10-12] However, scoping reviews are undertaken with the same degree of rigor as more traditional systematic reviews, paying attention to PRISMA criteria.[12] [13] The study review protocol is available at www.crd.york.ac.uk/PROSPERO (registration number: PROSPERO 2015:CRD42015029741)

Search strategy

Six databases were searched using Ovid and EBSCOHost: CINAHL; Medline; PsyARTICLES; PsychINFO; SocINDEX; and Embase using terms related to primary care out-of-hours services. The full search strategy is included in Appendix 1. Manual searches of key journals were also conducted and identified two additional papers. The initial search timeframe was from 1995, when key changes took place in the organisation of UK out-of-hours services, to December 2017. An update was conducted in March 2019.

Study selection and quality assessment

All searches were saved into Endnote and duplicates removed. Articles were then screened in the review management software DistillerSR, using predefined inclusion and exclusion criteria (Box 1). All study designs were included. Two authors (drawn from COD, HF, KM, NB, MG and SMcD) independently assessed the abstracts and full papers for eligibility; disagreements were resolved by discussion, with reference to a third team member if required.

Study characteristics were extracted for all included papers by HF, KM, NB, MG and COD (two reviewers per paper). Papers were quality assessed using recognised checklists based on CASP checklists (https://casp-uk.net/casp-tools-checklists/) for observational studies, randomised controlled trials and reviews/systematic reviews. Each paper was appraised by two members of the team, led by COD and HF, supported by KM, NB, MG and SMcD. Papers were judged good if no element of the design was judged to be poor; fair if they were assigned one poor score; and poor if they were assigned two or more poor scores. COD reviewed papers identified in the update search.

Data extraction and analysis

Thematic analysis focused on the aims of the study; the population group; key findings and how this fitted to the key areas of interest to the Scottish Out-of-Hours Review Group. Discussion with the Review Group identified four major areas of interest, namely: Patient demand; new models of care; use of information technology; and quality and safety of care. In this paper, we focus on those papers addressing patient demand, as well as outcomes associated with that demand. The summary table is presented in Appendix 2. Some papers gave an estimated or adjusted rate of contact per annum. If these data were not provided crude contact rates were calculated, if possible. This relied on the paper giving information on (i) the size of population covered; (ii) the number of patient contacts; and (iii) a timeframe for data collection. These were calculated by HF, in discussion with COD.

Box 1. Inclusion and exclusion criteria

Studies were included if they met both of the following criteria:

- Based in UK or similar international primary care setting with recognised OOHS i.e. Europe, Australasia, US or Canada
- Studies of OOHS or services which impact directly on primary care, including:
  - Out-of-hours telephone-based services such as NHS 24, NHS Direct and NHS 111 service
  - Emergency Department (ED) initiatives designed to interface with primary care services
  - Community-based or social work services designed to interface with primary care services

Studies were excluded if they met any of the following criteria:

- Focus on dentistry, social work services, ED or other services not operating within or interfacing with primary care
- Editorials, opinion pieces or commentaries
- Evaluation reports of new services
- Policy documents produced by government agencies or position statements from professional bodies
- Not written in English language

Results

Study characteristics

The search identified 2548 papers, with 400 finally included (Figure 1). A description of all the identified papers is available on request to COD. Here, we report on the 105 papers which reported on the theme of demand, use and outcomes (see Appendix 2 for a summary of these papers). Over half were studies conducted in mainland Europe or Ireland, with the Netherlands (n=18) and Norway (n=11) predominant; one-third were set in the UK, mainly England; 6 were based in the USA, Australia or New Zealand; and 5 were set in multiple countries (Table 1). The majority of papers focused on the general population of users rather than on particular groups. Observational study designs predominated, in particular the use of routinely collected data from OOHS (n=41, 39.1%); prospective

or retrospective record reviews (n=31, 29.5%) and questionnaire surveys (n=14, 13.3%). Most reported studies were cross-sectional in design. Study quality was generally fair or good. A majority of studies reported on GP-led out-of-hours co-operative models (n=86), but there were also studies examining use in emergency departments (n=21); telephone triage services (n=12); GP deputising services (n=9) and urgent care or walk-in centres (n=7).

Six main subthemes were identified: patterns of use; time of use and demographics of users; urgency and presenting symptoms; proximity to OOHS and relationship with daytime services; OOHS outcomes; and the wider impact of new models of OOHS. These are discussed in turn below.

Patterns of use

Prior to services recording patient contacts themselves, either manually or electronically, studies used proxies for out-of-hours work (e.g. night visit claim fees) which failed to capture all out-of-hours contacts and made overall OOHS use levels difficult to ascertain.[14] In general, there was little attempt to standardise data reporting across settings – for example by reporting contact rates per head of population served. While many studies reported on the out-of-hours period covered, there was often no clear description of the characteristics of the population beyond age and gender. To explore trends in OOHS use we characterised the 40 studies identified in this review that gave OOHS contact rates or reported data from which a contact rate could be calculated (Table 2).This was not possible for the remaining 65 papers due to a lack of population denominators, individual patient level data, duplicate data, in-hours and out-of-hours contacts combined, or data that were restricted to particular patient groups or face-to-face contacts.

Overall, crude OOHS contact rates by country and year of data collection show no clear trend. Variation within country settings was apparent. For example, analysis of routine data comparing 20 GP co-operatives in England and Scotland showed an overall OOHS contact rate of 159 calls per 1000

patients per year but a rate of 221 calls/1000/year in Scotland compared with 45 calls/1000/year in England.[15] However, variation in OOHS model type, population covered and operational hours by the service made rate comparisons difficult. This heterogeneity in the data collected is described in Table 2. [15] Adjusting for the number of hours covered by OOHS made little difference to the crude contact rates presented in Table 2 (data not shown). However, variation in use might be due to more than demographic factors of the population or opening hours of the service; one international comparison suggested cultural differences accounted for more OOHS use in Denmark than in the Netherlands.[16]

More recently, routine electronic data for entire countries has become available. Data from the national telephone triage and advice (TTA) service in Scotland, NHS24, showed there were 1,285,038 calls in 2011, with 82% of calls occurring during OOH period.[17] This equated to an OOHS contact rate of roughly 200/1000/year. Countrywide data from Norway explored OOHS use between 2008 and 2017 and found that the number of consultations remained fairly constant at around 1.4 million per year[18]. However, the rise in the population meant that crude contact rates fell from 295/1000 /year in 2008 to 267/1000/year in 2017 (Table 2).

Time of use and demographics of users

Many papers reported OOHS use by time of the week. This identified a consistent weekly pattern of peak OOHS use across countries (Table 3). Weekends were busier than weeknights. During the week, 1800-2300 was the busiest period, while Sunday mornings were often the busiest weekend period.[15] [19] [20] Night time contacts (0000-0800) were more common at the weekend than during the week.[15] [21]

Studies which examined the demographics of users found that the most frequent users of OOHS were children, especially those under 5 years old (Table 3). Although not always apparent when absolute numbers of contacts were reported, older adults (65 and over) had higher rates of contact than

younger adults. [15 16 22 23] Women tended to use OOHS more than men, but men were more likely than women to use the emergency department (ED) out-of-hours.[23-27]

Overall, lower socioeconomic status was associated with higher use of OOHS,[15 22 28-33] although one study reported that this pattern was reversed for patients aged over 65.[22] Data from 21 co-operatives in the Netherlands showed neighbourhood characteristics such as household income and socioeconomic status explained some but not all of the variation in OOHS use.[33] Deprivation also appeared to influence service choice with those from more deprived areas more likely to use ED than OOHS.[23 29] These deprivation effects may be due to increased need, or to reduced access (or perceived reduced access) to daytime services in more deprived.[34] Having a chronic disease was associated with increased use of OOHS, although the chronic disease was often not the reason for contact.[28 35-38].

Few studies examined patient ethnicity or migrant status. Of those which did, there appeared to be an association with OOHS use, although the evidence was mixed and studies used various definitions of ethnicity and migrant status. Routine data from 21 Dutch co-operatives showed higher OOHS use in neighbourhoods with more non-Western immigrants[33] while national data from Norway showed that migrant groups had lower emergency primary care contact rates overall although rates were higher for specific migrant groups.[39] In England, TTA data found that, following contact with NHS Direct, white British or Bangladeshi children were most likely to be referred to urgent care services including OOHS while children of Indian and 'other white' ethnicity were least likely to be referred.[40]

Urgency and presenting symptoms

Contact with OOHS was driven by new or evolving problems perceived as urgent both by patients and by telephone triage call handlers (Table 3). Perceived urgency or exacerbation of an existing problem was reported as a reason for encounter in OOHS studies from Scotland,[34] Denmark,[41] and Norway.[42] Four months of national TTA data from NHS Direct in England showed 1 in 5 callers were referred on

to urgent care services (ambulance, ED or OOHS) by call handlers and urgent and emergency referrals were more frequent than non-urgent referrals in the OOH period.[40] In Scotland, TTA call handlers recorded duration of symptoms for 897,903 calls (69.9% of all calls); 62.9% of these calls concerned symptoms of <24hr duration.[17]

Eighteen papers reported that respiratory, skin, abdominal, musculoskeletal and unspecified symptoms were common presentations (Table 3). Symptoms associated with viral and upper respiratory tract infections, diarrhoea and vomiting also featured in 11 papers. Retrospective data from eight European countries showed consistency across countries in the common presenting symptoms: respiratory (20.4% of contacts), musculoskeletal (15.0%), skin (12.5%), abdominal/digestive (11.6%), general and unspecified symptoms (13.2%).[43] This is supported by TTA data from Scotland where the commonest out-of-hours problems were abdominal symptoms (13.2%), rashes/skin conditions (6.4%), breathing difficulties (6.3%) and genitourinary symptoms (6.2%).[17] Symptoms varied with age: fever and gastrointestinal symptoms were commonest in children under-5; cardiovascular disease and gastrointestinal symptoms commonest in older patients.[44]

Few studies focused on mental health; those that did described an increased prevalence of mental health problems in OOHS populations.[35 38] The studies also highlighted the higher level of urgency associated with mental health related OOHS contacts,[40 45] and that mental health problems in OOHS were of a greater severity than those in day-time hours.[46]

Five studies focussed on cancer and OOHS use.[47-51] Cancer related symptoms and palliative care accounted for 2% of OOHS contacts in two observational studies in the UK.[47 48] Analysis of billing claims in Norway showed contacts by patients with a cancer diagnosis accounted for 1% of all OOHS contacts in 2014, although only 47.7% of those contacts were cancer related.[51] Pain and infection control were the most common reasons for cancer related contact in two observational studies.[50 51]

Proximity to OOHS and relationship with daytime services

The relationship of proximity to OOHS to use or interactions with daytime GP services were addressed less frequently. Six studies reported that proximity to an OOHS was associated with higher use.[30 32 38 52-54] Three studies showed higher rates of OOHS use in more urban areas.[32 33 53] Conversely, routine data in Ireland found rural co-operatives had higher OOHS use than urban co-operatives.[55 56] In Finland, a retrospective review comparing three models of care found that OOHS use was higher where patients were able to attend their local primary care centre during out-of-hours compared to a model where OOHS access was more centralised.[57] However, these studies did not adjust for potential confounders such as patient socioeconomic status or need.

Two studies reported that frequent users of daytime services were also frequent users of OOHS;[37 58] three reported that difficulties accessing daytime services were a reason for using OOHS.[34 59 60] Drummond et al. found that these difficulties were associated with patients from lower socioeconomic areas.[34] Analysis of 100 general practices in the Netherlands found that practices characterised as high users of OOHS were: situated closer to co-operatives; had longer telephone waiting times; had GPs less available for palliative care; performed more tests; had a higher perceived work load; and had more assistants.[61] However, this study was unable to assess patient health status and did not adjust for socioeconomic status.

One third of patients contacting OOHS due to a chronic disease exacerbation had a daytime primary care contact in the preceding 30 days.[62] A study of 210 observed OOHS consultations in Norway found that that 18% of the clinicians' time was taken up with dealing with 'minor ailments' suggesting that improved self-care for minor ailments might reduce OOHS use.[63] Finally, a review of palliative care related OOHS contacts showed that where information from the daytime GP was available, patients

were less likely to be referred by OOHS doctors to hospital, highlighting how communication links with daytime services could influence OOHS care.[49]

OOHS outcomes

Much of the literature focused on the consultation type after contacting the OOHS, onward referral from the OOHS and outcomes after the contact. Most services offered the option of a home visit, a face-to-face consultation with a GP or other health care professional often at a primary care centre, or telephone advice (Table 4). Other outcomes included being sent an ambulance or being re-directed to an emergency department. Overall, face-to-face consultations or telephone advice were the most frequent outcomes. However, home visits were much more likely for older patients or patients with cancer or palliative care needs.[16 17 20 22 25 40 41 50 51 64-66] Younger patients were more likely to be seen at an OOH centre or receive telephone advice.[20 22 30 41 50 51]

The types of OOHS consultation were associated with geographical distance. Routine data from a co-operative in England found that those who lived further away were less likely to be seen face-to-face.[52] In Ireland, urban co-operatives performed fewer home visits and fewer telephone consultations and more centre-based consultations than rural co-operatives.[56]

Several studies identified characteristics associated with face-to-face contacts, onward referral to ED, and subsequent contacts or escalation in care. Analysis of four years' worth of OOHS contacts in one area of England showed that 1% (4832) of all OOHS contacts had a second OOHS contact within 3 days which resulted in referral to urgent secondary care services (e.g. hospital admission, ED or immediate ambulance).[67] Increasing age, prior use of OOHS and presentation during periods of low contact rates (e.g. overnight) were identified as patient factors associated with this 'delayed escalation'. In Denmark, patients with chronic disease had a higher risk of subsequent OOHS or daytime GP contact, hospital admission, and mortality during a 30-day follow-up period.[62] Palliative care patients were also

more likely to be referred to hospital by OOHS doctors; this was true across a range of palliative conditions including cancer, cardiovascular disease, digestive and endocrine problems.[49 58 62 63]

Wider impact of new models of OOHS care

OOHS service reforms leading to the formation of GP co-operatives and primary care centres led to marked changes in consultation types within geographical areas, in particular the development of patient visits to centres, telephone triage and advice and a decrease in home visits.[3 5 14] There was little evidence that reforms to OOHS led to higher use of EDs. Routine data of OOHS and ED use from one region in the Netherlands over four weeks before and after the introduction of three OOHS co-operatives showed a 9% decrease in ED contacts and a 10% increase in OOHS contacts.[68] Similarly, routine data from a single co-operative and ED in Maastricht, the Netherlands, showed that after introduction of a co-operative ED use dropped by 53% and OOHS use increased by 25%.[69]

More recently, evaluation of Dutch Urgent Care Collaborations, in which OOHS are co-located with EDs, reported mixed results. One study found no significant difference in ED contact rates but significantly fewer telephone consultations and home visits and more centre visits at the co-located OOHC.[70] In another evaluation, GPs dealt with a significantly higher proportion of patients and fewer patients ended up being seen in the ED, compared to separate OOHS and EDs.[27] Furthermore, within a co-located OOHS and ED, non-urgent ED contacts received more tests and more follow-up contacts than non-urgent OOHS contacts.[71] This might suggest improved efficiency at co-located OOHS and EDs with fewer patients inappropriately diverted to ED. However, these studies did not include quality of care measures or patient perspectives, so it is difficult to corroborate this assertion.[27]

A prospective case review following introduction of a TTA service in three areas in England showed minimal impact on ED and ambulance services and a small reduction in OOHS use.[72] Routine data analysis from Denmark showed that OOHS reform to regional co-operatives was not associated with

significant change in ED contact rates.[73] However, there was some evidence for inappropriate ED use after OOHS reform and that OOHS organisations could reduce ED workload. For example, after implementation of new OOHS arrangements in England, a survey of 200 patients admitted via ED to an inner-city hospital showed that although most patients sought primary care advice prior to attending ED, a significant minority attended ED directly and there was incomplete awareness of the new OOHS arrangements.[74] A systematic review of 74 studies identified barriers and facilitators of successful implementation of OOHS models that reduced ED workload. The review cited evidence for: TTA response delays increasing ambulance demand; extended paramedic roles reducing ED demand; and co-location and integration of GP and ED services reducing cost and ED workload.[75]

Discussion

We present here a major update to the literature on OOHS demand, use and outcomes. This literature was predominately observational and cross-sectional, drawing on data collected by the services themselves and originating in UK or western European countries. The literature documents the impact of the widespread policy change in OOHS organisation from smaller, rota-based models to larger, more centralised OOHS models, the development of telephone-based triage and advice lines and co-location of OOHS with EDs. Although there is a generally agreed definition of the out-of-hours period internationally, a lack of comparable collected data (e.g. by defining the denominator population or the timeframe) means that it is difficult to reliably track demand over time, even within countries. Thus, there is a lack of clear evidence to support claims that demand for OOHS is increasing or that OOHS use has been affected by new models of care. A general absence of contextual data on the setting and/or population served also means that variations in demand across OOHS are difficult to explain. We suggest, therefore, that rather than continuing to collect data on demand, some effort is first put into defining what data should be collected, and by whom, to allow robust comparisons within and across countries.

We did, however, identify clear and consistent patterns of peak OOHS use as well as population groups who are more frequent OOHS users: young children, older adults, women, as well as those with chronic diseases or mental health problems. However, the reason for the actual contact with the OOHS was often unrelated to the chronic illness itself. There was also clear descriptive evidence for the common symptoms and reasons for which people contact OOHS including perceived urgency and infection related symptoms and these reasons tend to differ from those attending ED out-of-hours. However, evidence using accurate diagnostic coding for conditions presenting during out-of-hours is non-existent. Linking high quality data from OOHS, hospital discharge and daytime primary care could, therefore, generate more definitive diagnostic data that could aid service planning.

Descriptive data here shows that palliative related contacts may account for relatively few numbers of OOHS contacts (1-2%). However, such contacts were associated with a high rate of home visits; thus although the overall numbers are small, the workload generated is large. The effects of deprivation, distance and rurality on OOHS use highlights the importance of incorporating local sociodemographic variables into OOHS design. Similarly, the effect of culture on OOHS use means that comparisons across countries need to take into account cultural differences as well structural service differences in order for comparisons to be meaningful.

OOHS reforms and organisational changes led to new types of care being offered to patients, including face-to-face contacts in primary care centres and an increasing use of telephone triage and advice. However, there was a lack of evidence for an effect of OOHS models on overall OOHS use. There was mixed evidence of the effect of OOHS models on ED use but policy reform towards a co-located model seemed to reduce ED demand. The potential impact that different models of care can have on OOHS use means that new models should be piloted and their impact on other health services evaluated prior to national roll out. Moreover, the literature highlighted the inter-related nature of daytime services and OOHS. Future developments should, we suggest, pay more attention to this relationship

and consider how changes in one setting may impact on care provision in the other setting. In particular, the literature offered observational evidence of opportunities for daytime primary care contacts to reduce OOHS through enhanced chronic disease management and anticipatory palliative care however there is a lack of experimental evidence of enhancing daytime care to influence OOHS use. However, such developments must be mindful of those who are disadvantaged in terms of health care access, and so ensure that health inequalities are not exacerbated.

Conclusion

There is a large, international body of quantitative, observational and cross-sectional literature documenting the demand, use and outcomes of OOHS. Changes in patient use of OOHS has been driven by new models of care developed as a result of changes to out-of-hours primary care policy. A lack of internationally agreed standards in data collection and service definitions means that comparison of service demand across and within countries is difficult and makes it difficult to ascertain how that demand is changing; however, there are consistencies with respect to the demographics and presenting symptoms of those who use OOHS. Moving forward, there is an urgent need for robust evaluations of the new models of care being developed, particularly in relation to the OOHS-ED interface and more consideration of how demand in daytime services impacts on OOHS and vice versa.

Contributors.

COD, HF and SM conceived the idea and designed the study; COD, NB and SM designed the search strategies, with input from University of Glasgow and Health Improvement Scotland subject-specific librarians. All authors contributed to the design of data extraction pro-formas, screening of titles, abstracts and papers and data extraction. HF, KM and COD analysed the data; all authors contributed to data interpretation. HF wrote the first draft; COD led the re-drafting; all authors contributed to the final version and agreed to its submission. COD is the guarantor.

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Competing interests.

All authors have completed the ICMJE uniform disclosure form at http://www.icmje.org/coi_disclosure.pdf and declare: no support from any organisation for the submitted work; no financial relationships with any organisations that might have an interest in the submitted work in the previous three years, no other relationships or activities that could appear to have influenced the submitted work.

Ethical approval.

Ethical approval was not required for this study.

Data sharing.

Copies of the search strategy, identified studies and data extraction proforma are available on request to HF or COD.

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Table 1. Characteristics of the included papers addressing demand, use and outcomes in OOHS.

Characteristics	Number (%) of papers
Country/Regional Setting (n = 105)	
Mainland Europe & Republic of Ireland	57 (54.3)
United Kingdom	37 (35.2)
USA, Australia, or New Zealand	6 (5.7)
International	5 (4.8)
Year of Publication (n = 105)	
1995 - 1999	14 (13.3)
2000 - 2004	14 (13.3)
2005 - 2009	16 (15.2)
2010 - 2014	29 (27.7)
2015 – 2019 (up to March 2019)	32 (30.5)
Study Design (n=105)	
Routine data analysis	41 (39.1)
Retrospective case review	17 (16.2)
Prospective case review	14 (13.3)
Observational (Case control or cohort studies)	6 (5.7)
Questionnaire/Survey	14 (13.3)
Mixed methods	5 (4.8)
Reviews/Systematic reviews	5 (4.8)
Other	3 (2.8)
Patient Focus (n=101)	
General	63 (63.4)
Adults (aged 16 and over)	2 (2.0)
Elderly only (65 years and over)	2 (2.0)
Children (under 16 years)	6 (5.9)
Cancer/Palliative patients	6 (5.9)
Mental health/Psychiatric patients	4 (4.0)
Other (includes frequent attenders (4); patients with chronic disease (4); migrant patients (n = 2)	18 (17.8)
Main Setting (n = 151*)	
GP out-of-hours co-operative	86 (57.0)
Accident & Emergency/Emergency department	21 (13.9)
Telephone triage service (e.g. NHS Direct, NHS 24, NHS 111)	12 (8.0)
GP deputising service	9 (5.9)
Urgent care centre	4 (2.6)
Walk-in clinic	3 (2.0)
Other (e.g. Ambulance; Casualty clinic; Community hospital; Minor injuries unit; OOH Palliative care service; Daytime general practice)	16 (10.6)

*More than 105 due to multiple settings in some papers.

Table 2. Characteristics of 40 studies with data to permit a calculation of crude contact rates.

Study	Country	Model	Data origin (OOHS period definition, excluding holidays)	Number of hours covered by OOHS per week	Crude contacts/ 1000/yr*
Majeed et al, 1995.[28]	England	Rota & Deputising	Night visit rates from 129 practices collected over 12 months from 1993 to 1994; London (2200-0800, Mon-Sun).	70	25 night visits/1000/yr
Heaney & Gorman, 1996.[21]	Scotland	Rota	8 GP practices; 2,236 contacts over 10 weeks in 1995 (OOHS opening hours not stated).	Not stated	265
Brogan et al, 1998.[76]	England	Rota & Deputising	Buckinghamshire; population 660,000; 21,649 contacts; March-April 1995. (1900-0800, Mon-Fri + all weekend).	113	197
Toivanen et al, 1998.[57]	Finland	Co-op	2 semi-rural health centres; population 46,438; 2,926 'office visits' over 2 months in 1993; no telephone contacts (1600-0800 Mon-Fri + all weekend).	128	378
Avery et al, 1999.[77]	England	Rota & Deputising	6 inner-city GP Practices; Nottingham; population 45,1826; 3181 GP contacts; 6 months period in 1996 (1900-0800 Mon-Fri + weekend from Sat 1200)	109	136
O'Donnell et al, 1999.[22]	Scotland	Co-op	Whole city of approx. 950,000 population; Glasgow; 3193 contacts in 1 week in October 1996, rate given by authors (OOHS opening hours not stated).	Not stated	158
Salisbury et al, 2000.[15]	England + Scotland	Co-op	20 co-operatives; population 4,677,855; 899 657 calls over 12 months in 1997-1998 (1900-0700 Mon-Fri + weekend from Sat 1200).	104	159
O'Reilly et al, 2001.[30]	N. Ireland	Co-op	1 co-operative (4 primary care centres); population 394,000; 110,357 OOH calls in 1 year, 1998 (OOHS opening hours not stated).	Not stated	280
Payne et al, 2001.[78]	England	TTA	One city area; population 900,000; 56,450 calls in 1 year (1999-2000) although not all calls recorded. Total calls	118	49

			'likely' between 74,706 and 56,450. Estimate taken as 65,000 calls; 68% of calls OOH (1800-0800 Mon-Fri + all weekend).		
Munro et al, 2003.[52]	England	Co-op	1 primary care centre; population 230,000; 31,048 OOHS calls over 14 months in 1997-1998 (OOHS opening hours not stated).	Not stated	116
van Uden et al, 2003.[70]	Netherlands	Co-op	2 regions; Heerlen; population 278,000; 3 weeks in June 2001; Maastricht population 190,000; 3 weeks in Oct-Sep 2001; 3,825 and 3,054 contacts (OOHS opening hours not stated).	Not stated	258
Beale et al, 2006.[31]	England	TTA	3 postcode areas; population not given; 4 months in 2004; rate stated in paper (1900-0700 Mon-Fri + weekends from Sat 1200).	103	77
Bury et al, 2006.[56]	R.O.I.	Co-op	8 non-urban and 3 urban co-ops.; population 1,523,500; 336,466 contacts in 1 year, 2002 (OOHS opening hours not stated).	Not stated	221
Giesen et al, 2006.[24]	Netherlands	Co-op	1 co-operative; population 223,410; 4 weeks in February 2003; 4423 contacts (1700-0800 Mon-Fri + all weekend).	123	258
Moll van Charante et al, 2007.[64]	Netherlands	Co-op	1 co-operative; population 62,000; 11,375 contacts; Nov-Mar 1997-98 and Nov-Mar 2002-03; both rates used separately (1700-0800 Mon-Fri + all weekend).	123	1997-98: 283; 2002-03: 267
Giesen et al, 2008.[79]	Netherlands	Co-op	1 co-operative; population 165,000; 36,259 contacts; 12 months June 2001 to June 2002 (1700-0800 Mon-Fri + all weekend).	123	220
Margas et al, 2008.[20]	Poland	Co-op	1 OOHS (multiple OOHC); Krakow; population 420,000; 238,072 contacts; 24 months from 2003 to 2004 (1800-0800 Mon-Fri + all weekend).	118	238
Scott-Jones et al, 2008.[80]	New Zealand	Co-op	1 OOHS; population 9,200; 204 contacts; 1 month in 2007 (1700-0830 Mon-Fri + all weekend).	125.5	320
Turnbull et al, 2008.[32]	England	Co-op	1 county; Devon; population 928,725; 34,229 calls; 2 months (June and December) in 2003 (OOHS opening hours not stated).	Not stated	221

den Boer-Wolters et al, [35].	Netherlands	Co-op	1 region; population 270,000; 69,274 contacts in the year 2007 (1700-0800 Mon-Fri + all weekend).	123	256
De Korte-Verhoef et al, 2012.[49]	Netherlands	Co-op	8 co-operatives; Amsterdam; population 800,000; 137,828 calls; 12 months from Nov 2005-Nov 2006 (OOHS opening hours not stated).	Not stated	172
Belche et al, 2014.[81]	Belgium	Co-op	1 OOHC; population 24,703; 3439 contacts in 2009 (2100-0800 Mon-Fri + all weekend).	103	139
Flarup et al, 2014.[41]	Denmark	Co-op	1 region; population 1.3million; 21,457 contacts representing approximately 3.3% of all contacts; 12 months from 2010 to 2011 (1600-0800 Mon-Fri + all weekend).	128	500
Huibers et al, 2014.[16]	Denmark; Netherlands	Co-op	1 Danish region; population 1,265,601; 101,429 contacts; 1 Dutch region; population 430,498; 21,410 contacts; 2-month period Sept to October 2011. Both rates used separately (Denmark: 1600-0800 Mon-Fri + all weekend; Netherlands: 1700-0800 Mon-Fri + all weekend).	128; 123	Denmark: 481; Netherlands: 298
Buja et al, 2015.[44]	Italy	Co-op	1 region; population 190,000; 23,980 contacts in 1 year, 2011 (2000-0800 Mon-Fri + weekends from 1000 Sat).	106	126
Cook et al, 2015.[40]	England	TTA	Country wide; population 53,107,200 [ONS mid-year estimate for 2011]; 4 months, Jul & Oct 2010 and Jan & Apr 2011; 1,415,472 contacts (24hr/day) (OOHS opening hours not stated).	Not stated	80
de Bont et al, 2015.[66]	Netherlands	Co-op	1 region; population 270,000; 1 year, 2012; 78,514 contacts (not stated but likely 1700-0800 Mon-Fri + weekends).	123	291
Elliott et al, 2015.[17]	Scotland	TTA	Country wide; population 5.3m [ONS mid-year estimate for 2011]; 1,061,347 OOH calls; 1 year, 2011 (1800-0800 Mon-Fri + weekends).	118	200
Jansen et al, 2015.[33]	Netherlands	Co-op	21 co-operatives; population 7,269,160; 1,668,047 contacts; 1 year, 2012 (1700-0800 Mon-Fri + weekends).	123	229
van Gils-van Rooij et al, 2015.[27]	Netherlands	Co-op ; Co-location	2 regional models; Usual care vs. Co-loc.; Usual care: population 538,115; 72.4% of 63,441 were GP contacts;	123	Co-op: 256;

			Co-loc: population 533,000; 78.4% of 58,620 were GP contacts; 4 months; Mar-Apr and Oct-Nov, 2011; both rates used separately (1700-0800 Mon-Fri + weekends).		Co-location: 259
Fisher et al, 2016.[82]	England	Co-op	1 region; population 600,000; 496,931 contacts; 51 months from 2010 to 2014; does not include community nursing contacts (1830-0800 Mon-Fri + weekends).	115.5	195
Scapinello et al, 2016.[83]	Italy	Co-op	1 region; population 53,742; 5217 contacts; 6 months; Oct 2012 to March 2013 (2000-0800 Mon-Fri + weekends from 1000 Sat).	106	194
Thoresen et al, 2016.[51]	Norway	Casualty clinic	Country wide; population 5,109,000 [Statistics Norway 2014]; Mon-Fri 1600-0700 cancer + non-cancer contacts and weekend non-cancer + cancer contacts [5091+977,565+4492+776,635]; 1,763,783 contacts; 1 year (1600-0700 Mon-Fri + weekends).	123	345
Raknes & Hunskaar, 2017.[84]	Norway	Casualty clinic	Seven OOH districts; population 260,196 [Statistics Norway 2014]; 2014 to 2015 (OOHS opening hours not stated).	Not stated	2014: 331; 2015: 350
Smits et al, 2017.[8]	Netherlands	Co-op	119 co-operatives across the country; approx. 16.8 million in 2015 (1700-0800 Mon-Fri + weekends).	123	2005: 200; 2015: 245
Brettell et al, 2018.[85]	England	Co-op	1 region; population 600,000; 102,877 contacts; 12 months Dec 2014 to Nov 2015 (18.30-08.00 Mon-Fri + weekends).	115.5	172
Collins et al, 2018.[86]	Ireland	Co-op	1 region; population 550,000; 280,000 episodes of care; 1 year (18.00-09.00 Mon-Fri + weekends)	123	509
Leutgeb et al, 2018.[87]	Germany	OOHC Centres	1 region; 3.81 million insured individuals; number of contacts not stated, rate given by authors; 1 year, 2014 (19.00-07.00 Mon, Tues, Thurs; 14.00-07.00 Wed, Fri, weekends).	135	246
Sandvik & Hunskaar, 2018.[18]	Norway	Casualty clinic	Country wide; population of 4.75 million in 2008, 5.25 million in 2017; 1,402,452 consultations in 2008, 1,399,001 consultations in 2017 (OOHS opening hours not stated).	Not stated	2008: 295; 2017: 267

Heutmekers et al, 2018.[88]	Netherlands	Co-op	1 region; population of 432,582; 41,166 patients aged 20-65; 1 year, 2014 (17.00-08.00 Mon-Fri + weekends).	123	95 (for patients aged 20-65)

Rota = Traditional on call rota organised on a small scale/by individual GP practices. Deputising = Deputising/commercial service employed by GP practices to provide OOHS. Co-op = medium to large scale regional co-operative organised centrally. TTA= regional or national telephone triage and advice service. Casualty clinic = co-operative model with regional telephone triage and OOHC available 24 hr/day. Co-location = Co-located OOHC and ED organised within a co-operative model.

*Mean rate given if data from multiple sites unless otherwise stated.

Table 3. Summary of OOHS use patterns, user characteristics associated with increased use and common reason for encounter/presenting condition

Time of peak use	References
Weekday: 1800-2300hrs	15 19-21 27 45 52 64 76 84 89 90
Weekends > Weekdays	15 20 21 32 52 65 76 90-93
Within Weekends: Sunday morning > afternoon/evening	15 19 20
0000-0800hrs: weekend > weekday	15 21
User characteristics	
Age: < 5 years, children (5 to 16 years), and > 65 years most frequent users	15-17 19-21 23 25 26 28 30-32 38 39 43 44 65 76 90 94-99
Gender: Female > Male	15 19 21 24 31 32 52 64 77 90 95 96 100 16 18 23 26 27 36 38 39 41 43 44 65 67 84 88 92 93 98 99 101
Socioeconomic status: Lower > Higher	15 22 28-33 38
Presence of chronic disease	28 35-38
Reason for encounter/Presenting symptoms	
Perceived urgency	34 40-42 74 90 99 102
Symptoms of <24hr duration	17 92 93
Respiratory, skin, abdominal, musculoskeletal or unspecified symptoms	17-19 25 35 43 59 70 81 84 89 92 93 101 103-105
Infection related (viral, URTI, diarrhoea and vomiting)	19 24 26 59 64 67 76 77 98 105 106
More mental health problems compared to in-hours primary care	35
More severe psychiatric disease	36 38 45 46
Cancer and palliative care issues, including pain and infection	47-51
Geographical proximity and daytime practice	
Closer to OOHS > Further away from OOHS	30 32 38 52-54
Rural use > urban use	55 56
Rural use < Urban use	32
Higher users of daytime services more likely to use OOHS	37 58
Perceived difficulty accessing daytime services	34 59 60

Table 4. Outcomes of OOHS contact.

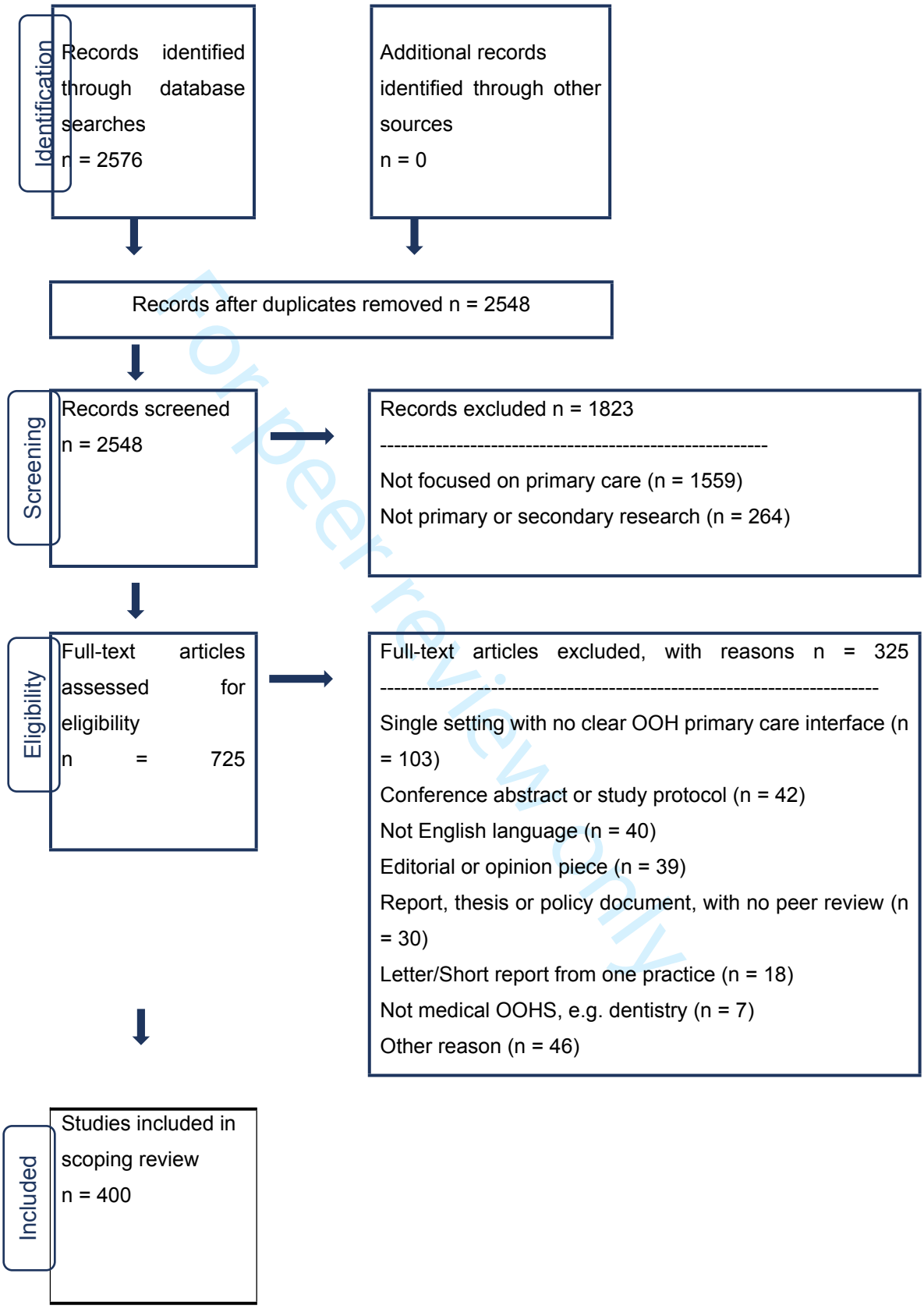
		Outcomes as a % of OOHS contacts			
Study	**Service and setting**	**Home visit**	**Centre visit**	**Telephone advice**	**Other**
Heaney et al, 1996.[21]	GP rota, Scotland	63.0	8.0	29.0	-
Hulland et al, 1999.[94]	GP rota + deputising service, England (Children under 5 years only)	-	-	34.0	-
O'Donnell et al, 1999.[22]	Co-operative, Scotland	22.7	53.7	14.1	Sent ambulance 2.0 Did not attend 4.5
Salisbury et al, 2000.[15]	Co-operatives, England and Scotland	23.6	29.8	45.4	Other (not stated) 1.2
O'Reilly et al, 2001.[30]	Co-operative, Northern Ireland	19.0	27.0	54.0	-
Payne et al, 2001.[90]	Telephone triage & advice service, England			37.0	Directed to GP, either OOHS or daytime 29.0 Directed to ED 6.0 Directed to community-based services 6.0 Directed to ambulance services 1.0
Munro et al, 2003.[52]	Co-operative, England	14.2	42.5	43.3	-
Pooley et al, 2003.[96]	Co-operatives, England	36.1	29.5	34.3	-
Van Uden et al, 2003.[70]	Two co-operatives, the Netherlands	Site A 13.4 Site B 7.4	Site A 47.6 Site B 62.8	Site A 39.0 Site B 29.8	-
Bury et al, 2006.[56]	Eleven co-operatives, Ireland	12.3	53.8	34.0	-
Moll van Charante et al, 2007.[64]	Co-operative, the Netherlands	9.4	41.7	36.6	-
Hansen et al, 2008.[107]	Co-operative casualty clinics, Norway	1.9	62.2	29.9	Call out GP and ambulance 2.1 Other 3.9
Margas et al, 2008.[20]	GP deputizing service, Poland	9.8	GP 63.0 Nurse 27.2	-	-

Richards et al, 2008.[48]	Co-operative, England	Pre-contract 41.7 Post-contract 40.1	Pre-contract 8.9 Post-contract 11.0	Pre-contract 36.3 Post-contract 42.4	Referred to hospital: Pre 2.0; Post 2.2 Patient cancelled call: Pre 0.3; Post 1.1 Triaged then passed to in-hours service: Pre 10.8; Post 3.2
Hansen et al, 2009.[65]	Co-operative casualty clinics, Norway	3.3	62.7	9.5	Dealt with by nurses only 24.0
Eichler et al, 2010.[103]	Co-operative, Switzerland	61.3	24.8	13.9	-
Philips et al, 2010.[25]	Co-operative, Belgium	Pre co-op: 27.0 Post co-op: 16.0	Pre co-op: 73.0* Post co-op: 84.0*	-	*GP consultation – unclear if face-to-face, or if telephone consultation included
Johansen et al, 2012.[45]	Co-operative 'casualty clinics', Norway	0.9	62.6	9.1	Emergency call out of GP 1.8 Telephone advice from nurse 18.2 Nurse consultation 1.7 Other 5.7
Adam et al, 2014.[50]	Co-operative, Scotland (Cancer contacts only)	71.0	6.0	22.0	-
Flarup et al, 2014.[41]	Co-operatives, Denmark	9.2	19.8	42.1	Telephone referrals to other services 28.9
Huibers et al, 2014.[16]	Co-operatives, Denmark & the Netherlands	Denmark: 13.1 Netherlands: 10.2	Denmark: 28.4 Netherlands: 49.6	Denmark: 58.6 Netherlands: 40.3	-
Buja et al, 2015.[44]	OOHS, Italy	52.1*	*	37.9	*Home visits and centre visits combined Referred to ED 9.2 Referred to other specialist 0.8

Cook et al, 2015.[40]	Telephone triage & advice line, England (In hours and out-of-hours period)	-	-	-	Urgent redirect to ambulance service 3.5 Urgent redirect to A&E 8.6 Urgent redirect to GP service 7.3 Non-urgent redirect to GP service 9.9 See GP on same day 12.1 Self-care advice 27.9 Health or dental 14.5 Other 16.2
de Bont et al, 2015.[66]	Co-operative, The Netherlands (Contacts for fever in children only)	-	70.0	30.0	-
Elliott et al, 2015.[17]	Telephone triage & advice service, Scotland (Out-of-hours period only)	12.2	34.1	10.2	Ambulance called 6.9 Advised/sent to ED 5.8 Advised to contact daytime GP 8.4 Advised to contact pharmacist 2.3 Other 20.2
Van Gils-van Rooij et al, 2015.[27]	Urgent care collaboratives (UCCs), the Netherlands	5.1	43.8	29.5	Treatment at ED 21.6
Gnani et al, 2016.[105]	Urgent care centres, England (Pre-school children)	-	-	-	Discharged home after attendance 40.0 Discharged home with GP follow-up 39.0 Referred to specialist 11.0 Referred to ED 8.0 Other 2.0
Huibers et al, 2016.[92]	OOHS, Denmark	-	40.8*	59.2	*Unclear if this includes both home visits and centre attendances

Thoresen et al, 2016.[51]	Co-operative casualty clinics, Norway (Focus on cancer patients)	Cancer patients: 3.1 Non-cancer patients: 14.2	Cancer patients: 42.4 Non-cancer patients: 67.0	Cancer patients: 26.7 Non-cancer patients: 24.3	Simple contacts (N.B. No definition given) Cancer patients: 2.6 Non-cancer patients: 2.2 Nursing service Cancer patients: 2.6 Non-cancer patients: 2.2
Hayward et al, 2017.[67]	OOHS, England	-	-	-	No follow-up 46.6 Own GP follow-up 31.5 Acute referral to secondary care 8.3 Referral to other service 2.5 OOHS follow-up 1.6 Failed encounter/Not coded 9.5
Smits et al, 2017.[8]	Co-operatives, the Netherlands	10.0	50.0	40.0	-
Brettell et al, 2018.[85]	OOHS, England (Focus on patients who died within 30 days of contact)	Died with 30 days: 55.8 Alive within 30 days: 9.7	Died with 30 days: 4.2 Alive within 30 days: 55.8	Died with 30 days: 39.9 Alive within 30 days: 34.3	-
Lous et al, 2019.[106]	OOHS, Denmark	12.9	27.6	59.5	-

Figure 1. PRISMA flow diagram.



/ScholarOne/conversions/435947006499956293/34261564_File000001_824676996.docx

Appendix 1. Search strategies.

For Ovid: searching Medline and Embase, from 1995 onwards.

1.	General practice.mp
2.	Primary care.mp
3.	Family medicine.mp
4.	Family practice.mp
5.	#1 OR #2 OR #3 OR #4
6.	Out of hours.mp
7.	Out-of-hours.mp
8.	#6 OR #7
9.	Urgent care.mp
10.	Unscheduled care.mp
11.	#8 OR #9 OR #10
12.	#5 AND #11
13.	Duplicates removed from #12
14.	Limit #13 to English language

For EBSCOHost: searching CINAHL, Medline, PsychARTILES, PsychINFO, SocINDEX with FULLTEXT, from 1995 onwards/

1.	[General practice OR primary care] AND [Out of hours OR Out-of-hours OR Urgent care]
2.	Limit #1 to English language
3.	Duplicates removed from #2
4.	[Out of hours OR Out-of-hours] AND [Primary care AND impact]

5.	Limit #4 to English language
6.	Duplicates removed from #5
7.	[Out of hours OR Out-of-hours] AND [General practice AND impact]
8.	Limit #7 to English language
9.	Duplicates removed from #8
10.	Primary care AND Urgent care AND Models of care
11.	Limit #10 to English language
12.	Duplicates removed from #11
13.	#3 AND #6 AND #9 AND #12
14.	Duplicates removed from #13

Appendix 2. Summary of papers reporting on OOHS demand, use & outcomes.

Citation	Setting	Study Design	Aim	Key Findings
(Majeed et al., 1995)	GP services, England	Routine data analysis	To analyse the night visit rate of GP practices by different practice variables.	1993-1994 there were 16, 674 night visits by 129 practices. Strongest positive association for patient variables and night visit rate were age and chronic illness. Lists with higher proportions of those aged under 5 and 5-14yrs had higher night visit rates. No association with higher proportions of those over 65. Negative correlation with lists with higher proportions of those aged 35-44 and with lists with high inflation (difference between estimates of practice pop.).
(Heaney and Gorman, 1996)	GP OOH, Scotland	Routine data analysis	To describe the OOH demand of 8 GP practices prior to change of OOH service arrangements.	2,236 contacts over 10 weeks in 1995 or 265 contacts/1000 patients/year. Busiest OOH periods were weekends and within weekends Sunday mornings were busiest. During weekdays the busiest OOH period was 6-10pm. Doctors rated 62% of OOH calls as necessary. Of 2,236 contacts 64% requested home visit, 31% asked for phone advice. In the end 63% were seen at home, 29% given telephone advice and 8% seen in surgery. Note limitations of single area and 10 week period.
Kljakovic, 1996 #439}	GP After-hours Medical Centre and a hospital ED, Australia	Prospective case review	To describe patients who choose different primary care services for asthma care at Wellington general practitioner run After-hours Medical Centre (AMC) and Wellington hospital emergency department (WED).	Compared with ED users, users of the after-hours centre more likely to be younger; live further away; obtain a repeat prescription for asthma medication; and be sent back to their GP. They were also less likely to be referred to the service by a GP and to be admitted. 22.5%

				of patients admitted for asthma had seen a GP prior to admission. Authors conclude that the different patient management observed at the two settings reflected different management strategies.
.(Shipman et al., 1997)	GP and A&E OOH services, England	Mixed methods; routine data and interviews	To described demand for GP and A&E OOH and compare presenting complaints and patient decision making.	2x3week periods in 1995/1996 2,564 contacted either GP/A&E. 39% to A&E, 61% to GP. Peak time for A&E and GP were evenings, more contacts for A&E after midnight, more to GP Sunday am and weekend afternoons. Children <10 yr 45% of GP but only 26% of A&E contacts. 57% attending A&E made decision to attend A&E themselves. 56% would have attended regular GP had it been open.
Brogan, 1998 #20}	OOH services (GP and other), England	Routine data analysis and questionnaire	To describe the volume and type of OOH work by GP OOH and other OOH services and to estimate the costs of such work.	47,828 OOH contacts in 2 months in 1995: 21,649 (45%) with GPs, 12,908 (27%) with A&E, 11,318 (24%) with home nursing services, and 1953 (4%) with ambulance services. Estimate GP OOH co-op cost of £5190/1000 population/year compared to £2290/1000 population/year for A&E services.
(Carlisle et al., 1998)	A&E and GP OOH, England	Routine data analysis	To examine the relationship between GP OOH, A&E workloads and deprivation and distance to A&E.	6 months in 1996 saw 4742 OOH contacts; 2019 GP, 1016 deputising service, and 1707 A&E contacts. Deprivation associated with increased contact rates. Distance no significant impact on OOH contact rate when deprivation accounted for. Significant variation in contact rate between practices.
(Plauth and Pearson, 1998)	Urgent Care Centre, USA	Questionnaire	Comparison of patients attending urgent care centre vs routine GP with a survey of patients attending urgent care centre; reasons for attendance and attitudes towards primary care.	1996, 1 week - 551 seen at centre, 1000 at routine GP. 38% of those seen at centre seen during normal hours. 421 completed questionnaire. Urgent care patients were younger, reported a need to be seen

				immediately, difficulty getting a routine appointment due opening hours or logistical problems and a positive attitude towards primary care. Most would have preferred to see usual physician but did not mind when had acute illness.
(Toivanen et al., 1998)	GP OOH services, Finland	Routine data analysis	Comparison and characterisation of use and referrals of three different primary care OOH models.	2926 OOH contacts in 2 months. Patients that could attend their local centre during out of hours used that centre more during the OOH period compared with patients who had to attend a centralised cooperative OOH centre. No differences between age of those attending between different models: youngest age group attended the most and oldest group most likely to be referred to hospital.
(Vehvilainen et al., 1998)	GP weekend service, Finland	Survey of GPs	To examine the pattern of weekend GP referrals for 1 week in 1992 and 1 week in 1994.	530 patients referred. 90% were referred same day, 40% to surgical specialties. Men referred more often than women for arrhythmias, hand and foot fractures and dislocations. Most common diagnoses were musculoskeletal, digestive and circulation. Caution – no data on total number seen during weekend, no comparison of weekday referrals and ?reliability of recall.
(Avery et al., 1999)	A&E and GP OOH, England	Routine data analysis and questionnaire	To describe the patter of OOH activity for GP services and A&E, to compare the presenting complaints at both services and to assess those calls dealt with by telephone consultation alone by presenting complaint.	6 months in 1996 saw 5057 GP contacts or 217 contacts /1000 patients/year. 63% to GP or GP deputising and 37% to A&E. Fever and D+V being most common PC to GP. Accidents and injuries accounted for half of presentations to A&E. Note – single city, only 6 month data, underestimate due incomplete recording and collection.

(Hulland et al., 1999)	GP deputising/traditional on-call, England	Prospective case review	Describe use of GP and A&E services outside normal hours for children under 5.	1072 contacts over 6 months. Contact rate of 751/1000 children/yr. 80% dealt with by GP and 34% of those dealt with by telephone. Variation in presenting complaint and being dealt with by phone.
(O'Donnell et al., 1999a)	GP OOH, UK	Review	To examine literature concerning changes in OOH service provision over previous 5 years and to discuss the issues or models of care hitherto less well examined such as rural OOH provision or single handed practices.	Quotes increasing OOH demand and development of new models – rota, collaboration, GPs at A&E – cheaper and less tests, nurse telephone triage, GP cooperatives, primary care emergency centres – national survey evaluation of cooperatives- work load, some comparisons of models, GP stress levels reduced with new coop model. Need for national comparisons of quality, equity of access, efficacy +/- satisfaction – although difficult to interpret. Burden of OOH in rural areas or in single handed practices need assessment as well as cost comparisons of models.
(O'Donnell et al., 1999b)	GP OOH, Scotland	Routine data analysis	To describe OOH contacts and the patient transport service use by socioeconomic category.	3193 OOH contacts in 1 week. Children and adults higher contact rate from deprived areas whereas elderly from affluent areas had higher contact rates. More deprived depcat associated with home visits but not telephone consult or centre visit. Deprived patients used transport service more.
(Vedsted and Olesen, 1999)	OOH service, Denmark	Prospective case review	Describe the OOH use of the 10% who use OOH the most – 'frequent attenders'.	218 237 OOH contacts in 1990. FAs accounted for 42% of all OOH contacts. Of those defined as FA in 1990 2/3 contacted OOH the following year at least once. However regular frequent attendance over 5 years was low. Females and older patients were highest users and largest

				numbers of FAs were women. If FA for longer had higher chance of remaining a FA.
(Drummond et al., 2000)	GP OOH, Scotland	Routine data analysis and questionnaire	To evaluate reason for OOH contact and relate this to sociodemographic data and presenting complaint.	3193 OOH contacts over 1 week. 1115 questionnaires completed (69.3%). Most common reasons for contact were: perceived urgency, pain and anxiety. Patient socioeconomic deprivation status associated with higher perceived difficulty of day time access.
(Payne, 2000)	GP OOH co-op, and deputising, emergency social work, 24hr psych clinic, 24hr community mental health telephone line, A&E and ambulance service. London	Retrospective case review/routine data analysis	Patterns of OOH use by those with mental health problems in a deprived urban area.	4 weeks 1998, 556 contacts, 56% male. 45% presented to A&E. More males present to emergency psych clinic; females to GP. Self-harm more likely to present to A&E; suicidal patients to GP. Differences between age groups and sex. Note these are deprived urban figures and short time period.
(Salisbury, 2000)	GP OOH, UK	Review	To provide a review of demand for UK OOH care.	Different searches limited to UK, 1959-1999. Difficulty measuring and comparing demand but some more consistent characteristics of demand patterns – eg age of patients, time of contact etc. Some evidence of increased demand over time but difficult to corroborate. Will become easier with more comprehensive electronic data.
(Salisbury et al., 2000)	GP OOH cooperatives, England and Scotland	Routine data analysis	To estimate the demand and supply of OOH care from a representative sample of cooperatives.	899 657 OOH calls over 12 months. Rate of call highest before midnight and highest for 0-4 yr olds, peak demand Sunday mornings, Scotland higher rate than England, more deprived higher than less deprived. High variability

				between cooperatives in the proportion offered consultations at centre, over the phone or at home. Although only takes some data from co-ops using Adastra software and so may not be representative sample.
(Murphy et al., 2001)	GP OOH services, Ireland	Routine data analysis	Compare the OOH consultation rate of deprived patients seen by rural vs non-rural GPs across 2 Irish Health Boards.	102,286 OOH contacts in 1998. State higher median rate for rural vs urban (290/1000 vs 220/1000). 'Whilst causative conclusions are difficult to draw from international comparative work, at the very least such a study will harness the natural laboratory that is European general practice.'
(O'Reilly et al., 2001)	GP OOH cooperative, Northern Ireland	Routine data analysis	To examine for geographic and demographic variation in OOH contact outcomes.	Data for 78,907/110,357 OOH calls in 1998. Higher call rates at extremes of age and 74% of calls within 20mins drive. Call rate positive correlation with deprivation and negative correlation with distance. Measures of need - mortality ratio and long term illness census data – not correlated with call rate. Most received telephone advice, of those seen younger more likely at centre older more likely home visit. Telephone only positively correlated to distance and travel time from centre. Note variation between centres.
(Payne and Jessopp, 2001)	NHS Direct telephone triage service, England. 56,540 calls	Routine data analysis	To analyse activity, including the relationship between patient characteristics an outcome, over the first year of operation.	Data collected on 56,540 calls. Almost one-quarter of calls for children aged 0-5 years. Service busiest between 9am and 2pm, and again between 6pm and 9pm. Majority of calls (68%) were in the OOH period. Most calls (56%) were categorised as non-urgent, with 37% o callers given self-care advice. Call

				volume tripled over the Millennium period, with calls tending to be less urgent and from older callers.
(Vedsted et al., 2001)	OOH service and Routine practice, Denmark	Retrospective case review	Compare the rate of day time attendance to the rate of OOH attendance – are frequent day time attenders also OOH frequent attenders?	339 009 (81.5% of pop) patients made day time contact, 84 225(20.2%) patients to OOH in 12months. 34 428 (8.3%) daytime FAs, 8154 (2.0%) out-of-hours FAs, and 3429 (0.8%) both day and OOH FAs. 56.3% of day time FAs did not attend OOH at all. FAs accounted for a third of day time and OOH contacts. 10% of day time FAs were also OOH Fas. ?Already understood that intervening daytime FAs may help reduce OOH FA.
(Barrett et al., 2002)	District nursing service, UK	A retrospective examination of routine community-based data for a newly established intermediate care nursing service over a 12-month period from April 1998 to March 1999.	To explore routine data sources to assess its potential for monitoring performance.	The service provided out-of-hours community nursing care for 903 patients in 1071 episodes of care and 6033 recorded contacts. Although information about patient characteristics and episode start-dates were complete, over half the episode end-dates were missing. The data suggested that this was primarily a domiciliary service for people aged 65 years and over, covering six main care programmes: genito-urinary, neoplasm, wound management, elderly care, gastro-intestinal and locomotor care. Most of the referrals were from primary care clinicians. At present, the way we view and count activity can fragment services and increase the stress on clinicians. We need to shift our service-focused approach to a patient-centred one. This can be done now by consistent use of patient identifiers and by encouraging services to plan data linkage. But

				a gap still remains with regards to outcomes, limiting our ability to measure effectiveness
(Hampers et al., 2002)	Regional paediatric OOH service, USA	Billing records reviewed (?routine data analysis) and questionnaire to paediatricians	To describe a regional, community-based paediatric urgent care network (PUCN). To compare 4 different parts of a city catered for by different paediatric out of hours services.	In 2001, 37 143 visits /consultations at paediatric out of hours centres/paediatric urgent care centres. Minor trauma, ear complaints, and viral illnesses accounted for 70% of visits. 2.2% of visits required admission or transfer. 110 Paediatricians, representing all 55 practices, responded to questionnaire: reported high levels of use, good communication and high satisfaction with service. Note – billing and costs form part of conclusion and analysis that may not be transferrable.
(Munro et al., 2003)	GP OOH co-op, England	Routine data analysis	Study the effect of distance from OOH centre on the number of face to face consultations: at the OOH centre vs. house calls.	31,048 calls, 14 months 1997-1998, 57% seen in person. 75% of those were seen at centre, remainder were house calls. Reduced odds to be seen in person with increasing distance but odds of house call vs. consultation at centre did not change significantly with distance. Patients from more deprived areas less likely to be seen in person but of face to face consultations higher odds to be seen at home compared to less deprived patients.
(Pooley et al., 2003)	GP rota, deputising service and co-op., England	Routine data, questionnaire and qualitative interviews	The differences in OOH services in 2 Health authorities in 1998 and a comparison of delay times. Patient and practitioner views.	744 questionnaires, 83 interviews. Variation in proportion of house call: telephone advice: consultation between areas as well as delay time. Suggest variation less to do with geography or patient characteristics but rather due to different service organisation.
(Thomson et al., 2003)	GP OOH services, Scotland	Mixed methods, questionnaire, semistructured	To compare extant models of OOH service delivery.	Survey 1998, 75% Scottish pop. have co-operatives. Characterised 10 'models' based on level of rurality/urbanness and whether co-

		interviews, economic analysis		op or rota etc. Suggests categorical differences between rural vs urban services. Most co-operatives had some governance procedures like protocols but there was variable quality of patient satisfaction surveys and only 31% had quality standards. Data from rotas and deputising services was limited. Most patients satisfied and more were satisfied when felt the clinican listened. Large variation in cost/1000 population.
(van Uden et al., 2003)	A&E and OOH Co-operatives, The Netherlands	Routine data analysis	To compare the number and characteristics of patients attending A&E and GP OOH co-operatives in two areas that have different GP OOH organisation structures.	One co-op located at an A&E department with open access (all patients passing through GP prior to A&E) the other co-op in a city centre 5km and 9km from the nearest A&E with GP access via telephone first. 3 weeks in 2001 recorded 6879 GP OOH contacts and 1719 A&E contacts for both locations. Contact rate for OOH GP was 279/1000/yr for co-located co-op and 238 for the other OOH co-op whereas no significant difference for A&E contact rates. For the co-located co-op less patients received telephone advice, more attended for consultation and fewer received a home visit.
(Beale et al., 2006)	Kennet and North Wiltshire Primary Care Trust, UK	Routine data review of all recorded out-of-hours calls to GPs In North Wiltshire Jan-April 2004.	To test if out-of-hours demand in UK primary care is predicted by council tax band.	1335 out-of-hours contacts were recorded in the study period. It was possible to attribute a council tax valuation band to 1297 of the patients. Contact rates were significantly associated with council tax band: patients from council tax band A homes contact out-of-hours services twice as often as their counterparts at the other end of the council-tax-band spectrum.

(Bury et al., 2006)	GP OOH Co-operative, R.O. Ireland	Questionnaire	To document the activity of the 11 existing OOH co-operatives in 2002.	(Free GP services for 30% of pop. on basis if low income/>70yrs. And co-ops provide for approx. 40% of country population). Variety in size, facility, rural/urban and staff of co-ops. 3/11 did not do home visits. Averages (mean) of activity 34% of contacts dealt with by telephone advice alone, 54% contacts seen at centre, 12% were home visits. Mean contact rate of 244/1000/yr and consultation rate of 144/1000/yr. Mean non-urban vs urban contact rate of 262 vs 75/1000/yr. Urban co-ops less telephone advice only and less home visits but more centre consultations.
(Giesen et al., 2006)	GP OOH and A&E, The Netherlands	Retrospective case review	To gain insight into current patient characteristics and the care received at both GP cooperatives and A&E departments in order to help prepare and develop effective models for collaboration out of hours.	258 patients contacted the GP cooperative and 43 self referred to the A&E department per 1000 patients per year. A wide range of problems were seen in the GP cooperative, mainly related to infections (26.2%). The A&E department had a smaller range of problems, mainly related to trauma (66.1%). Relatively few urgent problems were seen in the GP cooperative (4.6%) or for self referrals in the A&E department (6.1%). Women, children, elderly, and rural patients chose the GP cooperative significantly more often, as did men and patients with less urgent complaints, infections, and heart and airway problems. DISCUSSION: The contact frequency of self referrals to the A&E department is much lower than that at the GP cooperative. Care is complementary: the A&E department focuses on trauma while the GP cooperative deals with

				a wide range of problems. The self referrals concern mostly minor, non-urgent problems and can generally be treated by the general practitioner, by a nurse, or by advice over the telephone, particularly in the case of optimal collaboration in an integrated care facility of GP cooperatives and A&E departments with one access point to medical care for all patients.
(Giesen et al., 2007)	GP OOH, The Netherlands	Routine data analysis	To study the relationship between the waiting time for a home visit and the distance to the GP cooperative	The average waiting time for 5827 consultations was 30.5 min. Traffic intensity, home visit intensity, time of day and urgency of the complaint all seemed to affect waiting times significantly. 88.7% of all patients were seen within 1 hour. In the case of life-threatening complaints (U1), 68.8% of the patients were seen within 15 min, and 95.6% of those with acute complaints (U2) were seen within 1 hour. For patients with life-threatening complaints (U1) the percentage of visits that met the time target of 15 minutes decreased from 86.5% (less than 2.5 km) to 16.7% (equals or more than 20 km). Discussion and conclusion. Although home visits waiting times increase with increasing distance from the GP cooperative, it appears that traffic intensity, home visit intensity, and urgency also influence waiting times. For patients with life-threatening complaints waiting times increase sharply with the distance.
(Lordan, 2007)	GP OOH Co-operative, The	Routine data analysis	To investigate for consistency of care across OOH services.	Service choice influenced by patient call and seasonal characteristics. Patient symptoms are

	Republic of Ireland			primary driver of the type of service a patient receives.
(Moll van Charante et al., 2007)	GP OOH co-op and A&E, the Netherlands	Prospective and retrospective case reviews	GP OOH and A&E use patterns comparing 2 x 4 month periods 5 years apart.	11,375 GP OOH contacts 1584 A&E contacts. Similar contact rate at both after 5years. Diagnoses presenting at both as expected. 80% A&E self-referrals presented with an injury and 20% of those had a fracture. Authors suggest reasonable A&E self-referrals and no change in demand/use after population more aware of service.
(Rossdale et al., 2007)	GP OOH Co-op, England	Routine data analysis	To examine for variation in OOH referral rates and identify factors that might influence the rate.	Exclusions aside there were 33,808 face to face OOH contacts over 3 years with 149 GPs, one co-op. Large variation in referral rates. Factors that had independent predictive association with increased referral rates was female sex of GP (AOR 1.37) and time (later contacts) and place of consultation (home visit vs practice). Note relatively small number of GPs being compared however all in similar place working to similar standards and no difference found for years since registration, employment status and number of contacts seen once sex and time and place of consult controlled for.
(Benger and Jones, 2008)	A&E, England	Patient questionnaire, 2005	Examine the extent to which patient behaviour and referral pathways may be contributing to increased ED attendances and hospital admissions.	200 patients recruited. Direct attendance at A&E was more common when help was sought by bystanders. 57 patients attended A&E directly, 45 of whom dialled 999 for an emergency ambulance. Most patients who attended A&E directly did so as a result of perceived urgency of their condition or have an ambulance called on their behalf and there was incomplete awareness of the out-of-hours

				GP service. The majority of adult patients who are admitted to hospital with an acute illness seek professional help from primary care in the first instance. The shift towards A&E care appears partly driven by changes in general practice and unfamiliarity with the new arrangements for out-of-hours primary care provision.
(Hansen and Hunskaar, 2008)	GP OOH, Norway	Routine data analysis	To pilot and establish a nationally representative network and develop the requisite procedures for collecting continuous routine data from out-of-hours services.	7 out of hours clinics selected covering 212, 921 inhabitants. Recorded 23, 346 contacts in last 3 months of 2006. Report quality data with minimal missing data. Suggest this 'sentinel' data be useful for research and service planning.
(Margas et al., 2008)	GP OOH Deputising service, Poland	Routine data analysis	To describe variation in OOH demand, identify associated GP practice characteristics and describe patient characteristics of frequent users.	2 years, 2003-2004, 173,345 face to face doctor consultations, 62,727 'nurse procedures'. 86% of GP contacts were consultations at OOH centre, remainder home visits. Highest daily number of consultations in Nov-Jan and second peak in May-Jun. Lowest in July. Similar for home visits but no second peak seen and proportion of home visits increased over winter. Little daily variation but highest on Fridays. Roughly 80% of workload 6-10pm on weekdays. Practices closer to OOH centre had higher contact rates, and those with older patients had more home visits. Note similar OOH definition, but OOH was new in Poland at the time. Also no telephone triage.
(Richards et al., 2008)	GP OOH services, England	Routine data analysis	To assess for change in demand and quality of care of patients with cancer	2x 1 year periods 2003-2005 370,220 OOH calls, 7574 (2%) 'core medical service calls' (3433 pre-contract, 4141 post-contract) were

			before and after the new GMS contract on OOH provision.	cancer related. Suggests proportion of cancer related calls pre and post contract was stable but overall OOH call rate increased post contract by 26% (185-233/1000). Post contract – proportions of cancer calls resulting in hospitalisation stable, increased proportions receiving telephone advice and in those attending OOH centre post contract. Also saw increase in time lag from call logged to triage.
(Scott-Jones et al., 2008)	GP OOH services, New Zealand	Prospective case review	To describe the OOH activity of a rural community in New Zealand with a recently established new model of organisation.	204 OOH encounters over 1 month in 2007. Total contact rate was 320/1000/yr whereas face to face contact rate was 245. Higher rate for Maori. 44% patients seen by GP, 45% by nurses, 11% by ambulance staff. 78% treated without need for hospital referral. Nurses referred more to A&E than GP. Note voluntary ambulance service and fee for private GP.
(Turnbull et al., 2008)	OOH call centre, England	Routine data analysis	Describe the rate of calls to OOH services and compare by measures of deprivation, distance and rurality.	34 229 calls in 2 months. There was a small but significant negative correlation of distance with call rate. Rurality also had negative correlation with call rate. Deprivation was associated with higher call rates and this association was strongest in urban areas.
(Fry, 2009)	OOH services, International	Systematic Review	To review OOH care models that reduced A&E workload with a focus on the barriers and facilitators to successful model implementation.	Searched studies from 1970-2009, found 74 relevant. Identified barriers (here have omitted those only relevant to Australian system): speed and delivery of telephone triage – ambulance demand up with delay to respond to call. Gatekeeper function – suggest that other services could refer other than solely GP (e.g. A&E to physio/dietician), more collaborative and integrated services required. Extended role for paramedics-evidence that

				see and treat option could reduce A&E demand. Segregation of medical records: opinions/perception rather than evidence. Patient expectations: suggest unreasonable expectations barrier to patient satisfaction. Financial barrier: suggest lack of A&E user fee could reduce inappropriate A&E use, no evidence cited. Facilitators: Integration – eg GP in A&E reduced cost and A&E activity. Location: co- or nearby location of services to A&E, purport evidence for sustainability and success. Appointment system: suggest not having appointment system preferred by patients. Financial incentives: can lead to reform but lacks evidence of impact on OOH. Nurse practitioners: evidence for high (and safe) patient turnover. Public awareness/media: success of model influenced by public perception/behaviour – low use of WiC cited.
(Hansen et al., 2009)	Emergency services and OOH services, Norway (National and Local telephone triage and OOH GP services)	Routine data analysis	To describe the activity of OOH services during 2007 within a representative sample of 'casualty clinics'.	85, 288 contacts and an average contact rate between casualty clinics of 399/1000 people. 77% classified as non-urgent and 63% ended as consultation with a doctor. 0-9 yr olds highest and 40-59 yr olds lowest contact rates. Women had higher rates than men. 51% contacts in afternoon period, 37% in day time and 12% at night but variety between clinics. 2/3 of contacts were by telephone. It seems this data includes in-hours contacts as well as OOH contacts.
(Zakariassen et al., 2009)	Emergency primary care	Routine data analysis	To assess incidence of emergency contacts (potential life threatening	During 2007 the Watchtowers registered 85,288 contacts, of which 1 946 (2.3%) were

	districts, Norway (the 'Watchtowers'). 1946 emergency contacts.		situations, red responses) to the emergency primary health care service	defined as emergency contacts (red responses), corresponding to a rate of 9 per 1000 inhabitants per year. 65% of the instances were initiated by patient, next of kin or health personnel by calling local emergency medical communication centres or meeting directly at the casualty clinics. In 48% of the red responses, the first action taken was a call-out of doctor and ambulance. On a national basis we can estimate approximately 42,500 red responses per year in the EPH in Norway.
(den Boer-Wolters et al., 2010)	GP OOH, The Netherlands	Retrospective case review	To assess the characteristics of the frequent attenders (FAs) and the presented morbidity during their consultations and to study the persistence of frequent attendance	44 953 contacts were made in 2007. Frequent attenders together with very frequent attenders made up 10% of patients and 23.6% of the total number of contacts. VFA alone represented 1% of the patients but 7.7% of the annual consultations and more often reported agitation as reason for encounter. The prevalence of psychiatric diagnosis in the VFA group (15.3%) was significantly higher than in other groups. Reassurance was the most frequent prevalent management action in each group. The prevalence of chronic disease and psychological problems was higher in those who attended more often.
(Eichler et al., 2010)	Out-of-Hours service, Switzerland. 125 GPs; 685 patient contacts	Questionnaire and cost description study	To evaluate the services provided and the economic consequences of a Swiss GP out-of-hours service	125 GPs collected data on 685 patient contacts. Most prevalent health problems were: respiratory (24%), musculoskeletal (13%) and digestive origin (12%). Home visits (61%) were the most common contact mode, followed by practice (25%) and telephone contacts (14%). 82% of patients could be

				treated by ambulatory care. Additional technical diagnostics, most often laboratory tests, were used for 20% of patients. Mean total costs for one emergency patient contact were €144 (95%-CI: 137-151). The mode of contact was an important determinant of total costs (mean total costs for home visits: €176 [95%-CI: 168-184]; practice contact: €90 [95%-CI: 84-98]; telephone contact: €48 [95%-CI: 40-55]). Basic costs contributed 83% of total costs for home visits and 70% of total costs for practice contacts. Individual mean costs were similarly low for home visits (€30) and practice contacts (€27). Medical problems had no relevant influence on this cost pattern.
(Johansen et al., 2010)	GP OOH co-op and GP in hours, Norway	Retrospective case review	Mental health diagnoses during OOH compared to normal working hours in a population of 23,607	Contacts in 2006:11, 976 at OOH and 61,783 in hours. 2.2% caseload at OOH mental health; 8.7% in hours. At OOH, higher proportion of psychosis, substance abuse and suicidal behaviour. Note may underestimate prevalence as this is first diagnosis data.
(Philips et al., 2010b)	GP OOH service and A&E, Belgium	Prospective case review before and after change/intervention.	OOH use before and after set up of GP OOH Co-operative compared with areas with no cooperative.	5149 contacts over 4 months (2months prior to change, 2 after). Total contacts increased, significantly more so for area with co-op. No sig change to A&E contacts but less self-referred ambulances. Note this GP co-op not available during weekdays and no telephone triage.
(Philips et al., 2010a)	A&E and GP OOH, Belgium	Prospective case review and questionnaire	To describe the number of patients who choose A&E versus GP OOH and investigate their socioeconomic characteristics.	Over 2 weekends in January 2005 1,970 patients contacted, 1,611 took part. 640 saw GP, of those 93.2% either the patient of family recommended calling GP, 971 in A&E group

				and 64% went to A&E out of own initiative. Factors associated with choosing GP on call: female, registered with GP, speaking national language. Those associated with choosing A&E: male, visited A&E in last 12months, speaking another language, African nationality, lack of insurance.
(Turnbull et al., 2010)	GP OOH co-operative, England	Mixed methods: Routine data analysis, semi structured interviews, non-participant observation, retrospective case review	To investigate the relationship between deprivation, distance and use of telephone based OOH by children 0-4 years old and to explore the experiences of users (parents/guardians).	Contacts from Jun + Dec 2003: 34,229 calls, 5697 (17%) for 0-4yr olds, 54% of these were for boys, call rate of 673/1000/yr. Higher rates from more deprived and closer address. Authors described 3 themes from qualitative data to explain geographical variation – 'familiarity of and trade-off between services, legitimacy of demand and negotiation.' Suggest telephone based services may not overcome geographical barriers to access.
(Chmiel et al., 2011)	A&E and GP Cooperative, Switzerland	Prospective case review	To compare the characteristics of walk-in patients in A&E with walk-in patients at GP cooperative.	1901/2974 patient encounters were walk-ins (A&E 1133, GP-C 768). Patients consulting the GP-C were significantly older (58.9 vs. 43.8 years), more often female (63.5 vs. 46.9%) and presented with non-injury related medical problems (93 vs. 55.6%) in comparison with patients at the ED. Independent determining factors for ED consultation were injury, male gender and younger age. Walk-in distribution in both settings was equal over a period of 24 hours and most common during daytime hours (65%). Outpatient care was predominant in both settings but significantly more so at the GP-C (79.9 vs. 85.7%).

(Fry, 2011)	OOH services, International	Systematic Review	To look for impact of OOH models of care on demand for A&E, ambulance and GP services.	87 studies (search from 1970-2011) reviewed with CASP. 44 from UK, Scotland 1. 5 RCTs. 6 models with evidence of impact – although mixed and minimal stat significant evidence. Minor injury units and practice nurses managing minor illnesses – evidence patients could be directed from A&E/GPs. Minimal evidence for impact on A&E workload. Walk in centres – good pt satisfaction, weak evidence for reduced A&E/GP workload. Telephone triage – mixed evidence for reduction in GP/A&E work load but balance in favour of reducing workload especially GPs. GP co-ops – mixed again but some evidence of reduced GP and A&E workload. Positive effect on GPs lives. Ambulance officer care – some evidence for reduced A&E workload, direct to MIU reduced time, safety questioned for treat and refer. GP integrated into A&E – reduced A&E workload, less tests/referrals/cost.
(Huber et al., 2011)	GP OOH Services, Switzerland	Questionnaire	To describe the workload and satisfaction of OOH GPs.	Surveyed all GPs 'on-duty', 2 weeks in 2009 - 295 total OOH episodes. Responses for 148 episodes, 93 GPs. 433 total contacts, only 382 contacts were characterised, 65% contacts were female. Median contact rate of 5 per OOH episode/GP. Home visits most common. 50-60% GPs felt burdened and disrupted by OOH but 58-64% felt OOH had no negative impact on their health. most common presenting complaints were general /unspecified (31%), respiratory (28%) and Musculoskeletal (19%). Note - Duty GP responsible for 24 hr period 'night doctor'

				provides care from 10pm – 7am with duty GP providing back up during that period. Analysis in paper focuses on period prior to night duty doctor as few visit during night period.
(Huibers et al., 2011)	Primary Care OOH or emergency services, 8 European countries.	Retrospective case review/routine data analysis	To compare presenting complaint and diagnoses in patients contacting OOH services in 8 European countries.	13154 OOH contacts analysed. Similar age distribution across countries but sex distribution more variable. 'general and unspecified symptoms' 13.2%, 'respiratory' 20.4%, 'musculoskeletal' 15.0%, 'skin' (mean 12.5%), and 'digestive' (mean 11.6%). Further analysis of age distribution. Authors suggest similar diagnoses presenting to OOH primary care across countries. Low incidence of life-threatening problems.
(De Korte-Verhoef et al., 2012)	GP OOH, The Netherlands	Retrospective case review	To explore hospital referrals of palliative care patients for whom an out-of-hours general practitioner was called.	(1/Nov/2005 to 1/Nov/2006) 529 charts for palliative care patients: 13% were referred to hospital Palliative care patients with cancer (OR 5,1), cardiovascular problems (OR 8,3), digestive problems (OR 2,5) and endocrine, metabolic and nutritional (EMN) problems (OR 2,5) had a significantly higher chance of being referred. Patients receiving professional nursing care (OR 0,2) and patients for whom their own general practitioner had transferred information to the out-of-hours cooperative (OR 0,4) had a significantly lower chance of hospital referral. The most frequent reasons for hospital referral were digestive (30%), EMN (19%) and respiratory (17%) problems.
(Johansen et al., 2012a)	Acute Psychiatric Unit, Norway	Prospective case review	To explore the differences between admissions to an acute psychiatric unit in terms of patient characteristics and referral circumstances.	5322 admissions over 3 years (2005-2008) by 2841 patients. 60% patients admitted due to exacerbation and 19% admitted due to new episode of illness. Half referred by casualty

				clinics (equivalent of OOH GP) and no difference in terms of avoiding admission between referrers.
(Johansen et al., 2012b)	Out-of-hours casualty clinics, Norway. 9487 contacts relating to mental ill-health	Routine data analysis	To identify patients contacting the casualty clinic for mental illness related problems and study interventions and diagnoses	In the initial contacts to the casualty clinics (n = 28527) a relation to mental illness was reported in 2.5% of contacts, whereas the corresponding proportion in the doctor registered consultations, home-visits and emergency call-outs (n = 9487) was 9.3%. Compared to other contacts, mental illness contacts were relatively more urgent and more frequent during night time. Common interventions were advice from a nurse, laboratory testing, prescriptions and minor surgical treatment. A third of patients in contact with doctors were referred to in-patient treatment, mostly non-psychiatric wards. Many patients were not given diagnoses signalling mental problems. When police was involved, they often presented the patient for examination.
(Patwardhan et al., 2012)	Convenient care clinics (CCC), US	Routine data analysis	To examine the utilization of CCC services outside of typical physician office hours and estimate cost savings from potentially avoided visits to the emergency room, urgent care center, and primary care physician associated with CCC encounters.	44.6% of convenient care clinic visits occurred on weekdays, 5 pm or later, or on weekends. Savings from avoided encounters with the emergency room, urgent care, and primary care physician were estimated at $135.53 million.
(Rubin, 2012)	Minor injury units, General Practice, England	Retrospective case review	Description of patients attending MIUs and their subsequent, unscheduled use of GP or A&E services.	1995 patients attended MIU. 63% treated and discharged, 2.7% subsequently attended A&E, 21.8% subsequently attended GP. 855 (42.9%) received further care, 265 (29.9%) had unscheduled further care. Diagnosis

				concurrence of 93.2% between subsequent GP visit and initial MIU visit. Caution – cannot differentiate between those that attended GP based on explicit advice or and those that attended due to 'open ended- safety netting'.
(Sandvik et al., 2012)	Emergency primary health care services, Norway (In and out of hours urgent services)	Routine data analysis	To compare immigrant use of emergency primary care services with that of native Norwegians.	1,715,278 EPHC contacts from 2008. Slightly lower rate of contact for immigrants but higher rate than Norwegians in immigrants aged 0-5yr. Women higher rate than men in all groups. Migrant groups associated with longer consultations, lab tests used more for migrants of specific countries. Differences noted between migrants of different countries: contact rate, employment, income, length of stay, non-specific pain, psych. diagnosis. Excluded short term visitors, some asylum seekers, illegal residents and those missing ID numbers (23% of total, included a lot of children).
(Huibers et al., 2013b)	GP OOH with A&E co –located, The Netherlands	Retrospective case review	To explore the flow and outcomes of patients attending a co-located GP OOH and A&E, with a focus on self-referring patients.	319 GP OOH consultations, 356 A&E consultations, 78% were non-urgent. Most GP contacts completed at the GP OOH without follow-up. More non-urgent A&E patients had tests, mainly X-rays. 88% non-urgent A&E patients had follow-up contact, usually at an outpatient clinic. 35% of non-urgent GP OOH contacts had follow-up. This may reflect differences in patient populations between the A&E and GP OOH or suggest opportunities for improving efficiency of planning follow-up contacts.

(Huibers et al., 2013a)	GP OOH Co-operatives, The Netherlands	Questionnaire	To investigate associations between patient experiences of nurse led telephone triage and co-op organisational factors with the likelihood of self-reported subsequent contact for the same health problem.	13,953 patients who had OOH contact 2009-2011 sent questionnaire. 16 co-ops. 7039 questionnaires returned (50% response rate), 5678 available for analysis, all had telephone contact initially. 40.6% subsequently had consultations at co-op, 31.1% had telephone consultations only, and 28.4% received home visits. 47% of total had follow up contact- 36% of which were in primary care. 59% of home visits had follow up as did 45% of telephone contacts only. More likely to have follow up if older, had home visit, had more negative experience of telephone triage or called a co-op that did more telephone consultations.
(Raknes et al., 2013)	OOH casualty clinics, Norway	Routine data analysis	The effect of distance on OOH 'casualty clinic' use – 5 years data.	Note 'casualty clinic' is an 'emergency primary care centre' that handles life threatening emergencies. Distance reduced contact and consultation rate even more so. Relationship strongest for cases triaged as non-urgent.
(Willems et al., 2013)	GP and A&E OOH at weekends, Belgium	Retrospective case review	To describe OOH weekend use in relation to socioeconomic status and distance from OOH centre.	7723 patients with first attendance over 16wknds and 2 public holidays. Roughly half went to A&E and half to GP OOH but during day time hours more go to GP and more to A&E during night. Men slightly more likely than women to attend A&E. Older patients more likely to go to GP. More go to A&E if closer to A&E and if from more deprived area. Note that there are differences in cost and timing of payments when attending GP OOH versus A&E in Belgium.
(Adam et al., 2014)	GP OOH service Grampian, Scotland	A retrospective review of case records between 1	To explore the reasons for contact and the range and prevalence of presenting symptoms in patients with	852/950 patients made contact because of a symptom. The remaining 97 were mostly administrative and data were missing for one

		January 2010 and 31 December 2011.	established cancer who presented to a primary care OOH department.	patient. The most frequent symptoms were pain (n = 262/852, 30.8%); nausea/vomiting (n = 102/852, 12.0%); agitation (n = 53/852, 6.2%); breathlessness (n = 51/852, 6.0%); and fatigue (n = 48/852, 5.6%). Of the 262 patients who presented with pain, at least 127 (48.5%) had metastatic disease and 141 (53.8%) were already prescribed strong opiate medication. Conclusion: Almost one-third of patients with cancer seeking OOH primary medical care did so because of poorly controlled pain. Pain management should specifically be addressed during routine anticipatory care planning.
(Belche et al., 2014)	OOH clinic, Belgium	A retrospective analysis of routine data for 2009	to study the activities recorded by the first out-of-hours clinic that has been opened, as a pilot study.	A total of 3949 contacts were recorded, 91.6% of contacts were handled locally, 8.4% resulted in hospitalization. In addition, 52% of contacts were with patients aged between 25 and 65; 29.9% of contacts were with paediatric patients. Patients over the age of 65 made up 18% of contacts. The most common pathologies were respiratory.
(Elshout et al., 2014)	GP OOH service, The Netherlands, March 2008- Feb 2009	Observational cohort study.	To determine the frequency of alarming signs/symptoms in febrile children in primary care.	10,476 face to face patient contacts; 59.7% had one or more alarming signs and/or symptoms but the majority of the alarm signs/symptoms were in <10% of patients. Suggests a need to determine the predictive value of alarming signs/symptoms for serious infections in primary care and prognosis.
(Flarup et al., 2014d)	GP OOH, Denmark	Prospective case review and patient questionnaire	To evaluate the reasons for encounter, the outcome and the patient perspectives.	383/700 duty GPs participated at least once. 21,457 contacts were registered and 59% were completed by telephone. Telephone consultations were most often offered to children and home visits primarily to elderly

				patients. Home visits were most often offered to patients aged 75 years or more. 8410/16,434 patients completed the questionnaire. Females comprised the majority of the contacts and of the respondents in the patient survey.
(Flarup et al., 2014b)	Out-of-hours GP service, Denmark	Retrospective case review	To describe contacts to OOH services by patients with chronic diseases: reason for encounter, diagnosis, severity of symptoms, and outcomes.	13,930 patients. 4,912 (35.2%) had at least one of the five chronic diseases. A quarter of all calls to OOH were due to an acute exacerbation in this chronic disease group. 32.6% of these calls came from patients with psychiatric diagnoses. Patients with chronic disease were more likely to receive a face-to-face contact than the remaining group of patients, except for calls from patients with a psychiatric disorder who were more often completed through a telephone consultation. Patients with heart disease calling due to a new health problem formed the largest proportion of all OOH referrals to hospital (13.3%) compared to calls from the other groups with chronic disease (3.4-6.7%).
(Flarup et al., 2014c)	Out-of-hours GP service, Denmark	Observational study/ Questionnaire	To investigate relationships between day time GP use and OOH use as well as chronic disease exacerbation OOH and day time GP use.	11,897 systematically selected adult patients who contacted OOH during 2010-2011. 2,665 patients (22.4%) had one of the five chronic diseases studied. Between 1/3-1/4 of those with chronic diseases were seen by day time GP 30 days prior to OOH exacerbation. Significantly higher OR for exacerbation for those with cancer and psychiatric disease. Caution – do not know which disease the exacerbation refers to therefore may be overestimate exacerbations. Also no way of

				telling if exacerbation was avoidable however data did show that annual review was associated with less OOH contacts.
(Flarup et al., 2014a)	Out-of-hours GP service, Denmark. 11,897 adults contacts with service	Observational cohort study	To describe the prognosis of patients with chronic disease who contact the OOH service in primary care by (i) identifying the characteristics of contacts with the Danish out-of-hours service and daytime general practice, hospitalization, and (ii) studying mortality during a 30-day follow-up period in patients with chronic heart diseases	Patients with chronic disease had a higher risk of new OOH contact, daytime GP contact, and hospitalization than other patients during the 30-day follow-up period. OOH use was particularly high among patients with severe mental illness. A strong association was seen between chronic disease and risk of dying during follow-up. Findings how that patients with chronic disease used both daytime general practice and the out-of-hours service more often than others during the 30-day follow-up period; were more often hospitalized and had higher risk of dying. The authors call for a proactive approach to future preventive day care and closer follow-up of this group, especially patients with psychiatric disease.
(Harris and McDonald, 2014)	A&E, GP, OOH, Walk-In Centre (WiC), England	Prospective case review and routine data	To compare the populations of patients presenting to various acute care facilities.	Random samples from ED between 0800-2200. 384 A&E self-referral attendances excluding ambulance retrievals compared to routine data of contacts from GP OOH (343), GP same day appointments (165) and WiC (300). OOH and GP patients were older and more were female compared to those attending A&E and WiC. A&E associated with chest pain and injuries, non-A&E sites associated with infections and non-traumatic musculoskeletal problems. Half of patients self-referring had further assessment/ investigations not

				available in non-A&E settings. Note timing of sampling of patients was not explicitly OOH.
(Huibers et al., 2014)	GP OOH, Denmark and The Netherlands	Routine data analysis	To compare and investigate the rates of use of GP OOH in Denmark vs The Netherlands.	All OOH contacts Sep-Oct 2011. Denmark- 80 contacts/1000 inhabitants; Netherlands- 50/1000. Significantly higher rate for all three types of contact in Denmark; most for telephone consultations -47/1000 vs 20/1000, particularly for the youngest age group -154/1000 vs 39/1000. Danish more home visits than Dutch while Dutch slightly more clinic consultations. Speculate that difference in triage system – GP vs. nurse – could account for difference but suggest further research into explaining difference in contact rate. Note – also shows lower rate of contact of other services in Netherlands reflects a cultural difference.
(Buja et al., 2015b)	Out-of-hours service, Italy	Retrospective cohort study	To describe the characteristics of patients contacting OOH and to analyse the related outcomes.	23,980 contacts in 12 months. Contact rates highest for older and younger age groups and higher for females. 52% were examined by a GP at home or at the walk-in clinic, 38% were managed over the phone and 9 % were referred to hospital. Factors, including demographic variables, process-logistic variables and clinical characteristics of the contact, were associated with the outcome. Certain OOH physicians were more likely than their colleagues to refer a patient to an ED.
(Buja et al., 2015a)	Out-of-hours service, Italy. 23,504 calls to service	Retrospective cohort study	To sketch an overall picture of the determinants of frequent attendance (FA) at OOH services, considering patients' clinical conditions and socio-demographic features, and whether	Frailty and clinical variables such as psychiatric disease were associated with FA status, as were sociodemographic variables such as sex, age and income level. Alongside other environmental factors, the GP's gender

			the way patients' GPs were organized influenced their likelihood of being FAs.	and mode of collaboration in the provision of health services were also associated with OOH FA. Thus determinants of OOH FA include not only patients' clinical conditions, but also several socio-economic characteristics (including income level) and their GPs' organizational format.
(Cook et al., 2015)	NHS Direct, England	Routine data analysis	Characterise the calls to telephone triage service that were then referred on to other services.	1,385,457 calls over 4 months in 2010-2011. 269,558 (19%) were urgent, and more urgent calls between 15:00-23:00 (all ages) and during bank holidays and weekends (adults only) than other times. Males, most deprived, 60+, more likely referred to urgent care. Associations were found between symptoms and urgency as well as ethnicity and urgency.
(de Bont et al., 2015)	Out-of-hours GP co-operative, The Netherlands. 17,170 contacts for children	Observational cohort study	Investigation of all fever related telephone contacts, consultations, antibiotic prescriptions and paediatric referrals of children during GP out-of-hours care within 1 year	Found an average of 14.6 fever related contacts for children per day at GP OOH services, with peaks during winter months. Of 17,170 contacts in 2012, 5343 (31.1%) were fever related and 70.0% resulted in a GP consultation. One in four consultations resulted in an antibiotic prescription. Prescriptions increased by age and referrals to secondary care decreased by age ($p<0.001$). The majority of parents (89.5%) contacted the OOH service only once during a fever episode (89.5%) and 7.6% of children were referred to secondary care. Thus childhood fever accounts for a large workload in OOH GP services, although most cases are manages in primary care without a referral.

(Elliott et al., 2015)	NHS 24 telephone triage service, Scotland	Routine data analysis	To examine how the public use the telephone triage system to manage symptoms and health problems through analysis of symptom/problem type, duration of symptoms and call outcome.	1 yr, 2011, worth of national call data. 1 285 038 calls with ID number of which 1 061 347 (86%) were OOH. 791 178 individual users. 83% of calls assigned a problem. Abdominal problem most common (12.2%), dental (6.8%), skin (6%). Most were abdominal (13.2%), skin and breathing problems OOH compared to dental (37.2%), abdominal and medication problems in hours. 70% had information on symptom duration - 63% were <24h duration and those OOH tended to be of shorter duration. OOH outcome – advice to visit Ooh centre 34.1%, HV 12.2% and self-care advice 10.2% In hours outcome – advice to see dentist 27.6%, clinician call back 21.1%, advice to contact own GP 19.2%. Of OOH users compared to in-hours users higher proportion were female, younger or older, more deprived or more remote areas. Older and more deprived less likely to use service in total.
(Haith-Cooper et al., 2015)	GP OOH co-operative, England.	Retrospective case review	To describe the characteristics of telephone consultation calls made by pregnant women to an OOH service run by a GP co-operative and also to compare and contrast the differences between the way the calls were handled by GPs and Nurse Practitioners (NPs).	In 12 month period, 128,717 telephone consultation involving 102 GPs and 36 NPs. Of these 2022 (1.6%) related to pregnancy. Most calls occurred on Saturday or Sunday (29.6% and 24.4% respectively). Most calls (963, 47.6%) from women under 13 weeks gestation; 593 (29.3%) 14 to 27 weeks gestation; 313 (15.5%) 28 weeks +. Reasons for call varied by gestational age. First trimester: Commonest reasons were vaginal blood loss (40.0%) and abdominal pain (39.0%). Abdominal pain commonest reason for call in second trimester (23.9%). Viral

				symptoms associated with cough or cold commonest reason for call in third trimester (18.2%). Women often had multiple symptoms associated with a call. NP calls were longer (9.7 vs 8.8 minutes, p<0.001). GPs more likely to offer advice (71.0% vs 61.0%, p<0.01); NPs more likely to offer a centre visit (25.7% vs 36.8%).
(Jansen et al., 2015)	Out-of-hours primary care, The Netherlands.	Routine data analysis	To evaluate the contribution of sociodemographic composition of the neighbourhood in explaining differences in primary OOH care use between GP cooperative catchment areas	The demand of primary OOH care was significantly higher in neighbourhoods with more women, low-income households, non-Western immigrants, neighbourhoods with a higher degree of urbanisation, and low neighbourhood socioeconomic status. Conversely, lower demand was associated with neighbourhoods with more 5 to 24 year old inhabitants. Sociodemographic neighbourhood characteristics explained a large part of the variation between GP cooperatives (R-squared ranging from 8% to 52%). Nevertheless, the multilevel models also showed that a considerable amount of variation in demand between GP cooperatives remained unexplained by sociodemographic characteristics, particularly regarding high-urgency contacts. In conclusion, although part of the variation between GP cooperatives could not be attributed to neighbourhood characteristics, the sociodemographic composition of the neighbourhood is a fair predictor of the demand of primary OOH care.

(Smits et al., 2015)	In hours GP and GP OOH coops, The Netherlands	Routine data analysis	To compare the characteristics of 100 GP practices and their associated level of out of hours use.	100 GP practices' data analysed over 1 year (2011-2012). Half the practices labelled as high use remainder as low use. High use mean OOH contact rate 1.8 x higher than low use group (369 vs. 204/1000/yr). High OOH use practices had higher percentage of foreigners, 0-4yr olds, were closer to co-op, had longer telephone waiting times, had GPs less available for palliative care, performed more tests, had higher perceived workload and had more assistants working. Note no data available on practice population health, small numbers mean chance may play a role in significant results and telephone accessibility was measured 11 months after data collection.
(van Gils-van Rooij et al., 2015)	Urgent Care Collaboration (collaboration of OOH GPs and ED), The Netherlands. 58,620 patients in UCC group; 63,441 in usual care	Observational study	To determine if GPs treat a larger proportion of out-of-hours patients in the UCC system, and how this relates to patient characteristics	A significantly higher proportion of patients attended their on-call GP within the UCC system. The proportion of ED patients was 22% smaller in UCCs compared to the usual care setting. Controlled for patient and health problem characteristics the difference remained statistically significant (OR_0.69; CI 0.66–0.72) but there were substantial differences between regions. Patients with trauma were treated more by GPs. Controlled for case mix, patients in the largest UCC-region were 1.2 times more likely to attend a GP than the reference group. Authors conclude that when GPs and EDs collaborate, GPs take a substantially higher proportion of all out-of-hours patients.

(Zhou et al., 2015)	GP services, England	Questionnaire	To assess the relationship between patient reported GP access and the use of OOH.	567 049 surveyed patients with GP contact in last 6months, 40 108 (7%) of whom accessed OOH in last6 months. Crudely, worse patient reported measures of GP access associated with increased OOH use. After multivariate analysis some association lost but strongest association remained between convenience of opening hours and OOH use and some association for other measures. Estimate an 11% reduction in OOH use if all patients adjusted to have optimal access. Note this assumes a causal relationship. Other limitations – self reported access, 'endogeneity'
(Fisher et al., 2016)	Out-of-hours service, England. 6045 palliative care contacts	Routine data analysis	To describe patterns of usage of patients presenting to an OOH service and coded as 'palliative'	Out of a total of 496,931 contacts, 6045 contacts were coded palliative; those 'palliative' contacts provided care to 3760 patients. Patients contacting the OOH service with palliative care needs did so predominantly during weekend daytime periods. Over a third had more than one contact. Patients were predictably older than the average population, but contacts coded as 'palliative' were relatively less deprived than contacts to the OOH service for all causes, even after adjusting for age and sex. Authors suggest that wider analysis of palliative patient flow through urgent care services is needed to identify whether healthcare access at the end of life is inequitable and to assess capacity requirements of the service.

(Gnani et al., 2016)	Two GP-led urgent care centres (UCCs), England. UCCs co-located with ED in a hospital setting. 7747 contacts for pre-school children (aged under 5).	Routine data analysis	To examine the presenting complaint and outcomes of care for young children in 2 general practitioner (GP)-led UCCs with extended opening times.	3% (n=7747/282 947) of all attenders at the GP-led UCCs were children aged under 5 years. The most common reason for attendance was a respiratory illness (27%), followed by infectious illness (17%). 18% (n=1428) were either upper respiratory tract infections or viral infections. The majority (91%) of children attending were registered with a GP, and over two-thirds of attendances were 'out of hours'. Overall 79% were seen and discharged home. Preschool children were more likely to attend their GP (47.0 per 100) than a GP-led UCC (9.4 per 100; 95% CI 8.9 to 10.0). Authors conclude that two-thirds of preschool children attending GP-led UCCs do so out of hours, despite the majority being registered with a GP. Case mix is comparable with those presenting to an ED setting, with the majority managed exclusively by the GPs in the UCC before discharge home.
(Huibers et al., 2016)	Out-of-hours primary care, Denmark. 4620 telephone contacts	Prospective case review	To describe telephone contacts triaged to face-to-face contacts, GP-assessed relevance, and factors associated with triage to face-to-face contact.	In total, 59.2% of calls ended with a telephone consultation. Factors associated with triage to a face-to-face contact were: patient age >40 years (40–64: RR = 1.13; >64: RR = 1.34), persisting problem for 12–24 hours (RR = 1.15), severe problem (RR = 2.60), potentially severe problem (RR = 5.81), and non-severe problem (RR = 2.23). Face-to-face contacts were assessed as irrelevant for 12.7% of clinic consultations and 11.7% of home visits. A statistically significantly higher risk of irrelevant face-to-face contact was found for a

				persisting problem of >24 hours (RR = 1.25), contact on weekday nights (RR = 1.25), and contact <2 hours before the patient's own GP's opening time (RR = 1.80).
(Scapinello et al., 2016)	Out-of-hours primary care, Italy. 5217 patient contacts.	Retrospective case review	To characterize patients referred from the OOH to ED service in order to explore the gate-keeping role of OOH service for hospital emergency care and to facilitate future research in improving its cost-effectiveness	Only 8.7% (454 people) of the total contacts were referred to ED. In the multivariate analysis, the significant predictors of being sent to ED were: age; residence in nursing home (odds ratios (OR) = 2.00, 95%CI: 1.30–3.10); being visited by a OOH physician (OR = 2.64, 95%CI: 2.09–3.34). Taking infections as the reference, cardiovascular diseases (OR = 18.31, 95%CI: 12.01–27.90), traumas (OR = 8.75, 95%CI: 5.36–14.26) and gastrointestinal conditions (OR = 7.69, 95%CI: 4.70–11.91) increased the probability to be referred to ED.
(Thoresen et al., 2016)	Out-of-hours primary care services, Norway. 5752 cancer patients with 20,220 contacts	Routine data analysis from billing claims	To investigate how cancer patients in Norway use primary care OOH services and describe different contact types and procedures	5752 cancer patients had 20,220 contacts (1% of all) in OOH services. Half of the contacts were cancer related. Cancer in the digestive (22.9%) and respiratory (18.0%) systems were most frequent; and infection/fever (21.8%) and pain (13.6%) most frequent additional diagnoses. A total of 4170 patients had at least one cancer-related direct contact; of these, 64.5% had only one contact during the year. Cancer patients had more home visits and more physicians' contact with municipal nursing services than other patients, but fewer consultations (p<0.001). Patients in the least central municipalities had significantly more

				contacts than more central municipalities (p<0.001).
(Hayward et al., 2017)	Out-of-hours GP co-operative, England. 496,931 patient contacts	Routine data analysis	To define the population contacting OOH primary care who are at higher risk of re-presenting to this service and requiring urgent transfer to secondary care within 3 days of their initial contact	Almost 1% of 496,931 patients contacting OOH primary care required escalation to secondary care within 3 days (4832 cases, 4465 individuals). Of these, 68.5% were initially discharged with no follow-up or advice to contact their GP; 14.7% were initially referred to secondary care. The odds of requiring escalation were increased with age (odds ratio [OR] 1.010; 95% confidence interval [CI] = 1.009 to 1.011; P<0.001), more frequent prior use of the OOH service (OR 1.016; 95% CI = 1.010 to 1.021; P<0.001), and presenting during periods of low call volume (OR 0.880; 95% CI = 0.857 to 0.904; P<0.001). In conclusion, older, prior users of the service, presenting at less busy times, are at greater risk of requiring secondary care referral from the OOH service within 3 days of their initial contact. These higher-risk patient groups might benefit from active follow-up by the OOH service
(Heutmekers et al., 2017)	Go OOH co-operatives, The Netherlands	Routine data analysis	To investigate whether people with intellectual disabilities (ID) in residential setting were more likely than people from the general population to request out-of-hours general practitioner (GP) care and whether these requests had a similar level of urgency.	Of the people with ID (448/1448), 30.9% requested out-of-hours GP care, whereas for the general population this was 18.4% (79 206/431 134), resulting in a relative risk of 1.7 (95% CI 1.6 to 1.8). There was a different distribution of urgency level for people with and without ID. Generally, requests for people with ID were rated as less urgent. Authors conclude that, while some contacts may be

				avoidable, results may point to access issues for people with ID.
(Keizer et al., 2017)	GP OOH co-operative, The Netherlands	Routine data analysis	To examine the motives and expectations of migrants for contacting out-of-hours primary care.	Main reason for contacting a GP OOH Co-operative for non-western and western migrants were an urgent need for contact with a GP (54.9%–52.4%), worry (49.3%–43.0%), and a need for medical information (21.3%–26.2%). These were also the most important motives for native Dutch patients. Compared to native Dutch patients, non-western migrants more often perceived an urgent need for a GP (OR 1.65; 99% CI 1.27–2.16), less often needed information (OR 0.59; 99% CI 0.43–0.81), and more often experienced problems contacting their own GP during office hours (OR 1.71; 99% CI 1.21–2.43). Western migrants also reported experiencing problems more often in contacting their own GP (OR 1.38; 99% CI 1.04–1.84). As well as for natives, most non-western and western migrants expected to see a doctor (46.2%–46.6%) or get advice (39.6%–41.5%). Non-western migrants expected more often to get physical examination (OR 1.53; 99% CI 1.14–2.04), and prescription (OR 1.37; 99% CI 1.00–1.88). Authors found no differences in expectations between western migrants and native Dutch patients.
(Raknes and Hunskaar, 2017)	OOH services, Norway	Prospective case review	To present frequencies of reasons for encounter (RFEs) in the different organ systems, and to identify the	Musculoskeletal, respiratory, skin, digestive and general and unspecified issues were the most frequent RFE groups. Fever was the most

			most frequent RFEs at different urgency levels.	frequent single ICPC-2 RFE code, but was less common among the most urgent cases. Abdominal pain was the most common RFE in patients with yellow urgency level (urgent), and chest pain dominated the potentially red (potentially life threatening) cases. There was less variation in the use of ICPC-2 with increasing urgency level.
(Reyes et al., 2017)	Urgent care centre, USA	Retrospective case review	To determine the most common clinical conditions associated with older adults visiting urgent care centres (UCCs) and the potential need for further resource use.	There were 9445 visits to the UCC from patients aged 55 and over; of these, 2445 had at least one healthcare encounter in the 30 days after index visit. Of these, 578 (23.6%) visited the emergency department (ED) or were hospitalized, 974 (39.8%) returned to the UCC, and 895 (63.4%) visited their primary care physician's office. A significantly higher proportion (38.4%, n = 68/177) of individuals aged 85 and older visited the ED or were hospitalized within 30 days (P < .010) than of those younger than 65 (20.0%, n = 273/1,367). Diabetes mellitus (odds ratio (OR) = 1.73, 95% confidence interval (CI) = 1.40–2.15, P < .001), coronary artery disease or cerebrovascular disease (OR = 2.45 CI 1.95–3.09, P < .001), COPD or asthma (OR = 1.57, 95% CI = 1.23–2.01, P < .001), polypharmacy (OR = 1.45, 95% CI = 1.18–1.78, P = .004), and cognitive impairment (OR = 2.74, 95% CI = 1.74–4.31, P < .010) were associated with higher rates of ED visits or hospitalizations within 30 days of the UCC visit.

(Smits et al., 2017)	GP OOH co-operatives, t he Netherlands	Review	To provide an overview of the organisation, performance and development of PCP co-operatives in the Netherlands.	Since 2005, the number of contacts with Dutch PCP cooperatives has steadily increased; by 2015 it was 245 contacts per 1000 citizens per year. Many contacts (45%) are non-urgent, and about half occur as part of a series of primary care contacts. Low accessibility and availability of daytime primary care are related to greater use of after-hours primary care. To prevent unnecessary attendance at the cooperatives, physicians advocate co-payment, a stricter triage system, and a larger role for telephone doctors. More than half of the PCP cooperatives in the Netherlands have integrated with hospital emergency departments, forming "emergency care access points." This collaboration has decreased emergency department use by 13% to 22%, and treatment of self-referrals by PCP cooperatives in emergency care access points is safe and cost-effective.
(Brettell et al., 2018)	GP OOH service, England	Population-based data linkage study	To establish the proportion of Oxfordshire patients seen by the OOH service within the last 30 days of their life, whether they known to be a palliative care patients and the demographic and clinical features of these groups.	Almost 1 in 3 (29.5%) of all population deaths were seen by the OOH service in the last 30 days of life. Among the 1530 patients seen, 577 (36.4%) patients had their palliative phase documented; these patients were slightly younger (median age=83.5 vs 85.2 years, P<0.001) and were seen closer to death (median days to death=2 vs 8, P<0.001). More were assessed at home (59.8% vs 51.9%, P<0.001) and less were admitted to hospital (2.7% vs 18.0%, P<0.001).

(Collins et al., 2018)	GP co-operative, Ireland	Retrospective data analysis	To establish the number and range of consultations at a GP out of hours service that have a primary or related mental health issue and to document adherence to their follow-up care referral.	Over 1 year, 11,650 (8.6%) adult consultations (out of 135,103 consultations) had a code relating to a mental health condition or prescribing. Focussing on consultations with multiple terms recorded identified 3844 OOH presentations with a mental health component. Overall, 9.3% were referred by the out of hours GP for follow-up to a hospital emergency department (ED) or were advised to attend their own GP. A total of 104 patients who were advised to attend their GP or ED following their consultation with the out of hours GP were tracked. Twenty-seven patients were referred back to their GP; however, 44.5% did not attend. Seventy-seven patients were referred to the hospital services, of whom 37.7% did not attend.
(Jansen et al., 2018)	OOH primary care services, the Netherlands	National survey through National Panel of People with Chronic Illness of Disability	To explore whether health literacy relates to the use of OOH primary care services in adults with a chronic condition; to study whether health literacy explains educational differences in the use of OOH primary care services.	Higher education attainment was associated with higher scores on the health literacy aspects of 'Appraisal of health information', and 'Navigating the healthcare system'. Appraisal and navigating the healthcare system partially accounted for educational differences in PCS use. Finally, higher appraisal of health information scores were associated with higher PCS utilisation. Thus several aspects of health literacy were demonstrated to relate to PCS use, and partly accounted for educational differences herein. Accordingly, developing health literacy within individuals or communities may help to reduce inappropriate PCS use among people with low education.

(Leutgeb et al., 2018)	OOH centres, Germany	Routine data analysis	To determine attendance frequencies and health problem presentation patterns for patients with and without somatoform disorders in OOH Centres in primary care; to compare health care utilization patterns between these patients groups.	350,528 patients (9.2%) out of the 3,813,398 insured persons had a diagnosis of somatoform disorder. Compared to other patients, patients with this diagnosis were older (51.7 vs. 44.0 years; p<0,0001) more likely to be female (70.1% vs 53.3%; p<0,0001). In OOHC, as opposed to normal office hours, the adjusted rate of patients with a diagnosis of somatoform disorder was 60.6% higher (adjusted for age, gender and co-morbidity). Accordingly, in OOHC, prescriptions for antidepressants, hypnotics, anxiolytics but also opioids were significantly higher than in the general study population. However, a diagnosis of somatoform disorder was only made in 3.45% of all patients in that group seen in OOHC in 2014.
(Sandvik and Hunskaar, 2018)	OOH services, Norway	Observational study using routine data	To analyse frequent attenders (FAs) who have visited OOH services in Norway during a 10-year period	FAs constituted 2% of all patients and around 10% of all consultations each year. FAs were most common among the youngest children and the elderly, increasing with age. Females were overrepresented, as were patients with psychosocial problems and various chronic somatic conditions. The majority were only temporary FAs: 59.8% of the FA cohort were not a FA attender. FAs tended to seek help in the late evening and night; they needed longer consultations and more often received a home visit. Predictors of FA were: Female (OR 1.17), age 0–1 years (OR 3.46), age 70+ (OR 1.57), small municipality (OR 1.61), psychological diagnosis (OR 10.00), social diagnosis (OR

				5.97), cancer (OR 6.76), diabetes (OR 4.65), and chronic obstructive pulmonary disease (OR 7.81).
(Heutmekers et al., 2019)	GP OOH co-operatives, the Netherlands	Cross-sectional analysis of routine data	To identify commonly presented health problems of people with intellectual disabilities compared with the general population, in OOH primary health care.	Having an intellectual disability was associated with a higher probability of presenting with epilepsy (OR 45.65), having concerns about medical treatment (OR 23.37), and adverse effects of medical treatment (OR 8.41). Authors suggest that these issues require special attention to improve the accessibility and quality of OOH primary care.
(Keizer et al., 2019)	GP OOH co-operatives, Denmark, the Netherlands & Switzerland.	Cross-sectional survey	To examine factors influencing the intended help-seeking in out-of-hours care for acute health problems during evenings, nights, and weekends. Focus on parents of children aged 0-4 years & on adults aged 30-39 and 50-59 years.	In total, 1015 parents and 2942 adults participated. We identified several significant influential factors. For parents, having a lower level of education (OR 1.56), having migrant background (western: OR 1.23; non-western: OR 1.93), having one child (OR 1.24), perceiving few barriers to using OOH primary care (OR 1.59), perceiving difficulties with organising childcare (OR 1.13), and having a history of frequent contacts with out-of-hours care (OR 1.55) were more inclined to contact out-of-hours care, whereas female (OR 0.85) and non-anxious parents (OR 0.77) were less inclined. Adults who were older (OR 1.01), holding a medical education (OR 1.13), having non-western background (OR 1.28), being unemployed (OR 1.17), perceiving few barriers to using OOH primary care (OR 1.37), and having a history of frequent contacts with a GP (few: OR 1.15; more: OR 1.22) and/or with OOH care (one: OR 1.20; more: OR 1.49) were

				more inclined to contact out-of-hours care, whereas adults with no or little social support (OR 0.84) and adults with high health literacy level on health information (OR 0.91) were less inclined. Dutch parents were less inclined than Danish parents to contact out-of-hours care (OR 0.62), whereas Swiss adults were more inclined than Danish adults to contact out-of-hours care (OR 1.16). Authors suggest that more research is required to understand the underlying explanations for the observed differences.
(Lous et al., 2019)	GP-led OOH service, Denmark	Cross sectional study of 2363 randomly selected contacts	To describe the reasons for encounter (RFE), the most common diagnoses, the provided care, and the parental satisfaction with the GP-led OOH service in a Danish population of children (0–5 years).	The most common RFE was non-specific complaints (40%), followed by respiratory tract symptoms (23%), skin symptoms (9%), and digestive organ symptoms (8%). The most common diagnosis group was respiratory tract diseases (41%), followed by general complaints (19%) and ear diseases (16%). Prescriptions were dispensed for 27% of contacts, of which about 75% were for antibiotics. A total of 12% contacts concerned acute otitis media; antibiotics were prescribed in 70% of these encounters. A total of 38% of contacts concerned fever, and 25% got antibiotics. A total of 7.4% were referred for further evaluation. Parent satisfaction was generally high, but 7.0% were dissatisfied. Dissatisfaction was correlated with low prescription rate.
(O'Connor et al., 2019)	Primary care OOH service	Questionnaire survey of patients	To examine the expectations of patients attending an urban primary	435 patients with acute URTI symptoms

			care OOH service with acute upper respiratory tract infection (acute URTI) regarding clinical examination, symptom management, information on their condition, reassurance, antibiotic treatment and other possible options including referral.	participated in the survey, representing 25.4% of those attending the single branch where the survey was conducted (n=1715). Of the study participants, 43% were aged under 6 years and 60% were women. The most common presenting symptoms were cough (72%), throat ache (46%) and common cold (26%). The most common expectations were for further examination (53%), reassurance (51%), information (49%) and medication for cough (47%). Only 34% expected an antibiotic. Authors suggest that recognising patient expectations may help clinicians decide on management options for patients with acute URTI.
(Seeger et al., 2019)	OOH primary care centre, Germany	Cross-sectional study with prospective data collection	To determine patient characteristics, reasons for encounter (RFE) and its duration, diagnostics provided, medication prescribed, the necessity of hospital admission or hospital treatment as an outpatient, and the assessment of the urgency from the physicians' point of view in an OOH primary care centre.	892/1098 OOH patients participated in the study (RR 81.2%). More than half of the patients were between 18 and 39 years old. A quarter of all RFE were in the ICPC-2 category "skin". More than 60% of patients had the symptoms for more than two days before visiting the OOH primary care centre. In 34.5% of all cases no medication was prescribed and one in six patients received further diagnostic tests such as urinalysis and blood tests 15.8%). From the physicians' point of view, 26.3% of all study participants could have been treated by the family doctor during routine consultation hours.
(Stegink et al., 2019)	OOH calls to national telephone triage	Routine data analysis	To estimate statistical complexity of patients' reasons for encounter (RFE) and to examine associations with	High users comprised 2.4% of adults using the service and accounted for 15% of all contacts. Statistical complexity (as entropy of categories) increased with number of contacts

	service (NHS 24), Scotland		patient demographics and presenting symptoms.	but was not substantially influenced by either patient age or sex. Between 5 and 10 consultations, higher entropy was associated with a reduced likelihood of further consultations. In contrast, the occurrence of one or more contacts for a mental health problem was associated with increased likelihood of further consultations.

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Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	Title refers to A systematic scoping review of international literature.
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	These areas are referred to and reported in the abstract.
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	Page 5, First paragraph of Methods describes the rationale for undertaking a scoping review.
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	Page 5, end of Introduction describes our objectives.
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	Page 5, Method: The study review protocol is available at www.crd.york.ac.uk/PROSPERO (registration number: PROSPERO 2015:CRD42015029741)
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	Page 5-6: Method: Search timeframe was from 1995 to March 2019; all study designs were included. Box 1 gives a detailed description of inclusion and exclusion criteria.
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with	Page 5, Method: Six databases were searched using Ovid and EBSCOHost: CINAHL; Medline; PsyARTICLES; PsychINFO; SocINDEX; and Embase.

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
		authors to identify additional sources), as well as the date the most recent search was executed.	The initial search timeframe was from 1995, when key changes took place in the organisation of UK out-of-hours services, to December 2017. An update was conducted in March 2019.
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	Searches are detailed in Appendix 1.
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	Page 6, Method: Includes a description of the title, abstract and full paper screening conducted in the SR software Distiller SR. Box 1 describes the inclusion and exclusion criteria used.
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	Page 6, Methods: Study characteristics were extracted for all included papers by HF, KM, NB, MG and COD (two reviewers per paper). All data information were extracted from the papers themselves.
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	Page 6, Methods: Thematic analysis focused on the areas of interest to the Scottish Government, who funded the study, Discussion with the Review Group identified four major areas of interest, namely: Patient demand; new models of care; use of information technology; and quality and safety of care
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	Page 6, Methods: Study characteristics were extracted for all included papers by HF, KM, NB, MG and COD (two reviewers per paper). Papers were quality assessed using recognised checklists based on CASP checklists (https://casp-uk.net/casp-tools-checklists/) for observational studies, randomised controlled trials and reviews/systematic reviews. Each paper was appraised by two members of the team, led by COD and HF, supported by KM, NB, MG and SMcD. Papers were judged good if no element of the design was judged to be poor; fair if they were assigned one poor score; and poor if they were assigned two or more poor scores. COD reviewed papers identified in the update search.

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	Page 6, Method: Thematic analysis focused on the aims of the study; the population group; key findings and how this fitted to the key areas of interest to the Scottish Out-of-Hours Review Group. Discussion with the Review Group identified four major areas of interest, namely: Patient demand; new models of care; use of information technology; and quality and safety of care. In this paper, we focus on those papers addressing patient demand, as well as outcomes associated with that demand. The summary table is presented in Appendix 2. Some papers gave an estimated or adjusted rate of contact per annum. If these data were not provided crude contact rates were calculated, if possible. This relied on the paper giving information on (i) the size of population covered; (ii) the number of patient contacts; and (iii) a timeframe for data collection. These were calculated by HF, in discussion with COD.
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	Figure 1 is a detailed PRISM flow diagram. We screened 2548 titles, excluding 1823 of these. 725 full-text papers were reviewed, with 400 included in the full scoping review. Of these, 105 reported on demand use and outcome of OOHS and are reported in this paper.
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	Page 7, Results: Data were extracted on country of study; year of publication; study design; patient focus; main setting in which and study was set. These are reported in Table 1. Appendix 2 expands on this for all 105 studies and reports on the aim and key findings for each paper.
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	Page 7, Results: Study quality was generally fair or good.
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	See Results section, Tables 2 to 4 and Appendix 2.

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	See Results section for syntheses by theme.
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	See Discussion pages 15 to 17.
Limitations	20	Discuss the limitations of the scoping review process.	Limitations are listed in the bullet points of Strengths and Limitations, in the format requested.
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	Conclusions are on Page 17.
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	Page 18: This study was funded by the Scottish Government through the Primary Care Division and Health Improvement Scotland.

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.
* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.
† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).
‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.
§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. Ann Intern Med. ;169:467–473. doi: 10.7326/M18-0850

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What do we know about demand, use and outcomes in primary care out-of-hours services? A systematic scoping review of international literature

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What do we know about demand, use and outcomes in primary care out-of-hours services? A systematic scoping review of international literature

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Abstract

Objective To synthesise international evidence for demand, use and outcomes of primary care out-of-hours health services (OOHS).

Design Systematic scoping review.

Data sources CINAHL; Medline; PsyARTICLES; PsychINFO; SocINDEX; and Embase from 1995 –2019.

Study selection English language studies in UK or similar international settings, focused on services in or directly impacting primary care.

Results 105 studies included: 54% from mainland Europe/Republic of Ireland; 37% from UK. Most focused on general practitioner-led out-of-hours co-operatives. Evidence for increasing patient demand over time was weak due to data heterogeneity, infrequent reporting of population denominators and little adjustment for population socio-demographics. There was consistent evidence of higher OOHS use in the evening compared to overnight, at weekends and by certain groups (children aged <5, adults aged >65, women, those from socioeconomically deprived areas, with chronic diseases or mental health problems). Contact with OOHS was driven by problems perceived as urgent by patients. Respiratory, musculoskeletal, skin and abdominal symptoms were commonest reasons for contact in adults; fever and gastrointestinal symptoms were commonest in the under-5s. Frequent users of daytime services were also frequent OOHS users; difficulty accessing daytime services was also associated with OOHS use. There is some evidence to suggest that OOHS co-located in emergency departments can reduce demand in EDs.

Conclusions Policy changes have impacted on OOHS over the past two decades. While there are generalisable lessons, a lack of comparable data makes it difficult to judge how demand has changed over time. Agreement on collection of OOHS data would allow robust comparisons within and across countries and across new models of care**.** Future developments in OOHS should also pay more attention to the relationship with daytime primary care and other services.

Strengths and limitations of this study

- Systematic scoping review of six medical, psychological and sociological databases and including a diverse range of study designs.
- Searches covering a timeframe of recognised international change in the provision of out-of-hours health services from 1995 to 2019.
- A focus on English language papers and on health systems broadly similar to UK primary care may have led to some relevant papers from other health systems being missed.
- The inclusion of 105 papers reporting on demand, use and outcomes of OOHS is the largest review to date of OOHS use and provision.

Introduction

Out-of-hours primary care is a key element of many health care systems. It is defined as care delivered outside 'normal working hours', when daytime family or general practice is closed; typically between 17:00 or 18:00 and 08:00 on weekdays, all weekend and public holidays.[1 2] However, the provision of out-of-hours care continues to face challenges, in particular rising demand and difficulties in recruiting general practitioners/family doctors to work in out-of-hours health services (OOHS).[2]

These difficulties have led to numerous attempts at both re-organising out-of-hours health care and implementing new models of care. Policy change in many European countries supported a switch from personal or small rota-based systems of family doctors/general practitioners (GPs) providing care for their own patients on a practice list or using a commercial deputising services, to regional co-operatives of GPs providing OOHS for all patients within a geographical region.[2-4] In the UK, a shift in funding arrangements for OOHS in 1995 encouraged GPs to work collaboratively in out-of-hours co-operatives.[5] In 2004, contractual changes to the General Medical Services contract then gave GPs the option of transferring responsibility for OOHS to local health authorities. This change, however, presented major challenges for health authorities, with an increasing lack of GPs to run services. As a result, there has been on-going development of new models of OOHS such as out-of-hours primary care centres (OOHC), walk-in-centres (WIC), minor injuries units (MIU), and national or centralised telephone triage and advice services (TTA).[6] Based in the primary care setting, these models of care are staffed by a range of professionals, including nurse practitioners, call handlers, and emergency care practitioners as well as GPs.[6 7] Similar re-organisations have been documented in other high income countries.[2 8] In the Netherlands, for example, around half of the primary care co-operatives have now integrated with hospital emergency departments to offer a single access point to emergency and out-of-hours primary care, with the suggestion that attendances at emergency departments decreased by about 13%. [8]

However, to date, little is known about the impact of these different models on demand for, and use of, OOHS across different health care systems. Nor is it clear how demand might have changed over this period of service reorganisation. Such information may help policy makers design and provide services that meet population need and demand. As part of a wider scoping review of OOHS commissioned by the Scottish Government to inform their strategy for OOHS nationally,[9] we report here on the international evidence of demand, use and outcomes of care associated with OOHS.

Method

The work reported here was part of a wider systematic scoping review designed to identify the international literature relating to the provision of out-of-hours primary medical care. Scoping reviews are particularly suited to research designed to inform policy, where the research aims are broad in scope and the studies included encompass a range of research approaches and designs.[10-12] However, scoping reviews are undertaken with the same degree of rigor as more traditional systematic reviews, paying attention to PRISMA criteria.[12] [13] The study review protocol is available at www.crd.york.ac.uk/PROSPERO (registration number: PROSPERO 2015:CRD42015029741)

Search strategy

Six databases were searched using Ovid and EBSCOHost: CINAHL; Medline; PsyARTICLES; PsychINFO; SocINDEX; and Embase using terms related to primary care out-of-hours services. The full search strategy is included in Appendix 1. Manual searches of key journals were also conducted and identified two additional papers. The initial search timeframe was from 1995, when key changes took place in the organisation of UK out-of-hours services, to December 2017. An update was conducted in March 2019.

Study selection and quality assessment

All searches were saved into Endnote and duplicates removed. Articles were then screened in the review management software DistillerSR, using predefined inclusion and exclusion criteria (Box 1). All study designs were included. Two authors (drawn from COD, HF, KM, NB, MG and SMcD) independently assessed the abstracts and full papers for eligibility; disagreements were resolved by discussion, with reference to a third team member if required.

Study characteristics were extracted for all included papers by HF, KM, NB, MG and COD (two reviewers per paper). Papers were quality assessed using recognised checklists based on CASP checklists (https://casp-uk.net/casp-tools-checklists/) for observational studies, randomised controlled trials and reviews/systematic reviews. Each paper was appraised by two members of the team, led by COD and HF, supported by KM, NB, MG and SMcD. Papers were judged good if no element of the design was judged to be poor; fair if they were assigned one poor score; and poor if they were assigned two or more poor scores. COD reviewed papers identified in the update search.

Data extraction and analysis

Thematic analysis focused on the aims of the study; the population group; key findings and how this fitted to the key areas of interest to the Scottish Out-of-Hours Review Group. Discussion with the Review Group identified four major areas of interest, namely: Patient demand; new models of care; use of information technology; and quality and safety of care. In this paper, we focus on those papers addressing patient demand, as well as outcomes associated with that demand. The summary table is presented in Appendix 2. Some papers gave an estimated or adjusted rate of contact per annum. If these data were not provided crude contact rates were calculated, if possible. This relied on the paper giving information on (i) the size of population covered; (ii) the number of patient contacts; and (iii) a timeframe for data collection. These were calculated by HF, in discussion with COD.

Box 1. Inclusion and exclusion criteria

Studies were included if they met both of the following criteria:

- Based in UK or similar international primary care setting with recognised OOHS i.e. Europe, Australasia, US or Canada
- Studies of OOHS or services which impact directly on primary care, including:
  - Out-of-hours telephone-based services such as NHS 24, NHS Direct and NHS 111 service
  - Emergency Department (ED) initiatives designed to interface with primary care services
  - Community-based or social work services designed to interface with primary care services

Studies were excluded if they met any of the following criteria:

- Focus on dentistry, social work services, ED or other services not operating within or interfacing with primary care
- Editorials, opinion pieces or commentaries
- Evaluation reports of new services
- Policy documents produced by government agencies or position statements from professional bodies
- Not written in English language

Patient and public involvement

Our research question was generated as part of the wider Scottish Government's National Review of Primary Care Out of Hours Services. For that wider review, as part of a National Engagement Programme, there were extensive engagement and consultation exercises. The exercises included health board visits and public discussion groups with out of hours services staff and patient representatives. Patients of the public were not directly involved in the design or conduct of this scoping review. The early results of the scoping review were made publicly available at https://www.gov.scot/publications/main-report-national-review-primary-care-out-hours-services/.

Results

Study characteristics

The search identified 2548 papers, with 400 finally included (Figure 1). A description of all the identified papers is available on request to COD. Here, we report on the 105 papers which reported on the theme of demand, use and outcomes (see Appendix 2 for a summary of these papers). Over half were studies conducted in mainland Europe or Ireland, with the Netherlands (n=18) and Norway (n=11) predominant; one-third were set in the UK, mainly England; 6 were based in the USA, Australia or New Zealand; and 5 were set in multiple countries (Table 1). The majority of papers focused on the general population of users rather than on particular groups. Observational study designs predominated, in particular the use of routinely collected data from OOHS (n=41, 39.1%); prospective or retrospective record reviews (n=31, 29.5%) and questionnaire surveys (n=14, 13.3%). Most reported studies were cross-sectional in design. Study quality was generally fair or good. A majority of studies reported on GP-led out-of-hours co-operative models (n=86), but there were also studies examining use in emergency departments (n=21); telephone triage services (n=12); GP deputising services (n=9) and urgent care or walk-in centres (n=7).

INSERT FIGURE 1 HERE

Six main subthemes were identified: patterns of use; time of use and demographics of users; urgency and presenting symptoms; proximity to OOHS and relationship with daytime services; OOHS outcomes; and the wider impact of new models of OOHS. These are discussed in turn below.

Patterns of use

Prior to services recording patient contacts themselves, either manually or electronically, studies used proxies for out-of-hours work (e.g. night visit claim fees) which failed to capture all out-of-hours contacts and made overall OOHS use levels difficult to ascertain.[14] In general, there was little attempt to standardise data reporting across settings – for example by reporting contact rates per head of population served. While many studies reported on the out-of-hours period covered, there was often no clear description of the characteristics of the population beyond age and gender. To explore trends in OOHS use we characterised the 40 studies identified in this review that gave OOHS contact rates or

reported data from which a contact rate could be calculated (Table 2).This was not possible for the remaining 65 papers due to a lack of population denominators, individual patient level data, duplicate data, in-hours and out-of-hours contacts combined, or data that were restricted to particular patient groups or face-to-face contacts.

Overall, crude OOHS contact rates by country and year of data collection show no clear trend. Variation within country settings was apparent. For example, analysis of routine data comparing 20 GP co-operatives in England and Scotland showed an overall OOHS contact rate of 159 calls per 1000 patients per year but a rate of 221 calls/1000/year in Scotland compared with 45 calls/1000/year in England.[15] However, variation in OOHS model type, population covered and operational hours by the service made rate comparisons difficult. This heterogeneity in the data collected is described in Table 2. [15] Adjusting for the number of hours covered by OOHS made little difference to the crude contact rates presented in Table 2 (data not shown). However, variation in use might be due to more than demographic factors of the population or opening hours of the service; one international comparison suggested cultural differences accounted for more OOHS use in Denmark than in the Netherlands.[16]

More recently, routine electronic data for entire countries has become available. Data from the national telephone triage and advice (TTA) service in Scotland, NHS24, showed there were 1,285,038 calls in 2011, with 82% of calls occurring during OOH period.[17] This equated to an OOHS contact rate of roughly 200/1000/year. Countrywide data from Norway explored OOHS use between 2008 and 2017 and found that the number of consultations remained fairly constant at around 1.4 million per year[18]. However, the rise in the population meant that crude contact rates fell from 295/1000 /year in 2008 to 267/1000/year in 2017 (Table 2).

Time of use and demographics of users

Many papers reported OOHS use by time of the week. This identified a consistent weekly pattern of peak OOHS use across countries (Table 3). Weekends were busier than weeknights. During the week, 1800-2300 was the busiest period, while Sunday mornings were often the busiest weekend period.[15 19 20] Night time contacts (0000-0800) were more common at the weekend than during the week.[15 21]

Studies which examined the demographics of users found that the most frequent users of OOHS were children, especially those under 5 years old (Table 3). Although not always apparent when absolute numbers of contacts were reported, older adults (65 and over) had higher rates of contact than younger adults. [15 16 22 23] Women tended to use OOHS more than men, but men were more likely than women to use the emergency department (ED) out-of-hours.[23-27]

Overall, lower socioeconomic status was associated with higher use of OOHS,[15 22 28-33] although one study reported that this pattern was reversed for patients aged over 65.[22] Data from 21 co-operatives in the Netherlands showed neighbourhood characteristics such as household income and socioeconomic status explained some but not all of the variation in OOHS use.[33] Deprivation also appeared to influence service choice with those from more deprived areas more likely to use ED than OOHS.[23 29] These deprivation effects may be due to increased need, or to reduced access (or perceived reduced access) to daytime services in more deprived.[34] Having a chronic disease was associated with increased use of OOHS, although the chronic disease was often not the reason for contact.[28 35-38].

Few studies examined patient ethnicity or migrant status. Of those which did, there appeared to be an association with OOHS use, although the evidence was mixed and studies used various definitions of ethnicity and migrant status. Routine data from 21 Dutch co-operatives showed higher OOHS use in neighbourhoods with more non-Western immigrants[33] while national data from Norway showed that migrant groups had lower emergency primary care contact rates overall although rates were higher for specific migrant groups.[39] In England, TTA data found that, following contact with NHS

Direct, white British or Bangladeshi children were most likely to be referred to urgent care services including OOHS while children of Indian and 'other white' ethnicity were least likely to be referred.[40]

Urgency and presenting symptoms

Contact with OOHS was driven by new or evolving problems perceived as urgent both by patients and by telephone triage call handlers (Table 3). Perceived urgency or exacerbation of an existing problem was reported as a reason for encounter in OOHS studies from Scotland,[34] Denmark,[41] and Norway.[42] Four months of national TTA data from NHS Direct in England showed 1 in 5 callers were referred on to urgent care services (ambulance, ED or OOHS) by call handlers and urgent and emergency referrals were more frequent than non-urgent referrals in the OOH period.[40] In Scotland, TTA call handlers recorded duration of symptoms for 897,903 calls (69.9% of all calls); 62.9% of these calls concerned symptoms of <24hr duration.[17]

Eighteen papers reported that respiratory, skin, abdominal, musculoskeletal and unspecified symptoms were common presentations (Table 3). Symptoms associated with viral and upper respiratory tract infections, diarrhoea and vomiting also featured in 11 papers. Retrospective data from eight European countries showed consistency across countries in the common presenting symptoms: respiratory (20.4% of contacts), musculoskeletal (15.0%), skin (12.5%), abdominal/digestive (11.6%), general and unspecified symptoms (13.2%).[43] This is supported by TTA data from Scotland where the commonest out-of-hours problems were abdominal symptoms (13.2%), rashes/skin conditions (6.4%), breathing difficulties (6.3%) and genitourinary symptoms (6.2%).[17] Symptoms varied with age: fever and gastrointestinal symptoms were commonest in children under-5; cardiovascular disease and gastrointestinal symptoms commonest in older patients.[44]

Few studies focused on mental health; those that did described an increased prevalence of mental health problems in OOHS populations.[35 38] The studies also highlighted the higher level of urgency

associated with mental health related OOHS contacts,[40 45] and that mental health problems in OOHS were of a greater severity than those in day-time hours.[46]

Five studies focussed on cancer and OOHS use.[47-51] Cancer related symptoms and palliative care accounted for 2% of OOHS contacts in two observational studies in the UK.[47 48] Analysis of billing claims in Norway showed contacts by patients with a cancer diagnosis accounted for 1% of all OOHS contacts in 2014, although only 47.7% of those contacts were cancer related.[51] Pain and infection control were the most common reasons for cancer related contact in two observational studies.[50 51]

Proximity to OOHS and relationship with daytime services

The relationship of proximity to OOHS to use or interactions with daytime GP services were addressed less frequently. Six studies reported that proximity to an OOHS was associated with higher use.[30 32 38 52-54] Three studies showed higher rates of OOHS use in more urban areas.[32 33 53] Conversely, routine data in Ireland found rural co-operatives had higher OOHS use than urban co-operatives.[55 56] In Finland, a retrospective review comparing three models of care found that OOHS use was higher where patients were able to attend their local primary care centre during out-of-hours compared to a model where OOHS access was more centralised.[57] However, these studies did not adjust for potential confounders such as patient socioeconomic status or need.

Two studies reported that frequent users of daytime services were also frequent users of OOHS;[37 58] three reported that difficulties accessing daytime services were a reason for using OOHS.[34 59 60] Drummond et al. found that these difficulties were associated with patients from lower socioeconomic areas.[34] Analysis of 100 general practices in the Netherlands found that practices characterised as high users of OOHS were: situated closer to co-operatives; had longer telephone waiting times; had GPs less available for palliative care; performed more tests; had a higher perceived work load; and had

more assistants.[61] However, this study was unable to assess patient health status and did not adjust for socioeconomic status.

One third of patients contacting OOHS due to a chronic disease exacerbation had a daytime primary care contact in the preceding 30 days.[62] A study of 210 observed OOHS consultations in Norway found that that 18% of the clinicians' time was taken up with dealing with 'minor ailments' suggesting that improved self-care for minor ailments might reduce OOHS use.[63] Finally, a review of palliative care related OOHS contacts showed that where information from the daytime GP was available, patients were less likely to be referred by OOHS doctors to hospital, highlighting how communication links with daytime services could influence OOHS care.[49]

OOHS outcomes

Much of the literature focused on the consultation type after contacting the OOHS, onward referral from the OOHS and outcomes after the contact. Most services offered the option of a home visit, a face-to-face consultation with a GP or other health care professional often at a primary care centre, or telephone advice (Table 4). Other outcomes included being sent an ambulance or being re-directed to an emergency department. Overall, face-to-face consultations or telephone advice were the most frequent outcomes. However, home visits were much more likely for older patients or patients with cancer or palliative care needs.[16 17 20 22 25 40 41 50 51 64-66] Younger patients were more likely to be seen at an OOH centre or receive telephone advice.[20 22 30 41 50 51]

The types of OOHS consultation were associated with geographical distance. Routine data from a co-operative in England found that those who lived further away were less likely to be seen face-to-face.[52] In Ireland, urban co-operatives performed fewer home visits and fewer telephone consultations and more centre-based consultations than rural co-operatives.[56]

Several studies identified characteristics associated with face-to-face contacts, onward referral to ED, and subsequent contacts or escalation in care. Analysis of four years' worth of OOHS contacts in one area of England showed that 1% (4832) of all OOHS contacts had a second OOHS contact within 3 days which resulted in referral to urgent secondary care services (e.g. hospital admission, ED or immediate ambulance).[67] Increasing age, prior use of OOHS and presentation during periods of low contact rates (e.g. overnight) were identified as patient factors associated with this 'delayed escalation'. In Denmark, patients with chronic disease had a higher risk of subsequent OOHS or daytime GP contact, hospital admission, and mortality during a 30-day follow-up period.[62] Palliative care patients were also more likely to be referred to hospital by OOHS doctors; this was true across a range of palliative conditions including cancer, cardiovascular disease, digestive and endocrine problems.[49 58 62 63]

Wider impact of new models of OOHS care

OOHS service reforms leading to the formation of GP co-operatives and primary care centres led to marked changes in consultation types within geographical areas, in particular the development of patient visits to centres, telephone triage and advice and a decrease in home visits.[3 5 14] There was little evidence that reforms to OOHS led to higher use of EDs. Routine data of OOHS and ED use from one region in the Netherlands over four weeks before and after the introduction of three OOHS co-operatives showed a 9% decrease in ED contacts and a 10% increase in OOHS contacts.[68] Similarly, routine data from a single co-operative and ED in Maastricht, the Netherlands, showed that after introduction of a co-operative ED use dropped by 53% and OOHS use increased by 25%.[69]

More recently, evaluation of Dutch Urgent Care Collaborations, in which OOHS are co-located with EDs, reported mixed results. One study found no significant difference in ED contact rates but significantly fewer telephone consultations and home visits and more centre visits at the co-located OOHC.[70] In another evaluation, GPs dealt with a significantly higher proportion of patients and fewer patients ended up being seen in the ED, compared to separate OOHS and EDs.[27] Furthermore, within

a co-located OOHS and ED, non-urgent ED contacts received more tests and more follow-up contacts than non-urgent OOHS contacts.[71] This might suggest improved efficiency at co-located OOHS and EDs with fewer patients inappropriately diverted to ED. However, these studies did not include quality of care measures or patient perspectives, so it is difficult to corroborate this assertion.[27]

A prospective case review following introduction of a TTA service in three areas in England showed minimal impact on ED and ambulance services and a small reduction in OOHS use.[72] Routine data analysis from Denmark showed that OOHS reform to regional co-operatives was not associated with significant change in ED contact rates.[73] However, there was some evidence for inappropriate ED use after OOHS reform and that OOHS organisations could reduce ED workload. For example, after implementation of new OOHS arrangements in England, a survey of 200 patients admitted via ED to an inner-city hospital showed that although most patients sought primary care advice prior to attending ED, a significant minority attended ED directly and there was incomplete awareness of the new OOHS arrangements.[74] A systematic review of 74 studies identified barriers and facilitators of successful implementation of OOHS models that reduced ED workload. The review cited evidence for: TTA response delays increasing ambulance demand; extended paramedic roles reducing ED demand; and co-location and integration of GP and ED services reducing cost and ED workload.[75]

Discussion

We present here a major update to the literature on OOHS demand, use and outcomes. This literature was predominately observational and cross-sectional, drawing on data collected by the services themselves and originating in UK or western European countries. The literature documents the impact of the widespread policy change in OOHS organisation from smaller, rota-based models to larger, more centralised OOHS models, the development of telephone-based triage and advice lines and co-location of OOHS with EDs. Although there is a generally agreed definition of the out-of-hours period internationally, a lack of comparable collected data (e.g. by defining the denominator population or

the timeframe) means that it is difficult to reliably track demand over time, even within countries. Thus, there is a lack of clear evidence to support claims that demand for OOHS is increasing or that OOHS use has been affected by new models of care. A general absence of contextual data on the setting and/or population served also means that variations in demand across OOHS are difficult to explain. We suggest, therefore, that rather than continuing to collect data on demand, some effort is first put into defining what data should be collected, and by whom, to allow robust comparisons within and across countries.

We did, however, identify clear and consistent patterns of peak OOHS use as well as population groups who are more frequent OOHS users: young children, older adults, women, as well as those with chronic diseases or mental health problems. However, the reason for the actual contact with the OOHS was often unrelated to the chronic illness itself. There was also clear descriptive evidence for the common symptoms and reasons for which people contact OOHS including perceived urgency and infection related symptoms and these reasons tend to differ from those attending ED out-of-hours. However, evidence using accurate diagnostic coding for conditions presenting during out-of-hours is non-existent. Linking high quality data from OOHS, hospital discharge and daytime primary care could, therefore, generate more definitive diagnostic data that could aid service planning.

Descriptive data here shows that palliative related contacts may account for relatively few numbers of OOHS contacts (1-2%). However, such contacts were associated with a high rate of home visits; thus although the overall numbers are small, the workload generated is large. The effects of deprivation, distance and rurality on OOHS use highlights the importance of incorporating local sociodemographic variables into OOHS design. Similarly, the effect of culture on OOHS use means that comparisons across countries need to take into account cultural differences as well structural service differences in order for comparisons to be meaningful.

OOHS reforms and organisational changes led to new types of care being offered to patients, including face-to-face contacts in primary care centres and an increasing use of telephone triage and advice. However, there was a lack of evidence for an effect of OOHS models on overall OOHS use. There was mixed evidence of the effect of OOHS models on ED use but policy reform towards a co-located model seemed to reduce ED demand. The potential impact that different models of care can have on OOHS use means that new models should be piloted and their impact on other health services evaluated prior to national roll out. Moreover, the literature highlighted the inter-related nature of daytime services and OOHS. Future developments should, we suggest, pay more attention to this relationship and consider how changes in one setting may impact on care provision in the other setting. In particular, the literature offered observational evidence of opportunities for daytime primary care contacts to reduce OOHS through enhanced chronic disease management and anticipatory palliative care however there is a lack of experimental evidence of enhancing daytime care to influence OOHS use. However, such developments must be mindful of those who are disadvantaged in terms of health care access, and so ensure that health inequalities are not exacerbated.

Conclusion

There is a large, international body of quantitative, observational and cross-sectional literature documenting the demand, use and outcomes of OOHS. Changes in patient use of OOHS has been driven by new models of care developed as a result of changes to out-of-hours primary care policy. A lack of internationally agreed standards in data collection and service definitions means that comparison of service demand across and within countries is difficult and makes it difficult to ascertain how that demand is changing; however, there are consistencies with respect to the demographics and presenting symptoms of those who use OOHS. Moving forward, there is an urgent need for robust evaluations of the new models of care being developed, particularly in relation to the OOHS-ED interface and more consideration of how demand in daytime services impacts on OOHS and vice versa.

Contributors.

COD, HF and SM conceived the idea and designed the study; COD, NB, MG and SM designed and conducted the search strategies, with input from University of Glasgow and Health Improvement Scotland subject-specific librarians. All authors (HF, KM, NB, MG, SM and COD) contributed to the design of data extraction pro-formas, screening of titles, abstracts and papers and data extraction. HF, KM and COD analysed the data; all authors contributed to data interpretation. HF wrote the first draft; COD led the re-drafting; all authors contributed to the final version and agreed to its submission. COD is the guarantor.

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Competing interests.

All authors have completed the ICMJE uniform disclosure form at http://www.icmje.org/coi_disclosure.pdf and declare: no support from any organisation for the submitted work; no financial relationships with any organisations that might have an interest in the submitted work in the previous three years, no other relationships or activities that could appear to have influenced the submitted work.

Ethical approval.

Ethical approval was not required for this study.

Data sharing.

Copies of the search strategy, identified studies and data extraction proforma are available on request to HF or COD.

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Table 1. Characteristics of the included papers addressing demand, use and outcomes in OOHS.

Characteristics	Number (%) of papers
Country/Regional Setting (n = 105)	
Mainland Europe & Republic of Ireland	57 (54.3)
United Kingdom	37 (35.2)
USA, Australia, or New Zealand	6 (5.7)
International	5 (4.8)
Year of Publication (n = 105)	
1995 - 1999	14 (13.3)
2000 - 2004	14 (13.3)
2005 - 2009	16 (15.2)
2010 - 2014	29 (27.7)
2015 – 2019 (up to March 2019)	32 (30.5)
Study Design (n=105)	
Routine data analysis	41 (39.1)
Retrospective case review	17 (16.2)
Prospective case review	14 (13.3)
Observational (Case control or cohort studies)	6 (5.7)
Questionnaire/Survey	14 (13.3)
Mixed methods	5 (4.8)
Reviews/Systematic reviews	5 (4.8)
Other	3 (2.8)
Patient Focus (n=101)	
General	63 (63.4)
Adults (aged 16 and over)	2 (2.0)
Elderly only (65 years and over)	2 (2.0)
Children (under 16 years)	6 (5.9)
Cancer/Palliative patients	6 (5.9)
Mental health/Psychiatric patients	4 (4.0)
Other (includes frequent attenders (4); patients with chronic disease (4); migrant patients (n = 2)	18 (17.8)
Main Setting (n = 151*)	
GP out-of-hours co-operative	86 (57.0)
Accident & Emergency/Emergency department	21 (13.9)
Telephone triage service (e.g. NHS Direct, NHS 24, NHS 111)	12 (8.0)
GP deputising service	9 (5.9)
Urgent care centre	4 (2.6)
Walk-in clinic	3 (2.0)
Other (e.g. Ambulance; Casualty clinic; Community hospital; Minor injuries unit; OOH Palliative care service; Daytime general practice)	16 (10.6)

*More than 105 due to multiple settings in some papers.

Table 2. Characteristics of 40 studies with data to permit a calculation of crude contact rates.

Study	Country	Model	Data origin (OOHS period definition, excluding holidays)	Number of hours covered by OOHS per week	Crude contacts/ 1000/yr*
Majeed et al, 1995.[28]	England	Rota & Deputising	Night visit rates from 129 practices collected over 12 months from 1993 to 1994; London (2200-0800, Mon-Sun).	70	25 night visits/1000/yr
Heaney & Gorman, 1996.[21]	Scotland	Rota	8 GP practices; 2,236 contacts over 10 weeks in 1995 (OOHS opening hours not stated).	Not stated	265
Brogan et al, 1998.[76]	England	Rota & Deputising	Buckinghamshire; population 660,000; 21,649 contacts; March-April 1995. (1900-0800, Mon-Fri + all weekend).	113	197
Toivanen et al, 1998.[57]	Finland	Co-op	2 semi-rural health centres; population 46,438; 2,926 'office visits' over 2 months in 1993; no telephone contacts (1600-0800 Mon-Fri + all weekend).	128	378
Avery et al, 1999.[77]	England	Rota & Deputising	6 inner-city GP Practices; Nottingham; population 45,1826; 3181 GP contacts; 6 months period in 1996 (1900-0800 Mon-Fri + weekend from Sat 1200)	109	136
O'Donnell et al, 1999.[22]	Scotland	Co-op	Whole city of approx. 950,000 population; Glasgow; 3193 contacts in 1 week in October 1996, rate given by authors (OOHS opening hours not stated).	Not stated	158
Salisbury et al, 2000.[15]	England + Scotland	Co-op	20 co-operatives; population 4,677,855; 899 657 calls over 12 months in 1997-1998 (1900-0700 Mon-Fri + weekend from Sat 1200).	104	159
O'Reilly et al, 2001.[30]	N. Ireland	Co-op	1 co-operative (4 primary care centres); population 394,000; 110,357 OOH calls in 1 year, 1998 (OOHS opening hours not stated).	Not stated	280
Payne et al, 2001.[78]	England	TTA	One city area; population 900,000; 56,450 calls in 1 year (1999-2000) although not all calls recorded. Total calls	118	49

			'likely' between 74,706 and 56,450. Estimate taken as 65,000 calls; 68% of calls OOH (1800-0800 Mon-Fri + all weekend).		
Munro et al, 2003.[52]	England	Co-op	1 primary care centre; population 230,000; 31,048 OOHS calls over 14 months in 1997-1998 (OOHS opening hours not stated).	Not stated	116
van Uden et al, 2003.[70]	Netherlands	Co-op	2 regions; Heerlen; population 278,000; 3 weeks in June 2001; Maastricht population 190,000; 3 weeks in Oct-Sep 2001; 3,825 and 3,054 contacts (OOHS opening hours not stated).	Not stated	258
Beale et al, 2006.[31]	England	TTA	3 postcode areas; population not given; 4 months in 2004; rate stated in paper (1900-0700 Mon-Fri + weekends from Sat 1200).	103	77
Bury et al, 2006.[56]	R.O.I.	Co-op	8 non-urban and 3 urban co-ops.; population 1,523,500; 336,466 contacts in 1 year, 2002 (OOHS opening hours not stated).	Not stated	221
Giesen et al, 2006.[24]	Netherlands	Co-op	1 co-operative; population 223,410; 4 weeks in February 2003; 4423 contacts (1700-0800 Mon-Fri + all weekend).	123	258
Moll van Charante et al, 2007.[64]	Netherlands	Co-op	1 co-operative; population 62,000; 11,375 contacts; Nov-Mar 1997-98 and Nov-Mar 2002-03; both rates used separately (1700-0800 Mon-Fri + all weekend).	123	1997-98: 283; 2002-03: 267
Giesen et al, 2008.[79]	Netherlands	Co-op	1 co-operative; population 165,000; 36,259 contacts; 12 months June 2001 to June 2002 (1700-0800 Mon-Fri + all weekend).	123	220
Margas et al, 2008.[20]	Poland	Co-op	1 OOHS (multiple OOHC); Krakow; population 420,000; 238,072 contacts; 24 months from 2003 to 2004 (1800-0800 Mon-Fri + all weekend).	118	238
Scott-Jones et al, 2008.[80]	New Zealand	Co-op	1 OOHS; population 9,200; 204 contacts; 1 month in 2007 (1700-0830 Mon-Fri + all weekend).	125.5	320
Turnbull et al, 2008.[32]	England	Co-op	1 county; Devon; population 928,725; 34,229 calls; 2 months (June and December) in 2003 (OOHS opening hours not stated).	Not stated	221

den Boer-Wolters et al, [35].	Netherlands	Co-op	1 region; population 270,000; 69,274 contacts in the year 2007 (1700-0800 Mon-Fri + all weekend).	123	256
De Korte-Verhoef et al, 2012.[49]	Netherlands	Co-op	8 co-operatives; Amsterdam; population 800,000; 137,828 calls; 12 months from Nov 2005-Nov 2006 (OOHS opening hours not stated).	Not stated	172
Belche et al, 2014.[81]	Belgium	Co-op	1 OOHC; population 24,703; 3439 contacts in 2009 (2100-0800 Mon-Fri + all weekend).	103	139
Flarup et al, 2014.[41]	Denmark	Co-op	1 region; population 1.3million; 21,457 contacts representing approximately 3.3% of all contacts; 12 months from 2010 to 2011 (1600-0800 Mon-Fri + all weekend).	128	500
Huibers et al, 2014.[16]	Denmark; Netherlands	Co-op	1 Danish region; population 1,265,601; 101,429 contacts; 1 Dutch region; population 430,498; 21,410 contacts; 2-month period Sept to October 2011. Both rates used separately (Denmark: 1600-0800 Mon-Fri + all weekend; Netherlands: 1700-0800 Mon-Fri + all weekend).	128; 123	Denmark: 481; Netherlands: 298
Buja et al, 2015.[44]	Italy	Co-op	1 region; population 190,000; 23,980 contacts in 1 year, 2011 (2000-0800 Mon-Fri + weekends from 1000 Sat).	106	126
Cook et al, 2015.[40]	England	TTA	Country wide; population 53,107,200 [ONS mid-year estimate for 2011]; 4 months, Jul & Oct 2010 and Jan & Apr 2011; 1,415,472 contacts (24hr/day) (OOHS opening hours not stated).	Not stated	80
de Bont et al, 2015.[66]	Netherlands	Co-op	1 region; population 270,000; 1 year, 2012; 78,514 contacts (not stated but likely 1700-0800 Mon-Fri + weekends).	123	291
Elliott et al, 2015.[17]	Scotland	TTA	Country wide; population 5.3m [ONS mid-year estimate for 2011]; 1,061,347 OOH calls; 1 year, 2011 (1800-0800 Mon-Fri + weekends).	118	200
Jansen et al, 2015.[33]	Netherlands	Co-op	21 co-operatives; population 7,269,160; 1,668,047 contacts; 1 year, 2012 (1700-0800 Mon-Fri + weekends).	123	229
van Gils-van Rooij et al, 2015.[27]	Netherlands	Co-op ; Co-location	2 regional models; Usual care vs. Co-loc.; Usual care: population 538,115; 72.4% of 63,441 were GP contacts;	123	Co-op: 256;

			Co-loc: population 533,000; 78.4% of 58,620 were GP contacts; 4 months; Mar-Apr and Oct-Nov, 2011; both rates used separately (1700-0800 Mon-Fri + weekends).		Co-location: 259
Fisher et al, 2016.[82]	England	Co-op	1 region; population 600,000; 496,931 contacts; 51 months from 2010 to 2014; does not include community nursing contacts (1830-0800 Mon-Fri + weekends).	115.5	195
Scapinello et al, 2016.[83]	Italy	Co-op	1 region; population 53,742; 5217 contacts; 6 months; Oct 2012 to March 2013 (2000-0800 Mon-Fri + weekends from 1000 Sat).	106	194
Thoresen et al, 2016.[51]	Norway	Casualty clinic	Country wide; population 5,109,000 [Statistics Norway 2014]; Mon-Fri 1600-0700 cancer + non-cancer contacts and weekend non-cancer + cancer contacts [5091+977,565+4492+776,635]; 1,763,783 contacts; 1 year (1600-0700 Mon-Fri + weekends).	123	345
Raknes & Hunskaar, 2017.[84]	Norway	Casualty clinic	Seven OOH districts; population 260,196 [Statistics Norway 2014]; 2014 to 2015 (OOHS opening hours not stated).	Not stated	2014: 331; 2015: 350
Smits et al, 2017.[8]	Netherlands	Co-op	119 co-operatives across the country; approx. 16.8 million in 2015 (1700-0800 Mon-Fri + weekends).	123	2005: 200; 2015: 245
Brettell et al, 2018.[85]	England	Co-op	1 region; population 600,000; 102,877 contacts; 12 months Dec 2014 to Nov 2015 (18.30-08.00 Mon-Fri + weekends).	115.5	172
Collins et al, 2018.[86]	Ireland	Co-op	1 region; population 550,000; 280,000 episodes of care; 1 year (18.00-09.00 Mon-Fri + weekends)	123	509
Leutgeb et al, 2018.[87]	Germany	OOHC Centres	1 region; 3.81 million insured individuals; number of contacts not stated, rate given by authors; 1 year, 2014 (19.00-07.00 Mon, Tues, Thurs; 14.00-07.00 Wed, Fri, weekends).	135	246
Sandvik & Hunskaar, 2018.[18]	Norway	Casualty clinic	Country wide; population of 4.75 million in 2008, 5.25 million in 2017; 1,402,452 consultations in 2008, 1,399,001 consultations in 2017 (OOHS opening hours not stated).	Not stated	2008: 295; 2017: 267

Heutmekers et al, 2018.[88]	Netherlands	Co-op	1 region; population of 432,582; 41,166 patients aged 20-65; 1 year, 2014 (17.00-08.00 Mon-Fri + weekends).	123	95 (for patients aged 20-65)

Rota = Traditional on call rota organised on a small scale/by individual GP practices. Deputising = Deputising/commercial service employed by GP practices to provide OOHS. Co-op = medium to large scale regional co-operative organised centrally. TTA= regional or national telephone triage and advice service. Casualty clinic = co-operative model with regional telephone triage and OOHC available 24 hr/day. Co-location = Co-located OOHC and ED organised within a co-operative model.

*Mean rate given if data from multiple sites unless otherwise stated.

Table 3. Summary of OOHS use patterns, user characteristics associated with increased use and common reason for encounter/presenting condition.

Time of peak use	References
Weekday: 1800-2300hrs	15 19-21 27 45 52 64 76 84 89 90
Weekends > Weekdays	15 20 21 32 52 65 76 90-93
Within Weekends: Sunday morning > afternoon/evening	15 19 20
0000-0800hrs: weekend > weekday	15 21
User characteristics	
Age: < 5 years, children (5 to 16 years), and > 65 years most frequent users	15-17 19-21 23 25 26 28 30-32 38 39 43 44 65 76 90 94-99
Gender: Female > Male	15 19 21 24 31 32 52 64 77 90 95 96 100 16 18 23 26 27 36 38 39 41 43 44 65 67 84 88 92 93 98 99 101
Socioeconomic status: Lower > Higher	15 22 28-33 38
Presence of chronic disease	28 35-38
Reason for encounter/Presenting symptoms	
Perceived urgency	34 40-42 74 90 99 102
Symptoms of <24hr duration	17 92 93
Respiratory, skin, abdominal, musculoskeletal or unspecified symptoms	17-19 25 35 43 59 70 81 84 89 92 93 101 103-105
Infection related (viral, URTI, diarrhoea and vomiting)	19 24 26 59 64 67 76 77 98 105 106
More mental health problems compared to in-hours primary care	35
More severe psychiatric disease	36 38 45 46
Cancer and palliative care issues, including pain and infection	47-51
Geographical proximity and daytime practice	
Closer to OOHS > Further away from OOHS	30 32 38 52-54
Rural use > urban use	55 56
Rural use < Urban use	32
Higher users of daytime services more likely to use OOHS	37 58
Perceived difficulty accessing daytime services	34 59 60

Table 4. Outcomes of OOHS contact.

		Outcomes as a % of OOHS contacts			
Study	**Service and setting**	**Home visit**	**Centre visit**	**Telephone advice**	**Other**
Heaney et al, 1996.[21]	GP rota, Scotland	63.0	8.0	29.0	-
Hulland et al, 1999.[94]	GP rota + deputising service, England (Children under 5 years only)	-	-	34.0	-
O'Donnell et al, 1999.[22]	Co-operative, Scotland	22.7	53.7	14.1	Sent ambulance 2.0 Did not attend 4.5
Salisbury et al, 2000.[15]	Co-operatives, England and Scotland	23.6	29.8	45.4	Other (not stated) 1.2
O'Reilly et al, 2001.[30]	Co-operative, Northern Ireland	19.0	27.0	54.0	-
Payne et al, 2001.[90]	Telephone triage & advice service, England			37.0	Directed to GP, either OOHS or daytime 29.0 Directed to ED 6.0 Directed to community-based services 6.0 Directed to ambulance services 1.0
Munro et al, 2003.[52]	Co-operative, England	14.2	42.5	43.3	-
Pooley et al, 2003.[96]	Co-operatives, England	36.1	29.5	34.3	-
Van Uden et al, 2003.[70]	Two co-operatives, the Netherlands	Site A 13.4 Site B 7.4	Site A 47.6 Site B 62.8	Site A 39.0 Site B 29.8	-
Bury et al, 2006.[56]	Eleven co-operatives, Ireland	12.3	53.8	34.0	-
Moll van Charante et al, 2007.[64]	Co-operative, the Netherlands	9.4	41.7	36.6	-
Hansen et al, 2008.[107]	Co-operative casualty clinics, Norway	1.9	62.2	29.9	Call out GP and ambulance 2.1 Other 3.9
Margas et al, 2008.[20]	GP deputizing service, Poland	9.8	GP 63.0 Nurse 27.2	-	-

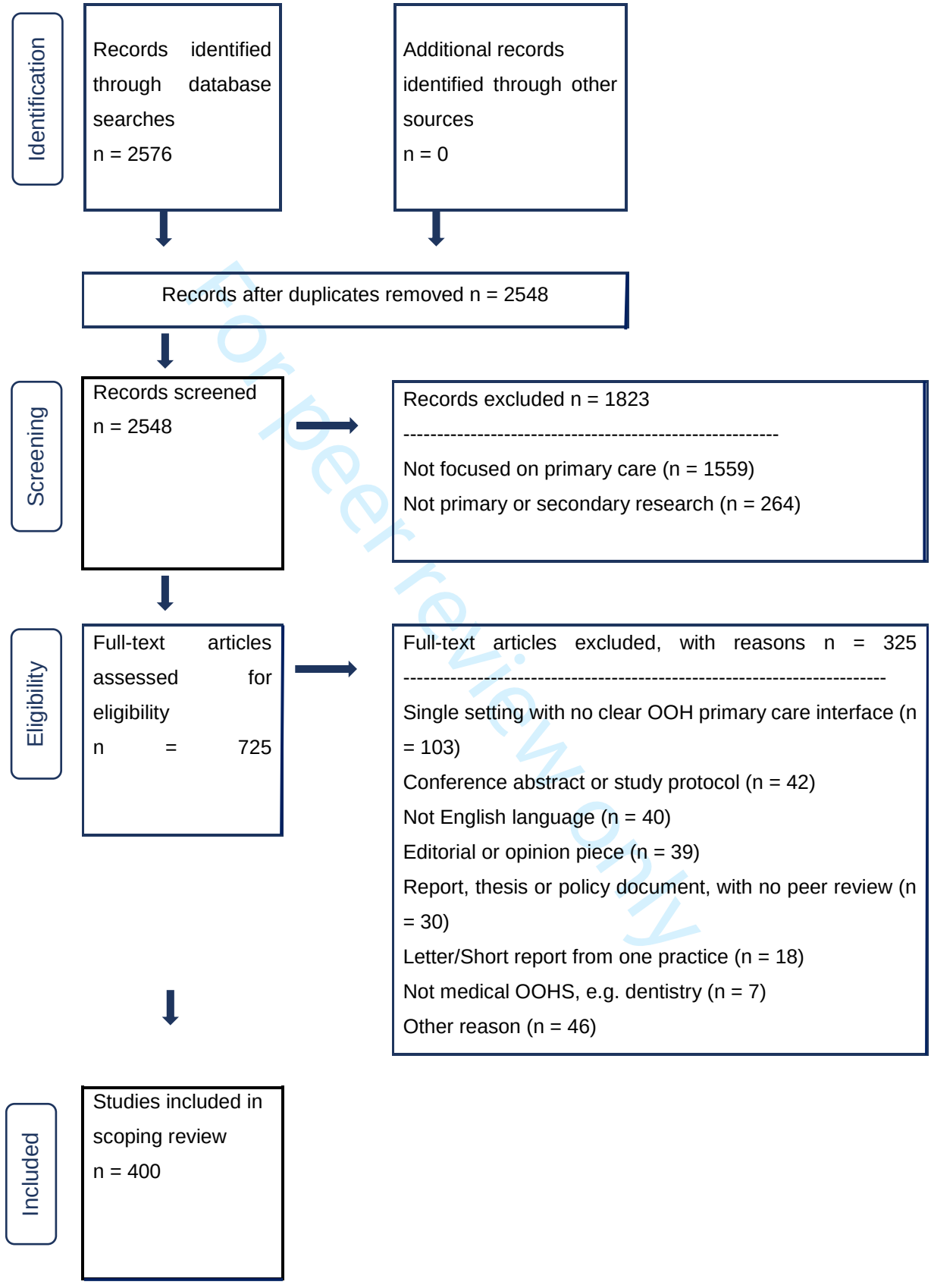
Richards et al, 2008.[48]	Co-operative, England	Pre-contract 41.7 Post-contract 40.1	Pre-contract 8.9 Post-contract 11.0	Pre-contract 36.3 Post-contract 42.4	Referred to hospital: Pre 2.0; Post 2.2 Patient cancelled call: Pre 0.3; Post 1.1 Triaged then passed to in-hours service: Pre 10.8; Post 3.2
Hansen et al, 2009.[65]	Co-operative casualty clinics, Norway	3.3	62.7	9.5	Dealt with by nurses only 24.0
Eichler et al, 2010.[103]	Co-operative, Switzerland	61.3	24.8	13.9	-
Philips et al, 2010.[25]	Co-operative, Belgium	Pre co-op: 27.0 Post co-op: 16.0	Pre co-op: 73.0* Post co-op: 84.0*	-	*GP consultation – unclear if face-to-face, or if telephone consultation included
Johansen et al, 2012.[45]	Co-operative 'casualty clinics', Norway	0.9	62.6	9.1	Emergency call out of GP 1.8 Telephone advice from nurse 18.2 Nurse consultation 1.7 Other 5.7
Adam et al, 2014.[50]	Co-operative, Scotland (Cancer contacts only)	71.0	6.0	22.0	-
Flarup et al, 2014.[41]	Co-operatives, Denmark	9.2	19.8	42.1	Telephone referrals to other services 28.9
Huibers et al, 2014.[16]	Co-operatives, Denmark & the Netherlands	Denmark: 13.1 Netherlands: 10.2	Denmark: 28.4 Netherlands: 49.6	Denmark: 58.6 Netherlands: 40.3	-
Buja et al, 2015.[44]	OOHS, Italy	52.1*	*	37.9	*Home visits and centre visits combined Referred to ED 9.2 Referred to other specialist 0.8

Cook et al, 2015.[40]	Telephone triage & advice line, England (In hours and out-of-hours period)	-	-	-	Urgent redirect to ambulance service 3.5 Urgent redirect to A&E 8.6 Urgent redirect to GP service 7.3 Non-urgent redirect to GP service 9.9 See GP on same day 12.1 Self-care advice 27.9 Health or dental 14.5 Other 16.2
de Bont et al, 2015.[66]	Co-operative, The Netherlands (Contacts for fever in children only)	-	70.0	30.0	-
Elliott et al, 2015.[17]	Telephone triage & advice service, Scotland (Out-of-hours period only)	12.2	34.1	10.2	Ambulance called 6.9 Advised/sent to ED 5.8 Advised to contact daytime GP 8.4 Advised to contact pharmacist 2.3 Other 20.2
Van Gils-van Rooij et al, 2015.[27]	Urgent care collaboratives (UCCs), the Netherlands	5.1	43.8	29.5	Treatment at ED 21.6
Gnani et al, 2016.[105]	Urgent care centres, England (Pre-school children)	-	-	-	Discharged home after attendance 40.0 Discharged home with GP follow-up 39.0 Referred to specialist 11.0 Referred to ED 8.0 Other 2.0
Huibers et al, 2016.[92]	OOHS, Denmark	-	40.8*	59.2	*Unclear if this includes both home visits and centre attendances

Thoresen et al, 2016.[51]	Co-operative casualty clinics, Norway (Focus on cancer patients)	Cancer patients: 3.1 Non-cancer patients: 14.2	Cancer patients: 42.4 Non-cancer patients: 67.0	Cancer patients: 26.7 Non-cancer patients: 24.3	Simple contacts (N.B. No definition given) Cancer patients: 2.6 Non-cancer patients: 2.2 Nursing service Cancer patients: 2.6 Non-cancer patients: 2.2
Hayward et al, 2017.[67]	OOHS, England	-	-	-	No follow-up 46.6 Own GP follow-up 31.5 Acute referral to secondary care 8.3 Referral to other service 2.5 OOHS follow-up 1.6 Failed encounter/Not coded 9.5
Smits et al, 2017.[8]	Co-operatives, the Netherlands	10.0	50.0	40.0	-
Brettell et al, 2018.[85]	OOHS, England (Focus on patients who died within 30 days of contact)	Died with 30 days: 55.8 Alive within 30 days: 9.7	Died with 30 days: 4.2 Alive within 30 days: 55.8	Died with 30 days: 39.9 Alive within 30 days: 34.3	-
Lous et al, 2019.[106]	OOHS, Denmark	12.9	27.6	59.5	-

Figure 1. PRISMA flow diagram.

Figure 1. PRISMA flow diagram.



Appendix 1. Search strategies.

For Ovid: searching Medline and Embase, from 1995 onwards.

1.	General practice.mp
2.	Primary care.mp
3.	Family medicine.mp
4.	Family practice.mp
5.	#1 OR #2 OR #3 OR #4
6.	Out of hours.mp
7.	Out-of-hours.mp
8.	#6 OR #7
9.	Urgent care.mp
10.	Unscheduled care.mp
11.	#8 OR #9 OR #10
12.	#5 AND #11
13.	Duplicates removed from #12
14.	Limit #13 to English language

For EBSCOHost: searching CINAHL, Medline, PsychARTILES, PsychINFO, SocINDEX with FULLTEXT, from 1995 onwards/

1.	[General practice OR primary care] AND [Out of hours OR Out-of-hours OR Urgent care]
2.	Limit #1 to English language
3.	Duplicates removed from #2
4.	[Out of hours OR Out-of-hours] AND [Primary care AND impact]

5.	Limit #4 to English language
6.	Duplicates removed from #5
7.	[Out of hours OR Out-of-hours] AND [General practice AND impact]
8.	Limit #7 to English language
9.	Duplicates removed from #8
10.	Primary care AND Urgent care AND Models of care
11.	Limit #10 to English language
12.	Duplicates removed from #11
13.	#3 AND #6 AND #9 AND #12
14.	Duplicates removed from #13

Appendix 2. Summary of papers reporting on OOHS demand, use & outcomes.

Citation	Setting	Study Design	Aim	Key Findings
(Majeed et al., 1995)	GP services, England	Routine data analysis	To analyse the night visit rate of GP practices by different practice variables.	1993-1994 there were 16, 674 night visits by 129 practices. Strongest positive association for patient variables and night visit rate were age and chronic illness. Lists with higher proportions of those aged under 5 and 5-14yrs had higher night visit rates. No association with higher proportions of those over 65. Negative correlation with lists with higher proportions of those aged 35-44 and with lists with high inflation (difference between estimates of practice pop.).
(Heaney and Gorman, 1996)	GP OOH, Scotland	Routine data analysis	To describe the OOH demand of 8 GP practices prior to change of OOH service arrangements.	2,236 contacts over 10 weeks in 1995 or 265 contacts/1000 patients/year. Busiest OOH periods were weekends and within weekends Sunday mornings were busiest. During weekdays the busiest OOH period was 6-10pm. Doctors rated 62% of OOH calls as necessary. Of 2,236 contacts 64% requested home visit, 31% asked for phone advice. In the end 63% were seen at home, 29% given telephone advice and 8% seen in surgery. Note limitations of single area and 10 week period.
Kljakovic, 1996 #439}	GP After-hours Medical Centre and a hospital ED, Australia	Prospective case review	To describe patients who choose different primary care services for asthma care at Wellington general practitioner run After-hours Medical Centre (AMC) and Wellington hospital emergency department (WED).	Compared with ED users, users of the after-hours centre more likely to be younger; live further away; obtain a repeat prescription for asthma medication; and be sent back to their GP. They were also less likely to be referred to the service by a GP and to be admitted. 22.5%

				of patients admitted for asthma had seen a GP prior to admission. Authors conclude that the different patient management observed at the two settings reflected different management strategies.
.(Shipman et al., 1997)	GP and A&E OOH services, England	Mixed methods; routine data and interviews	To described demand for GP and A&E OOH and compare presenting complaints and patient decision making.	2x3week periods in 1995/1996 2,564 contacted either GP/A&E. 39% to A&E, 61% to GP. Peak time for A&E and GP were evenings, more contacts for A&E after midnight, more to GP Sunday am and weekend afternoons. Children <10 yr 45% of GP but only 26% of A&E contacts. 57% attending A&E made decision to attend A&E themselves. 56% would have attended regular GP had it been open.
Brogan, 1998 #20}	OOH services (GP and other), England	Routine data analysis and questionnaire	To describe the volume and type of OOH work by GP OOH and other OOH services and to estimate the costs of such work.	47,828 OOH contacts in 2 months in 1995: 21,649 (45%) with GPs, 12,908 (27%) with A&E, 11,318 (24%) with home nursing services, and 1953 (4%) with ambulance services. Estimate GP OOH co-op cost of £5190/1000 population/year compared to £2290/1000 population/year for A&E services.
(Carlisle et al., 1998)	A&E and GP OOH, England	Routine data analysis	To examine the relationship between GP OOH, A&E workloads and deprivation and distance to A&E.	6 months in 1996 saw 4742 OOH contacts; 2019 GP, 1016 deputising service, and 1707 A&E contacts. Deprivation associated with increased contact rates. Distance no significant impact on OOH contact rate when deprivation accounted for. Significant variation in contact rate between practices.
(Plauth and Pearson, 1998)	Urgent Care Centre, USA	Questionnaire	Comparison of patients attending urgent care centre vs routine GP with a survey of patients attending urgent care centre; reasons for attendance and attitudes towards primary care.	1996, 1 week - 551 seen at centre, 1000 at routine GP. 38% of those seen at centre seen during normal hours. 421 completed questionnaire. Urgent care patients were younger, reported a need to be seen

				immediately, difficulty getting a routine appointment due opening hours or logistical problems and a positive attitude towards primary care. Most would have preferred to see usual physician but did not mind when had acute illness.
(Toivanen et al., 1998)	GP OOH services, Finland	Routine data analysis	Comparison and characterisation of use and referrals of three different primary care OOH models.	2926 OOH contacts in 2 months. Patients that could attend their local centre during out of hours used that centre more during the OOH period compared with patients who had to attend a centralised cooperative OOH centre. No differences between age of those attending between different models: youngest age group attended the most and oldest group most likely to be referred to hospital.
(Vehvilainen et al., 1998)	GP weekend service, Finland	Survey of GPs	To examine the pattern of weekend GP referrals for 1 week in 1992 and 1 week in 1994.	530 patients referred. 90% were referred same day, 40% to surgical specialties. Men referred more often than women for arrhythmias, hand and foot fractures and dislocations. Most common diagnoses were musculoskeletal, digestive and circulation. Caution – no data on total number seen during weekend, no comparison of weekday referrals and ?reliability of recall.
(Avery et al., 1999)	A&E and GP OOH, England	Routine data analysis and questionnaire	To describe the patter of OOH activity for GP services and A&E, to compare the presenting complaints at both services and to assess those calls dealt with by telephone consultation alone by presenting complaint.	6 months in 1996 saw 5057 GP contacts or 217 contacts /1000 patients/year. 63% to GP or GP deputising and 37% to A&E. Fever and D+V being most common PC to GP. Accidents and injuries accounted for half of presentations to A&E. Note – single city, only 6 month data, underestimate due incomplete recording and collection.

(Hulland et al., 1999)	GP deputising/traditional on-call, England	Prospective case review	Describe use of GP and A&E services outside normal hours for children under 5.	1072 contacts over 6 months. Contact rate of 751/1000 children/yr. 80% dealt with by GP and 34% of those dealt with by telephone. Variation in presenting complaint and being dealt with by phone.
(O'Donnell et al., 1999a)	GP OOH, UK	Review	To examine literature concerning changes in OOH service provision over previous 5 years and to discuss the issues or models of care hitherto less well examined such as rural OOH provision or single handed practices.	Quotes increasing OOH demand and development of new models – rota, collaboration, GPs at A&E – cheaper and less tests, nurse telephone triage, GP cooperatives, primary care emergency centres – national survey evaluation of cooperatives- work load, some comparisons of models, GP stress levels reduced with new coop model. Need for national comparisons of quality, equity of access, efficacy +/- satisfaction – although difficult to interpret. Burden of OOH in rural areas or in single handed practices need assessment as well as cost comparisons of models.
(O'Donnell et al., 1999b)	GP OOH, Scotland	Routine data analysis	To describe OOH contacts and the patient transport service use by socioeconomic category.	3193 OOH contacts in 1 week. Children and adults higher contact rate from deprived areas whereas elderly from affluent areas had higher contact rates. More deprived depcat associated with home visits but not telephone consult or centre visit. Deprived patients used transport service more.
(Vedsted and Olesen, 1999)	OOH service, Denmark	Prospective case review	Describe the OOH use of the 10% who use OOH the most – 'frequent attenders'.	218 237 OOH contacts in 1990. FAs accounted for 42% of all OOH contacts. Of those defined as FA in 1990 2/3 contacted OOH the following year at least once. However regular frequent attendance over 5 years was low. Females and older patients were highest users and largest

				numbers of FAs were women. If FA for longer had higher chance of remaining a FA.
(Drummond et al., 2000)	GP OOH, Scotland	Routine data analysis and questionnaire	To evaluate reason for OOH contact and relate this to sociodemographic data and presenting complaint.	3193 OOH contacts over 1 week. 1115 questionnaires completed (69.3%). Most common reasons for contact were: perceived urgency, pain and anxiety. Patient socioeconomic deprivation status associated with higher perceived difficulty of day time access.
(Payne, 2000)	GP OOH co-op, and deputising, emergency social work, 24hr psych clinic, 24hr community mental health telephone line, A&E and ambulance service. London	Retrospective case review/routine data analysis	Patterns of OOH use by those with mental health problems in a deprived urban area.	4 weeks 1998, 556 contacts, 56% male. 45% presented to A&E. More males present to emergency psych clinic; females to GP. Self-harm more likely to present to A&E; suicidal patients to GP. Differences between age groups and sex. Note these are deprived urban figures and short time period.
(Salisbury, 2000)	GP OOH, UK	Review	To provide a review of demand for UK OOH care.	Different searches limited to UK, 1959-1999. Difficulty measuring and comparing demand but some more consistent characteristics of demand patterns – eg age of patients, time of contact etc. Some evidence of increased demand over time but difficult to corroborate. Will become easier with more comprehensive electronic data.
(Salisbury et al., 2000)	GP OOH cooperatives, England and Scotland	Routine data analysis	To estimate the demand and supply of OOH care from a representative sample of cooperatives.	899 657 OOH calls over 12 months. Rate of call highest before midnight and highest for 0-4 yr olds, peak demand Sunday mornings, Scotland higher rate than England, more deprived higher than less deprived. High variability

				between cooperatives in the proportion offered consultations at centre, over the phone or at home. Although only takes some data from co-ops using Adastra software and so may not be representative sample.
(Murphy et al., 2001)	GP OOH services, Ireland	Routine data analysis	Compare the OOH consultation rate of deprived patients seen by rural vs non-rural GPs across 2 Irish Health Boards.	102,286 OOH contacts in 1998. State higher median rate for rural vs urban (290/1000 vs 220/1000). 'Whilst causative conclusions are difficult to draw from international comparative work, at the very least such a study will harness the natural laboratory that is European general practice.'
(O'Reilly et al., 2001)	GP OOH cooperative, Northern Ireland	Routine data analysis	To examine for geographic and demographic variation in OOH contact outcomes.	Data for 78,907/110,357 OOH calls in 1998. Higher call rates at extremes of age and 74% of calls within 20mins drive. Call rate positive correlation with deprivation and negative correlation with distance. Measures of need - mortality ratio and long term illness census data – not correlated with call rate. Most received telephone advice, of those seen younger more likely at centre older more likely home visit. Telephone only positively correlated to distance and travel time from centre. Note variation between centres.
(Payne and Jessopp, 2001)	NHS Direct telephone triage service, England. 56,540 calls	Routine data analysis	To analyse activity, including the relationship between patient characteristics an outcome, over the first year of operation.	Data collected on 56,540 calls. Almost one-quarter of calls for children aged 0-5 years. Service busiest between 9am and 2pm, and again between 6pm and 9pm. Majority of calls (68%) were in the OOH period. Most calls (56%) were categorised as non-urgent, with 37% o callers given self-care advice. Call

				volume tripled over the Millennium period, with calls tending to be less urgent and from older callers.
(Vedsted et al., 2001)	OOH service and Routine practice, Denmark	Retrospective case review	Compare the rate of day time attendance to the rate of OOH attendance – are frequent day time attenders also OOH frequent attenders?	339 009 (81.5% of pop) patients made day time contact, 84 225(20.2%) patients to OOH in 12months. 34 428 (8.3%) daytime FAs, 8154 (2.0%) out-of-hours FAs, and 3429 (0.8%) both day and OOH FAs. 56.3% of day time FAs did not attend OOH at all. FAs accounted for a third of day time and OOH contacts. 10% of day time FAs were also OOH Fas. ?Already understood that intervening daytime FAs may help reduce OOH FA.
(Barrett et al., 2002)	District nursing service, UK	A retrospective examination of routine community-based data for a newly established intermediate care nursing service over a 12-month period from April 1998 to March 1999.	To explore routine data sources to assess its potential for monitoring performance.	The service provided out-of-hours community nursing care for 903 patients in 1071 episodes of care and 6033 recorded contacts. Although information about patient characteristics and episode start-dates were complete, over half the episode end-dates were missing. The data suggested that this was primarily a domiciliary service for people aged 65 years and over, covering six main care programmes: genito-urinary, neoplasm, wound management, elderly care, gastro-intestinal and locomotor care. Most of the referrals were from primary care clinicians. At present, the way we view and count activity can fragment services and increase the stress on clinicians. We need to shift our service-focused approach to a patient-centred one. This can be done now by consistent use of patient identifiers and by encouraging services to plan data linkage. But

				a gap still remains with regards to outcomes, limiting our ability to measure effectiveness
(Hampers et al., 2002)	Regional paediatric OOH service, USA	Billing records reviewed (?routine data analysis) and questionnaire to paediatricians	To describe a regional, community-based paediatric urgent care network (PUCN). To compare 4 different parts of a city catered for by different paediatric out of hours services.	In 2001, 37 143 visits /consultations at paediatric out of hours centres/paediatric urgent care centres. Minor trauma, ear complaints, and viral illnesses accounted for 70% of visits. 2.2% of visits required admission or transfer. 110 Paediatricians, representing all 55 practices, responded to questionnaire: reported high levels of use, good communication and high satisfaction with service. Note – billing and costs form part of conclusion and analysis that may not be transferrable.
(Munro et al., 2003)	GP OOH co-op, England	Routine data analysis	Study the effect of distance from OOH centre on the number of face to face consultations: at the OOH centre vs. house calls.	31,048 calls, 14 months 1997-1998, 57% seen in person. 75% of those were seen at centre, remainder were house calls. Reduced odds to be seen in person with increasing distance but odds of house call vs. consultation at centre did not change significantly with distance. Patients from more deprived areas less likely to be seen in person but of face to face consultations higher odds to be seen at home compared to less deprived patients.
(Pooley et al., 2003)	GP rota, deputising service and co-op., England	Routine data, questionnaire and qualitative interviews	The differences in OOH services in 2 Health authorities in 1998 and a comparison of delay times. Patient and practitioner views.	744 questionnaires, 83 interviews. Variation in proportion of house call: telephone advice: consultation between areas as well as delay time. Suggest variation less to do with geography or patient characteristics but rather due to different service organisation.
(Thomson et al., 2003)	GP OOH services, Scotland	Mixed methods, questionnaire, semistructured	To compare extant models of OOH service delivery.	Survey 1998, 75% Scottish pop. have co-operatives. Characterised 10 'models' based on level of rurality/urbanness and whether co-

		interviews, economic analysis		op or rota etc. Suggests categorical differences between rural vs urban services. Most co-operatives had some governance procedures like protocols but there was variable quality of patient satisfaction surveys and only 31% had quality standards. Data from rotas and deputising services was limited. Most patients satisfied and more were satisfied when felt the clinican listened. Large variation in cost/1000 population.
(van Uden et al., 2003)	A&E and OOH Co-operatives, The Netherlands	Routine data analysis	To compare the number and characteristics of patients attending A&E and GP OOH co-operatives in two areas that have different GP OOH organisation structures.	One co-op located at an A&E department with open access (all patients passing through GP prior to A&E) the other co-op in a city centre 5km and 9km from the nearest A&E with GP access via telephone first. 3 weeks in 2001 recorded 6879 GP OOH contacts and 1719 A&E contacts for both locations. Contact rate for OOH GP was 279/1000/yr for co-located co-op and 238 for the other OOH co-op whereas no significant difference for A&E contact rates. For the co-located co-op less patients received telephone advice, more attended for consultation and fewer received a home visit.
(Beale et al., 2006)	Kennet and North Wiltshire Primary Care Trust, UK	Routine data review of all recorded out-of-hours calls to GPs In North Wiltshire Jan-April 2004.	To test if out-of-hours demand in UK primary care is predicted by council tax band.	1335 out-of-hours contacts were recorded in the study period. It was possible to attribute a council tax valuation band to 1297 of the patients. Contact rates were significantly associated with council tax band: patients from council tax band A homes contact out-of-hours services twice as often as their counterparts at the other end of the council-tax-band spectrum.

(Bury et al., 2006)	GP OOH Co-operative, R.O. Ireland	Questionnaire	To document the activity of the 11 existing OOH co-operatives in 2002.	(Free GP services for 30% of pop. on basis if low income/>70yrs. And co-ops provide for approx. 40% of country population). Variety in size, facility, rural/urban and staff of co-ops. 3/11 did not do home visits. Averages (mean) of activity 34% of contacts dealt with by telephone advice alone, 54% contacts seen at centre, 12% were home visits. Mean contact rate of 244/1000/yr and consultation rate of 144/1000/yr. Mean non-urban vs urban contact rate of 262 vs 75/1000/yr. Urban co-ops less telephone advice only and less home visits but more centre consultations.
(Giesen et al., 2006)	GP OOH and A&E, The Netherlands	Retrospective case review	To gain insight into current patient characteristics and the care received at both GP cooperatives and A&E departments in order to help prepare and develop effective models for collaboration out of hours.	258 patients contacted the GP cooperative and 43 self referred to the A&E department per 1000 patients per year. A wide range of problems were seen in the GP cooperative, mainly related to infections (26.2%). The A&E department had a smaller range of problems, mainly related to trauma (66.1%). Relatively few urgent problems were seen in the GP cooperative (4.6%) or for self referrals in the A&E department (6.1%). Women, children, elderly, and rural patients chose the GP cooperative significantly more often, as did men and patients with less urgent complaints, infections, and heart and airway problems. DISCUSSION: The contact frequency of self referrals to the A&E department is much lower than that at the GP cooperative. Care is complementary: the A&E department focuses on trauma while the GP cooperative deals with

				a wide range of problems. The self referrals concern mostly minor, non-urgent problems and can generally be treated by the general practitioner, by a nurse, or by advice over the telephone, particularly in the case of optimal collaboration in an integrated care facility of GP cooperatives and A&E departments with one access point to medical care for all patients.
(Giesen et al., 2007)	GP OOH, The Netherlands	Routine data analysis	To study the relationship between the waiting time for a home visit and the distance to the GP cooperative	The average waiting time for 5827 consultations was 30.5 min. Traffic intensity, home visit intensity, time of day and urgency of the complaint all seemed to affect waiting times significantly. 88.7% of all patients were seen within 1 hour. In the case of life-threatening complaints (U1), 68.8% of the patients were seen within 15 min, and 95.6% of those with acute complaints (U2) were seen within 1 hour. For patients with life-threatening complaints (U1) the percentage of visits that met the time target of 15 minutes decreased from 86.5% (less than 2.5 km) to 16.7% (equals or more than 20 km). Discussion and conclusion. Although home visits waiting times increase with increasing distance from the GP cooperative, it appears that traffic intensity, home visit intensity, and urgency also influence waiting times. For patients with life-threatening complaints waiting times increase sharply with the distance.
(Lordan, 2007)	GP OOH Co-operative, The	Routine data analysis	To investigate for consistency of care across OOH services.	Service choice influenced by patient call and seasonal characteristics. Patient symptoms are

	Republic of Ireland			primary driver of the type of service a patient receives.
(Moll van Charante et al., 2007)	GP OOH co-op and A&E, the Netherlands	Prospective and retrospective case reviews	GP OOH and A&E use patterns comparing 2 x 4 month periods 5 years apart.	11,375 GP OOH contacts 1584 A&E contacts. Similar contact rate at both after 5years. Diagnoses presenting at both as expected. 80% A&E self-referrals presented with an injury and 20% of those had a fracture. Authors suggest reasonable A&E self-referrals and no change in demand/use after population more aware of service.
(Rossdale et al., 2007)	GP OOH Co-op, England	Routine data analysis	To examine for variation in OOH referral rates and identify factors that might influence the rate.	Exclusions aside there were 33,808 face to face OOH contacts over 3 years with 149 GPs, one co-op. Large variation in referral rates. Factors that had independent predictive association with increased referral rates was female sex of GP (AOR 1.37) and time (later contacts) and place of consultation (home visit vs practice). Note relatively small number of GPs being compared however all in similar place working to similar standards and no difference found for years since registration, employment status and number of contacts seen once sex and time and place of consult controlled for.
(Benger and Jones, 2008)	A&E, England	Patient questionnaire, 2005	Examine the extent to which patient behaviour and referral pathways may be contributing to increased ED attendances and hospital admissions.	200 patients recruited. Direct attendance at A&E was more common when help was sought by bystanders. 57 patients attended A&E directly, 45 of whom dialled 999 for an emergency ambulance. Most patients who attended A&E directly did so as a result of perceived urgency of their condition or have an ambulance called on their behalf and there was incomplete awareness of the out-of-hours

				GP service. The majority of adult patients who are admitted to hospital with an acute illness seek professional help from primary care in the first instance. The shift towards A&E care appears partly driven by changes in general practice and unfamiliarity with the new arrangements for out-of-hours primary care provision.
(Hansen and Hunskaar, 2008)	GP OOH, Norway	Routine data analysis	To pilot and establish a nationally representative network and develop the requisite procedures for collecting continuous routine data from out-of-hours services.	7 out of hours clinics selected covering 212, 921 inhabitants. Recorded 23, 346 contacts in last 3 months of 2006. Report quality data with minimal missing data. Suggest this 'sentinel' data be useful for research and service planning.
(Margas et al., 2008)	GP OOH Deputising service, Poland	Routine data analysis	To describe variation in OOH demand, identify associated GP practice characteristics and describe patient characteristics of frequent users.	2 years, 2003-2004, 173,345 face to face doctor consultations, 62,727 'nurse procedures'. 86% of GP contacts were consultations at OOH centre, remainder home visits. Highest daily number of consultations in Nov-Jan and second peak in May-Jun. Lowest in July. Similar for home visits but no second peak seen and proportion of home visits increased over winter. Little daily variation but highest on Fridays. Roughly 80% of workload 6-10pm on weekdays. Practices closer to OOH centre had higher contact rates, and those with older patients had more home visits. Note similar OOH definition, but OOH was new in Poland at the time. Also no telephone triage.
(Richards et al., 2008)	GP OOH services, England	Routine data analysis	To assess for change in demand and quality of care of patients with cancer	2x 1 year periods 2003-2005 370,220 OOH calls, 7574 (2%) 'core medical service calls' (3433 pre-contract, 4141 post-contract) were

			before and after the new GMS contract on OOH provision.	cancer related. Suggests proportion of cancer related calls pre and post contract was stable but overall OOH call rate increased post contract by 26% (185-233/1000). Post contract – proportions of cancer calls resulting in hospitalisation stable, increased proportions receiving telephone advice and in those attending OOH centre post contract. Also saw increase in time lag from call logged to triage.
(Scott-Jones et al., 2008)	GP OOH services, New Zealand	Prospective case review	To describe the OOH activity of a rural community in New Zealand with a recently established new model of organisation.	204 OOH encounters over 1 month in 2007. Total contact rate was 320/1000/yr whereas face to face contact rate was 245. Higher rate for Maori. 44% patients seen by GP, 45% by nurses, 11% by ambulance staff. 78% treated without need for hospital referral. Nurses referred more to A&E than GP. Note voluntary ambulance service and fee for private GP.
(Turnbull et al., 2008)	OOH call centre, England	Routine data analysis	Describe the rate of calls to OOH services and compare by measures of deprivation, distance and rurality.	34 229 calls in 2 months. There was a small but significant negative correlation of distance with call rate. Rurality also had negative correlation with call rate. Deprivation was associated with higher call rates and this association was strongest in urban areas.
(Fry, 2009)	OOH services, International	Systematic Review	To review OOH care models that reduced A&E workload with a focus on the barriers and facilitators to successful model implementation.	Searched studies from 1970-2009, found 74 relevant. Identified barriers (here have omitted those only relevant to Australian system): speed and delivery of telephone triage – ambulance demand up with delay to respond to call. Gatekeeper function – suggest that other services could refer other than solely GP (e.g. A&E to physio/dietician), more collaborative and integrated services required. Extended role for paramedics-evidence that

				see and treat option could reduce A&E demand. Segregation of medical records: opinions/perception rather than evidence. Patient expectations: suggest unreasonable expectations barrier to patient satisfaction. Financial barrier: suggest lack of A&E user fee could reduce inappropriate A&E use, no evidence cited. Facilitators: Integration – eg GP in A&E reduced cost and A&E activity. Location: co- or nearby location of services to A&E, purport evidence for sustainability and success. Appointment system: suggest not having appointment system preferred by patients. Financial incentives: can lead to reform but lacks evidence of impact on OOH. Nurse practitioners: evidence for high (and safe) patient turnover. Public awareness/media: success of model influenced by public perception/behaviour – low use of WiC cited.
(Hansen et al., 2009)	Emergency services and OOH services, Norway (National and Local telephone triage and OOH GP services)	Routine data analysis	To describe the activity of OOH services during 2007 within a representative sample of 'casualty clinics'.	85, 288 contacts and an average contact rate between casualty clinics of 399/1000 people. 77% classified as non-urgent and 63% ended as consultation with a doctor. 0-9 yr olds highest and 40-59 yr olds lowest contact rates. Women had higher rates than men. 51% contacts in afternoon period, 37% in day time and 12% at night but variety between clinics. 2/3 of contacts were by telephone. It seems this data includes in-hours contacts as well as OOH contacts.
(Zakariassen et al., 2009)	Emergency primary care	Routine data analysis	To assess incidence of emergency contacts (potential life threatening	During 2007 the Watchtowers registered 85,288 contacts, of which 1 946 (2.3%) were

	districts, Norway (the 'Watchtowers'). 1946 emergency contacts.		situations, red responses) to the emergency primary health care service	defined as emergency contacts (red responses), corresponding to a rate of 9 per 1000 inhabitants per year. 65% of the instances were initiated by patient, next of kin or health personnel by calling local emergency medical communication centres or meeting directly at the casualty clinics. In 48% of the red responses, the first action taken was a call-out of doctor and ambulance. On a national basis we can estimate approximately 42,500 red responses per year in the EPH in Norway.
(den Boer-Wolters et al., 2010)	GP OOH, The Netherlands	Retrospective case review	To assess the characteristics of the frequent attenders (FAs) and the presented morbidity during their consultations and to study the persistence of frequent attendance	44 953 contacts were made in 2007. Frequent attenders together with very frequent attenders made up 10% of patients and 23.6% of the total number of contacts. VFA alone represented 1% of the patients but 7.7% of the annual consultations and more often reported agitation as reason for encounter. The prevalence of psychiatric diagnosis in the VFA group (15.3%) was significantly higher than in other groups. Reassurance was the most frequent prevalent management action in each group. The prevalence of chronic disease and psychological problems was higher in those who attended more often.
(Eichler et al., 2010)	Out-of-Hours service, Switzerland. 125 GPs; 685 patient contacts	Questionnaire and cost description study	To evaluate the services provided and the economic consequences of a Swiss GP out-of-hours service	125 GPs collected data on 685 patient contacts. Most prevalent health problems were: respiratory (24%), musculoskeletal (13%) and digestive origin (12%). Home visits (61%) were the most common contact mode, followed by practice (25%) and telephone contacts (14%). 82% of patients could be

				treated by ambulatory care. Additional technical diagnostics, most often laboratory tests, were used for 20% of patients. Mean total costs for one emergency patient contact were €144 (95%-CI: 137-151). The mode of contact was an important determinant of total costs (mean total costs for home visits: €176 [95%-CI: 168-184]; practice contact: €90 [95%-CI: 84-98]; telephone contact: €48 [95%-CI: 40-55]). Basic costs contributed 83% of total costs for home visits and 70% of total costs for practice contacts. Individual mean costs were similarly low for home visits (€30) and practice contacts (€27). Medical problems had no relevant influence on this cost pattern.
(Johansen et al., 2010)	GP OOH co-op and GP in hours, Norway	Retrospective case review	Mental health diagnoses during OOH compared to normal working hours in a population of 23,607	Contacts in 2006:11, 976 at OOH and 61,783 in hours. 2.2% caseload at OOH mental health; 8.7% in hours. At OOH, higher proportion of psychosis, substance abuse and suicidal behaviour. Note may underestimate prevalence as this is first diagnosis data.
(Philips et al., 2010b)	GP OOH service and A&E, Belgium	Prospective case review before and after change/intervention.	OOH use before and after set up of GP OOH Co-operative compared with areas with no cooperative.	5149 contacts over 4 months (2months prior to change, 2 after). Total contacts increased, significantly more so for area with co-op. No sig change to A&E contacts but less self-referred ambulances. Note this GP co-op not available during weekdays and no telephone triage.
(Philips et al., 2010a)	A&E and GP OOH, Belgium	Prospective case review and questionnaire	To describe the number of patients who choose A&E versus GP OOH and investigate their socioeconomic characteristics.	Over 2 weekends in January 2005 1,970 patients contacted, 1,611 took part. 640 saw GP, of those 93.2% either the patient of family recommended calling GP, 971 in A&E group

				and 64% went to A&E out of own initiative. Factors associated with choosing GP on call: female, registered with GP, speaking national language. Those associated with choosing A&E: male, visited A&E in last 12months, speaking another language, African nationality, lack of insurance.
(Turnbull et al., 2010)	GP OOH co-operative, England	Mixed methods: Routine data analysis, semi structured interviews, non-participant observation, retrospective case review	To investigate the relationship between deprivation, distance and use of telephone based OOH by children 0-4 years old and to explore the experiences of users (parents/guardians).	Contacts from Jun + Dec 2003: 34,229 calls, 5697 (17%) for 0-4yr olds, 54% of these were for boys, call rate of 673/1000/yr. Higher rates from more deprived and closer address. Authors described 3 themes from qualitative data to explain geographical variation – 'familiarity of and trade-off between services, legitimacy of demand and negotiation.' Suggest telephone based services may not overcome geographical barriers to access.
(Chmiel et al., 2011)	A&E and GP Cooperative, Switzerland	Prospective case review	To compare the characteristics of walk-in patients in A&E with walk-in patients at GP cooperative.	1901/2974 patient encounters were walk-ins (A&E 1133, GP-C 768). Patients consulting the GP-C were significantly older (58.9 vs. 43.8 years), more often female (63.5 vs. 46.9%) and presented with non-injury related medical problems (93 vs. 55.6%) in comparison with patients at the ED. Independent determining factors for ED consultation were injury, male gender and younger age. Walk-in distribution in both settings was equal over a period of 24 hours and most common during daytime hours (65%). Outpatient care was predominant in both settings but significantly more so at the GP-C (79.9 vs. 85.7%).

(Fry, 2011)	OOH services, International	Systematic Review	To look for impact of OOH models of care on demand for A&E, ambulance and GP services.	87 studies (search from 1970-2011) reviewed with CASP. 44 from UK, Scotland 1. 5 RCTs. 6 models with evidence of impact – although mixed and minimal stat significant evidence. Minor injury units and practice nurses managing minor illnesses – evidence patients could be directed from A&E/GPs. Minimal evidence for impact on A&E workload. Walk in centres – good pt satisfaction, weak evidence for reduced A&E/GP workload. Telephone triage – mixed evidence for reduction in GP/A&E work load but balance in favour of reducing workload especially GPs. GP co-ops – mixed again but some evidence of reduced GP and A&E workload. Positive effect on GPs lives. Ambulance officer care – some evidence for reduced A&E workload, direct to MIU reduced time, safety questioned for treat and refer. GP integrated into A&E – reduced A&E workload, less tests/referrals/cost.
(Huber et al., 2011)	GP OOH Services, Switzerland	Questionnaire	To describe the workload and satisfaction of OOH GPs.	Surveyed all GPs 'on-duty', 2 weeks in 2009 - 295 total OOH episodes. Responses for 148 episodes, 93 GPs. 433 total contacts, only 382 contacts were characterised, 65% contacts were female. Median contact rate of 5 per OOH episode/GP. Home visits most common. 50-60% GPs felt burdened and disrupted by OOH but 58-64% felt OOH had no negative impact on their health. most common presenting complaints were general /unspecified (31%), respiratory (28%) and Musculoskeletal (19%). Note - Duty GP responsible for 24 hr period 'night doctor'

				provides care from 10pm – 7am with duty GP providing back up during that period. Analysis in paper focuses on period prior to night duty doctor as few visit during night period.
(Huibers et al., 2011)	Primary Care OOH or emergency services, 8 European countries.	Retrospective case review/routine data analysis	To compare presenting complaint and diagnoses in patients contacting OOH services in 8 European countries.	13154 OOH contacts analysed. Similar age distribution across countries but sex distribution more variable. 'general and unspecified symptoms' 13.2%, 'respiratory' 20.4%, 'musculoskeletal' 15.0%, 'skin' (mean 12.5%), and 'digestive' (mean 11.6%). Further analysis of age distribution. Authors suggest similar diagnoses presenting to OOH primary care across countries. Low incidence of life-threatening problems.
(De Korte-Verhoef et al., 2012)	GP OOH, The Netherlands	Retrospective case review	To explore hospital referrals of palliative care patients for whom an out-of-hours general practitioner was called.	(1/Nov/2005 to 1/Nov/2006) 529 charts for palliative care patients: 13% were referred to hospital Palliative care patients with cancer (OR 5,1), cardiovascular problems (OR 8,3), digestive problems (OR 2,5) and endocrine, metabolic and nutritional (EMN) problems (OR 2,5) had a significantly higher chance of being referred. Patients receiving professional nursing care (OR 0,2) and patients for whom their own general practitioner had transferred information to the out-of-hours cooperative (OR 0,4) had a significantly lower chance of hospital referral. The most frequent reasons for hospital referral were digestive (30%), EMN (19%) and respiratory (17%) problems.
(Johansen et al., 2012a)	Acute Psychiatric Unit, Norway	Prospective case review	To explore the differences between admissions to an acute psychiatric unit in terms of patient characteristics and referral circumstances.	5322 admissions over 3 years (2005-2008) by 2841 patients. 60% patients admitted due to exacerbation and 19% admitted due to new episode of illness. Half referred by casualty

				clinics (equivalent of OOH GP) and no difference in terms of avoiding admission between referrers.
(Johansen et al., 2012b)	Out-of-hours casualty clinics, Norway. 9487 contacts relating to mental ill-health	Routine data analysis	To identify patients contacting the casualty clinic for mental illness related problems and study interventions and diagnoses	In the initial contacts to the casualty clinics (n = 28527) a relation to mental illness was reported in 2.5% of contacts, whereas the corresponding proportion in the doctor registered consultations, home-visits and emergency call-outs (n = 9487) was 9.3%. Compared to other contacts, mental illness contacts were relatively more urgent and more frequent during night time. Common interventions were advice from a nurse, laboratory testing, prescriptions and minor surgical treatment. A third of patients in contact with doctors were referred to in-patient treatment, mostly non-psychiatric wards. Many patients were not given diagnoses signalling mental problems. When police was involved, they often presented the patient for examination.
(Patwardhan et al., 2012)	Convenient care clinics (CCC), US	Routine data analysis	To examine the utilization of CCC services outside of typical physician office hours and estimate cost savings from potentially avoided visits to the emergency room, urgent care center, and primary care physician associated with CCC encounters.	44.6% of convenient care clinic visits occurred on weekdays, 5 pm or later, or on weekends. Savings from avoided encounters with the emergency room, urgent care, and primary care physician were estimated at $135.53 million.
(Rubin, 2012)	Minor injury units, General Practice, England	Retrospective case review	Description of patients attending MIUs and their subsequent, unscheduled use of GP or A&E services.	1995 patients attended MIU. 63% treated and discharged, 2.7% subsequently attended A&E, 21.8% subsequently attended GP. 855 (42.9%) received further care, 265 (29.9%) had unscheduled further care. Diagnosis

				concurrence of 93.2% between subsequent GP visit and initial MIU visit. Caution – cannot differentiate between those that attended GP based on explicit advice or and those that attended due to 'open ended- safety netting'.
(Sandvik et al., 2012)	Emergency primary health care services, Norway (In and out of hours urgent services)	Routine data analysis	To compare immigrant use of emergency primary care services with that of native Norwegians.	1,715,278 EPHC contacts from 2008. Slightly lower rate of contact for immigrants but higher rate than Norwegians in immigrants aged 0-5yr. Women higher rate than men in all groups. Migrant groups associated with longer consultations, lab tests used more for migrants of specific countries. Differences noted between migrants of different countries: contact rate, employment, income, length of stay, non-specific pain, psych. diagnosis. Excluded short term visitors, some asylum seekers, illegal residents and those missing ID numbers (23% of total, included a lot of children).
(Huibers et al., 2013b)	GP OOH with A&E co –located, The Netherlands	Retrospective case review	To explore the flow and outcomes of patients attending a co-located GP OOH and A&E, with a focus on self-referring patients.	319 GP OOH consultations, 356 A&E consultations, 78% were non-urgent. Most GP contacts completed at the GP OOH without follow-up. More non-urgent A&E patients had tests, mainly X-rays. 88% non-urgent A&E patients had follow-up contact, usually at an outpatient clinic. 35% of non-urgent GP OOH contacts had follow-up. This may reflect differences in patient populations between the A&E and GP OOH or suggest opportunities for improving efficiency of planning follow-up contacts.

(Huibers et al., 2013a)	GP OOH Co-operatives, The Netherlands	Questionnaire	To investigate associations between patient experiences of nurse led telephone triage and co-op organisational factors with the likelihood of self-reported subsequent contact for the same health problem.	13,953 patients who had OOH contact 2009-2011 sent questionnaire. 16 co-ops. 7039 questionnaires returned (50% response rate), 5678 available for analysis, all had telephone contact initially. 40.6% subsequently had consultations at co-op, 31.1% had telephone consultations only, and 28.4% received home visits. 47% of total had follow up contact- 36% of which were in primary care. 59% of home visits had follow up as did 45% of telephone contacts only. More likely to have follow up if older, had home visit, had more negative experience of telephone triage or called a co-op that did more telephone consultations.
(Raknes et al., 2013)	OOH casualty clinics, Norway	Routine data analysis	The effect of distance on OOH 'casualty clinic' use – 5 years data.	Note 'casualty clinic' is an 'emergency primary care centre' that handles life threatening emergencies. Distance reduced contact and consultation rate even more so. Relationship strongest for cases triaged as non-urgent.
(Willems et al., 2013)	GP and A&E OOH at weekends, Belgium	Retrospective case review	To describe OOH weekend use in relation to socioeconomic status and distance from OOH centre.	7723 patients with first attendance over 16wknds and 2 public holidays. Roughly half went to A&E and half to GP OOH but during day time hours more go to GP and more to A&E during night. Men slightly more likely than women to attend A&E. Older patients more likely to go to GP. More go to A&E if closer to A&E and if from more deprived area. Note that there are differences in cost and timing of payments when attending GP OOH versus A&E in Belgium.
(Adam et al., 2014)	GP OOH service Grampian, Scotland	A retrospective review of case records between 1	To explore the reasons for contact and the range and prevalence of presenting symptoms in patients with	852/950 patients made contact because of a symptom. The remaining 97 were mostly administrative and data were missing for one

		January 2010 and 31 December 2011.	established cancer who presented to a primary care OOH department.	patient. The most frequent symptoms were pain (n = 262/852, 30.8%); nausea/vomiting (n = 102/852, 12.0%); agitation (n = 53/852, 6.2%); breathlessness (n = 51/852, 6.0%); and fatigue (n = 48/852, 5.6%). Of the 262 patients who presented with pain, at least 127 (48.5%) had metastatic disease and 141 (53.8%) were already prescribed strong opiate medication. Conclusion: Almost one-third of patients with cancer seeking OOH primary medical care did so because of poorly controlled pain. Pain management should specifically be addressed during routine anticipatory care planning.
(Belche et al., 2014)	OOH clinic, Belgium	A retrospective analysis of routine data for 2009	to study the activities recorded by the first out-of-hours clinic that has been opened, as a pilot study.	A total of 3949 contacts were recorded, 91.6% of contacts were handled locally, 8.4% resulted in hospitalization. In addition, 52% of contacts were with patients aged between 25 and 65; 29.9% of contacts were with paediatric patients. Patients over the age of 65 made up 18% of contacts. The most common pathologies were respiratory.
(Elshout et al., 2014)	GP OOH service, The Netherlands, March 2008- Feb 2009	Observational cohort study.	To determine the frequency of alarming signs/symptoms in febrile children in primary care.	10,476 face to face patient contacts; 59.7% had one or more alarming signs and/or symptoms but the majority of the alarm signs/symptoms were in <10% of patients. Suggests a need to determine the predictive value of alarming signs/symptoms for serious infections in primary care and prognosis.
(Flarup et al., 2014d)	GP OOH, Denmark	Prospective case review and patient questionnaire	To evaluate the reasons for encounter, the outcome and the patient perspectives.	383/700 duty GPs participated at least once. 21,457 contacts were registered and 59% were completed by telephone. Telephone consultations were most often offered to children and home visits primarily to elderly

				patients. Home visits were most often offered to patients aged 75 years or more. 8410/16,434 patients completed the questionnaire. Females comprised the majority of the contacts and of the respondents in the patient survey.
(Flarup et al., 2014b)	Out-of-hours GP service, Denmark	Retrospective case review	To describe contacts to OOH services by patients with chronic diseases: reason for encounter, diagnosis, severity of symptoms, and outcomes.	13,930 patients. 4,912 (35.2%) had at least one of the five chronic diseases. A quarter of all calls to OOH were due to an acute exacerbation in this chronic disease group. 32.6% of these calls came from patients with psychiatric diagnoses. Patients with chronic disease were more likely to receive a face-to-face contact than the remaining group of patients, except for calls from patients with a psychiatric disorder who were more often completed through a telephone consultation. Patients with heart disease calling due to a new health problem formed the largest proportion of all OOH referrals to hospital (13.3%) compared to calls from the other groups with chronic disease (3.4-6.7%).
(Flarup et al., 2014c)	Out-of-hours GP service, Denmark	Observational study/ Questionnaire	To investigate relationships between day time GP use and OOH use as well as chronic disease exacerbation OOH and day time GP use.	11,897 systematically selected adult patients who contacted OOH during 2010-2011. 2,665 patients (22.4%) had one of the five chronic diseases studied. Between 1/3-1/4 of those with chronic diseases were seen by day time GP 30 days prior to OOH exacerbation. Significantly higher OR for exacerbation for those with cancer and psychiatric disease. Caution – do not know which disease the exacerbation refers to therefore may be overestimate exacerbations. Also no way of

				telling if exacerbation was avoidable however data did show that annual review was associated with less OOH contacts.
(Flarup et al., 2014a)	Out-of-hours GP service, Denmark. 11,897 adults contacts with service	Observational cohort study	To describe the prognosis of patients with chronic disease who contact the OOH service in primary care by (i) identifying the characteristics of contacts with the Danish out-of-hours service and daytime general practice, hospitalization, and (ii) studying mortality during a 30-day follow-up period in patients with chronic heart diseases	Patients with chronic disease had a higher risk of new OOH contact, daytime GP contact, and hospitalization than other patients during the 30-day follow-up period. OOH use was particularly high among patients with severe mental illness. A strong association was seen between chronic disease and risk of dying during follow-up. Findings how that patients with chronic disease used both daytime general practice and the out-of-hours service more often than others during the 30-day follow-up period; were more often hospitalized and had higher risk of dying. The authors call for a proactive approach to future preventive day care and closer follow-up of this group, especially patients with psychiatric disease.
(Harris and McDonald, 2014)	A&E, GP, OOH, Walk-In Centre (WiC), England	Prospective case review and routine data	To compare the populations of patients presenting to various acute care facilities.	Random samples from ED between 0800-2200. 384 A&E self-referral attendances excluding ambulance retrievals compared to routine data of contacts from GP OOH (343), GP same day appointments (165) and WiC (300). OOH and GP patients were older and more were female compared to those attending A&E and WiC. A&E associated with chest pain and injuries, non-A&E sites associated with infections and non-traumatic musculoskeletal problems. Half of patients self-referring had further assessment/ investigations not

				available in non-A&E settings. Note timing of sampling of patients was not explicitly OOH.
(Huibers et al., 2014)	GP OOH, Denmark and The Netherlands	Routine data analysis	To compare and investigate the rates of use of GP OOH in Denmark vs The Netherlands.	All OOH contacts Sep-Oct 2011. Denmark- 80 contacts/1000 inhabitants; Netherlands- 50/1000. Significantly higher rate for all three types of contact in Denmark; most for telephone consultations -47/1000 vs 20/1000, particularly for the youngest age group -154/1000 vs 39/1000. Danish more home visits than Dutch while Dutch slightly more clinic consultations. Speculate that difference in triage system – GP vs. nurse – could account for difference but suggest further research into explaining difference in contact rate. Note – also shows lower rate of contact of other services in Netherlands reflects a cultural difference.
(Buja et al., 2015b)	Out-of-hours service, Italy	Retrospective cohort study	To describe the characteristics of patients contacting OOH and to analyse the related outcomes.	23,980 contacts in 12 months. Contact rates highest for older and younger age groups and higher for females. 52% were examined by a GP at home or at the walk-in clinic, 38% were managed over the phone and 9 % were referred to hospital. Factors, including demographic variables, process-logistic variables and clinical characteristics of the contact, were associated with the outcome. Certain OOH physicians were more likely than their colleagues to refer a patient to an ED.
(Buja et al., 2015a)	Out-of-hours service, Italy. 23,504 calls to service	Retrospective cohort study	To sketch an overall picture of the determinants of frequent attendance (FA) at OOH services, considering patients' clinical conditions and socio-demographic features, and whether	Frailty and clinical variables such as psychiatric disease were associated with FA status, as were sociodemographic variables such as sex, age and income level. Alongside other environmental factors, the GP's gender

			the way patients' GPs were organized influenced their likelihood of being FAs.	and mode of collaboration in the provision of health services were also associated with OOH FA. Thus determinants of OOH FA include not only patients' clinical conditions, but also several socio-economic characteristics (including income level) and their GPs' organizational format.
(Cook et al., 2015)	NHS Direct, England	Routine data analysis	Characterise the calls to telephone triage service that were then referred on to other services.	1,385,457 calls over 4 months in 2010-2011. 269,558 (19%) were urgent, and more urgent calls between 15:00-23:00 (all ages) and during bank holidays and weekends (adults only) than other times. Males, most deprived, 60+, more likely referred to urgent care. Associations were found between symptoms and urgency as well as ethnicity and urgency.
(de Bont et al., 2015)	Out-of-hours GP co-operative, The Netherlands. 17,170 contacts for children	Observational cohort study	Investigation of all fever related telephone contacts, consultations, antibiotic prescriptions and paediatric referrals of children during GP out-of-hours care within 1 year	Found an average of 14.6 fever related contacts for children per day at GP OOH services, with peaks during winter months. Of 17,170 contacts in 2012, 5343 (31.1%) were fever related and 70.0% resulted in a GP consultation. One in four consultations resulted in an antibiotic prescription. Prescriptions increased by age and referrals to secondary care decreased by age ($p<0.001$). The majority of parents (89.5%) contacted the OOH service only once during a fever episode (89.5%) and 7.6% of children were referred to secondary care. Thus childhood fever accounts for a large workload in OOH GP services, although most cases are manages in primary care without a referral.

(Elliott et al., 2015)	NHS 24 telephone triage service, Scotland	Routine data analysis	To examine how the public use the telephone triage system to manage symptoms and health problems through analysis of symptom/problem type, duration of symptoms and call outcome.	1 yr, 2011, worth of national call data. 1 285 038 calls with ID number of which 1 061 347 (86%) were OOH. 791 178 individual users. 83% of calls assigned a problem. Abdominal problem most common (12.2%), dental (6.8%), skin (6%). Most were abdominal (13.2%), skin and breathing problems OOH compared to dental (37.2%), abdominal and medication problems in hours. 70% had information on symptom duration - 63% were <24h duration and those OOH tended to be of shorter duration. OOH outcome – advice to visit Ooh centre 34.1%, HV 12.2% and self-care advice 10.2% In hours outcome – advice to see dentist 27.6%, clinician call back 21.1%, advice to contact own GP 19.2%. Of OOH users compared to in-hours users higher proportion were female, younger or older, more deprived or more remote areas. Older and more deprived less likely to use service in total.
(Haith-Cooper et al., 2015)	GP OOH co-operative, England.	Retrospective case review	To describe the characteristics of telephone consultation calls made by pregnant women to an OOH service run by a GP co-operative and also to compare and contrast the differences between the way the calls were handled by GPs and Nurse Practitioners (NPs).	In 12 month period, 128,717 telephone consultation involving 102 GPs and 36 NPs. Of these 2022 (1.6%) related to pregnancy. Most calls occurred on Saturday or Sunday (29.6% and 24.4% respectively). Most calls (963, 47.6%) from women under 13 weeks gestation; 593 (29.3%) 14 to 27 weeks gestation; 313 (15.5%) 28 weeks +. Reasons for call varied by gestational age. First trimester: Commonest reasons were vaginal blood loss (40.0%) and abdominal pain (39.0%). Abdominal pain commonest reason for call in second trimester (23.9%). Viral

				symptoms associated with cough or cold commonest reason for call in third trimester (18.2%). Women often had multiple symptoms associated with a call. NP calls were longer (9.7 vs 8.8 minutes, p<0.001). GPs more likely to offer advice (71.0% vs 61.0%, p<0.01); NPs more likely to offer a centre visit (25.7% vs 36.8%).
(Jansen et al., 2015)	Out-of-hours primary care, The Netherlands.	Routine data analysis	To evaluate the contribution of sociodemographic composition of the neighbourhood in explaining differences in primary OOH care use between GP cooperative catchment areas	The demand of primary OOH care was significantly higher in neighbourhoods with more women, low-income households, non-Western immigrants, neighbourhoods with a higher degree of urbanisation, and low neighbourhood socioeconomic status. Conversely, lower demand was associated with neighbourhoods with more 5 to 24 year old inhabitants. Sociodemographic neighbourhood characteristics explained a large part of the variation between GP cooperatives (R-squared ranging from 8% to 52%). Nevertheless, the multilevel models also showed that a considerable amount of variation in demand between GP cooperatives remained unexplained by sociodemographic characteristics, particularly regarding high-urgency contacts. In conclusion, although part of the variation between GP cooperatives could not be attributed to neighbourhood characteristics, the sociodemographic composition of the neighbourhood is a fair predictor of the demand of primary OOH care.

(Smits et al., 2015)	In hours GP and GP OOH coops, The Netherlands	Routine data analysis	To compare the characteristics of 100 GP practices and their associated level of out of hours use.	100 GP practices' data analysed over 1 year (2011-2012). Half the practices labelled as high use remainder as low use. High use mean OOH contact rate 1.8 x higher than low use group (369 vs. 204/1000/yr). High OOH use practices had higher percentage of foreigners, 0-4yr olds, were closer to co-op, had longer telephone waiting times, had GPs less available for palliative care, performed more tests, had higher perceived workload and had more assistants working. Note no data available on practice population health, small numbers mean chance may play a role in significant results and telephone accessibility was measured 11 months after data collection.
(van Gils-van Rooij et al., 2015)	Urgent Care Collaboration (collaboration of OOH GPs and ED), The Netherlands. 58,620 patients in UCC group; 63,441 in usual care	Observational study	To determine if GPs treat a larger proportion of out-of-hours patients in the UCC system, and how this relates to patient characteristics	A significantly higher proportion of patients attended their on-call GP within the UCC system. The proportion of ED patients was 22% smaller in UCCs compared to the usual care setting. Controlled for patient and health problem characteristics the difference remained statistically significant (OR_0.69; CI 0.66–0.72) but there were substantial differences between regions. Patients with trauma were treated more by GPs. Controlled for case mix, patients in the largest UCC-region were 1.2 times more likely to attend a GP than the reference group. Authors conclude that when GPs and EDs collaborate, GPs take a substantially higher proportion of all out-of-hours patients.

(Zhou et al., 2015)	GP services, England	Questionnaire	To assess the relationship between patient reported GP access and the use of OOH.	567 049 surveyed patients with GP contact in last 6months, 40 108 (7%) of whom accessed OOH in last6 months. Crudely, worse patient reported measures of GP access associated with increased OOH use. After multivariate analysis some association lost but strongest association remained between convenience of opening hours and OOH use and some association for other measures. Estimate an 11% reduction in OOH use if all patients adjusted to have optimal access. Note this assumes a causal relationship. Other limitations – self reported access, 'endogeneity'
(Fisher et al., 2016)	Out-of-hours service, England. 6045 palliative care contacts	Routine data analysis	To describe patterns of usage of patients presenting to an OOH service and coded as 'palliative'	Out of a total of 496,931 contacts, 6045 contacts were coded palliative; those 'palliative' contacts provided care to 3760 patients. Patients contacting the OOH service with palliative care needs did so predominantly during weekend daytime periods. Over a third had more than one contact. Patients were predictably older than the average population, but contacts coded as 'palliative' were relatively less deprived than contacts to the OOH service for all causes, even after adjusting for age and sex. Authors suggest that wider analysis of palliative patient flow through urgent care services is needed to identify whether healthcare access at the end of life is inequitable and to assess capacity requirements of the service.

(Gnani et al., 2016)	Two GP-led urgent care centres (UCCs), England. UCCs co-located with ED in a hospital setting. 7747 contacts for pre-school children (aged under 5).	Routine data analysis	To examine the presenting complaint and outcomes of care for young children in 2 general practitioner (GP)-led UCCs with extended opening times.	3% (n=7747/282 947) of all attenders at the GP-led UCCs were children aged under 5 years. The most common reason for attendance was a respiratory illness (27%), followed by infectious illness (17%). 18% (n=1428) were either upper respiratory tract infections or viral infections. The majority (91%) of children attending were registered with a GP, and over two-thirds of attendances were 'out of hours'. Overall 79% were seen and discharged home. Preschool children were more likely to attend their GP (47.0 per 100) than a GP-led UCC (9.4 per 100; 95% CI 8.9 to 10.0). Authors conclude that two-thirds of preschool children attending GP-led UCCs do so out of hours, despite the majority being registered with a GP. Case mix is comparable with those presenting to an ED setting, with the majority managed exclusively by the GPs in the UCC before discharge home.
(Huibers et al., 2016)	Out-of-hours primary care, Denmark. 4620 telephone contacts	Prospective case review	To describe telephone contacts triaged to face-to-face contacts, GP-assessed relevance, and factors associated with triage to face-to-face contact.	In total, 59.2% of calls ended with a telephone consultation. Factors associated with triage to a face-to-face contact were: patient age >40 years (40–64: RR = 1.13; >64: RR = 1.34), persisting problem for 12–24 hours (RR = 1.15), severe problem (RR = 2.60), potentially severe problem (RR = 5.81), and non-severe problem (RR = 2.23). Face-to-face contacts were assessed as irrelevant for 12.7% of clinic consultations and 11.7% of home visits. A statistically significantly higher risk of irrelevant face-to-face contact was found for a

				persisting problem of >24 hours (RR = 1.25), contact on weekday nights (RR = 1.25), and contact <2 hours before the patient's own GP's opening time (RR = 1.80).
(Scapinello et al., 2016)	Out-of-hours primary care, Italy. 5217 patient contacts.	Retrospective case review	To characterize patients referred from the OOH to ED service in order to explore the gate-keeping role of OOH service for hospital emergency care and to facilitate future research in improving its cost-effectiveness	Only 8.7% (454 people) of the total contacts were referred to ED. In the multivariate analysis, the significant predictors of being sent to ED were: age; residence in nursing home (odds ratios (OR) = 2.00, 95%CI: 1.30–3.10); being visited by a OOH physician (OR = 2.64, 95%CI: 2.09–3.34). Taking infections as the reference, cardiovascular diseases (OR = 18.31, 95%CI: 12.01–27.90), traumas (OR = 8.75, 95%CI: 5.36–14.26) and gastrointestinal conditions (OR = 7.69, 95%CI: 4.70–11.91) increased the probability to be referred to ED.
(Thoresen et al., 2016)	Out-of-hours primary care services, Norway. 5752 cancer patients with 20,220 contacts	Routine data analysis from billing claims	To investigate how cancer patients in Norway use primary care OOH services and describe different contact types and procedures	5752 cancer patients had 20,220 contacts (1% of all) in OOH services. Half of the contacts were cancer related. Cancer in the digestive (22.9%) and respiratory (18.0%) systems were most frequent; and infection/fever (21.8%) and pain (13.6%) most frequent additional diagnoses. A total of 4170 patients had at least one cancer-related direct contact; of these, 64.5% had only one contact during the year. Cancer patients had more home visits and more physicians' contact with municipal nursing services than other patients, but fewer consultations (p<0.001). Patients in the least central municipalities had significantly more

				contacts than more central municipalities (p<0.001).
(Hayward et al., 2017)	Out-of-hours GP co-operative, England. 496,931 patient contacts	Routine data analysis	To define the population contacting OOH primary care who are at higher risk of re-presenting to this service and requiring urgent transfer to secondary care within 3 days of their initial contact	Almost 1% of 496,931 patients contacting OOH primary care required escalation to secondary care within 3 days (4832 cases, 4465 individuals). Of these, 68.5% were initially discharged with no follow-up or advice to contact their GP; 14.7% were initially referred to secondary care. The odds of requiring escalation were increased with age (odds ratio [OR] 1.010; 95% confidence interval [CI] = 1.009 to 1.011; P<0.001), more frequent prior use of the OOH service (OR 1.016; 95% CI = 1.010 to 1.021; P<0.001), and presenting during periods of low call volume (OR 0.880; 95% CI = 0.857 to 0.904; P<0.001). In conclusion, older, prior users of the service, presenting at less busy times, are at greater risk of requiring secondary care referral from the OOH service within 3 days of their initial contact. These higher-risk patient groups might benefit from active follow-up by the OOH service
(Heutmekers et al., 2017)	Go OOH co-operatives, The Netherlands	Routine data analysis	To investigate whether people with intellectual disabilities (ID) in residential setting were more likely than people from the general population to request out-of-hours general practitioner (GP) care and whether these requests had a similar level of urgency.	Of the people with ID (448/1448), 30.9% requested out-of-hours GP care, whereas for the general population this was 18.4% (79 206/431 134), resulting in a relative risk of 1.7 (95% CI 1.6 to 1.8). There was a different distribution of urgency level for people with and without ID. Generally, requests for people with ID were rated as less urgent. Authors conclude that, while some contacts may be

				avoidable, results may point to access issues for people with ID.
(Keizer et al., 2017)	GP OOH co-operative, The Netherlands	Routine data analysis	To examine the motives and expectations of migrants for contacting out-of-hours primary care.	Main reason for contacting a GP OOH Co-operative for non-western and western migrants were an urgent need for contact with a GP (54.9%–52.4%), worry (49.3%–43.0%), and a need for medical information (21.3%–26.2%). These were also the most important motives for native Dutch patients. Compared to native Dutch patients, non-western migrants more often perceived an urgent need for a GP (OR 1.65; 99% CI 1.27–2.16), less often needed information (OR 0.59; 99% CI 0.43–0.81), and more often experienced problems contacting their own GP during office hours (OR 1.71; 99% CI 1.21–2.43). Western migrants also reported experiencing problems more often in contacting their own GP (OR 1.38; 99% CI 1.04–1.84). As well as for natives, most non-western and western migrants expected to see a doctor (46.2%–46.6%) or get advice (39.6%–41.5%). Non-western migrants expected more often to get physical examination (OR 1.53; 99% CI 1.14–2.04), and prescription (OR 1.37; 99% CI 1.00–1.88). Authors found no differences in expectations between western migrants and native Dutch patients.
(Raknes and Hunskaar, 2017)	OOH services, Norway	Prospective case review	To present frequencies of reasons for encounter (RFEs) in the different organ systems, and to identify the	Musculoskeletal, respiratory, skin, digestive and general and unspecified issues were the most frequent RFE groups. Fever was the most

			most frequent RFEs at different urgency levels.	frequent single ICPC-2 RFE code, but was less common among the most urgent cases. Abdominal pain was the most common RFE in patients with yellow urgency level (urgent), and chest pain dominated the potentially red (potentially life threatening) cases. There was less variation in the use of ICPC-2 with increasing urgency level.
(Reyes et al., 2017)	Urgent care centre, USA	Retrospective case review	To determine the most common clinical conditions associated with older adults visiting urgent care centres (UCCs) and the potential need for further resource use.	There were 9445 visits to the UCC from patients aged 55 and over; of these, 2445 had at least one healthcare encounter in the 30 days after index visit. Of these, 578 (23.6%) visited the emergency department (ED) or were hospitalized, 974 (39.8%) returned to the UCC, and 895 (63.4%) visited their primary care physician's office. A significantly higher proportion (38.4%, n = 68/177) of individuals aged 85 and older visited the ED or were hospitalized within 30 days (P < .010) than of those younger than 65 (20.0%, n = 273/1,367). Diabetes mellitus (odds ratio (OR) = 1.73, 95% confidence interval (CI) = 1.40–2.15, P < .001), coronary artery disease or cerebrovascular disease (OR = 2.45 CI 1.95–3.09, P < .001), COPD or asthma (OR = 1.57, 95% CI = 1.23–2.01, P < .001), polypharmacy (OR = 1.45, 95% CI = 1.18–1.78, P = .004), and cognitive impairment (OR = 2.74, 95% CI = 1.74–4.31, P < .010) were associated with higher rates of ED visits or hospitalizations within 30 days of the UCC visit.

(Smits et al., 2017)	GP OOH co-operatives, t he Netherlands	Review	To provide an overview of the organisation, performance and development of PCP co-operatives in the Netherlands.	Since 2005, the number of contacts with Dutch PCP cooperatives has steadily increased; by 2015 it was 245 contacts per 1000 citizens per year. Many contacts (45%) are non-urgent, and about half occur as part of a series of primary care contacts. Low accessibility and availability of daytime primary care are related to greater use of after-hours primary care. To prevent unnecessary attendance at the cooperatives, physicians advocate co-payment, a stricter triage system, and a larger role for telephone doctors. More than half of the PCP cooperatives in the Netherlands have integrated with hospital emergency departments, forming "emergency care access points." This collaboration has decreased emergency department use by 13% to 22%, and treatment of self-referrals by PCP cooperatives in emergency care access points is safe and cost-effective.
(Brettell et al., 2018)	GP OOH service, England	Population-based data linkage study	To establish the proportion of Oxfordshire patients seen by the OOH service within the last 30 days of their life, whether they known to be a palliative care patients and the demographic and clinical features of these groups.	Almost 1 in 3 (29.5%) of all population deaths were seen by the OOH service in the last 30 days of life. Among the 1530 patients seen, 577 (36.4%) patients had their palliative phase documented; these patients were slightly younger (median age=83.5 vs 85.2 years, P<0.001) and were seen closer to death (median days to death=2 vs 8, P<0.001). More were assessed at home (59.8% vs 51.9%, P<0.001) and less were admitted to hospital (2.7% vs 18.0%, P<0.001).

(Collins et al., 2018)	GP co-operative, Ireland	Retrospective data analysis	To establish the number and range of consultations at a GP out of hours service that have a primary or related mental health issue and to document adherence to their follow-up care referral.	Over 1 year, 11,650 (8.6%) adult consultations (out of 135,103 consultations) had a code relating to a mental health condition or prescribing. Focussing on consultations with multiple terms recorded identified 3844 OOH presentations with a mental health component. Overall, 9.3% were referred by the out of hours GP for follow-up to a hospital emergency department (ED) or were advised to attend their own GP. A total of 104 patients who were advised to attend their GP or ED following their consultation with the out of hours GP were tracked. Twenty-seven patients were referred back to their GP; however, 44.5% did not attend. Seventy-seven patients were referred to the hospital services, of whom 37.7% did not attend.
(Jansen et al., 2018)	OOH primary care services, the Netherlands	National survey through National Panel of People with Chronic Illness of Disability	To explore whether health literacy relates to the use of OOH primary care services in adults with a chronic condition; to study whether health literacy explains educational differences in the use of OOH primary care services.	Higher education attainment was associated with higher scores on the health literacy aspects of 'Appraisal of health information', and 'Navigating the healthcare system'. Appraisal and navigating the healthcare system partially accounted for educational differences in PCS use. Finally, higher appraisal of health information scores were associated with higher PCS utilisation. Thus several aspects of health literacy were demonstrated to relate to PCS use, and partly accounted for educational differences herein. Accordingly, developing health literacy within individuals or communities may help to reduce inappropriate PCS use among people with low education.

(Leutgeb et al., 2018)	OOH centres, Germany	Routine data analysis	To determine attendance frequencies and health problem presentation patterns for patients with and without somatoform disorders in OOH Centres in primary care; to compare health care utilization patterns between these patients groups.	350,528 patients (9.2%) out of the 3,813,398 insured persons had a diagnosis of somatoform disorder. Compared to other patients, patients with this diagnosis were older (51.7 vs. 44.0 years; p<0,0001) more likely to be female (70.1% vs 53.3%; p<0,0001). In OOHC, as opposed to normal office hours, the adjusted rate of patients with a diagnosis of somatoform disorder was 60.6% higher (adjusted for age, gender and co-morbidity). Accordingly, in OOHC, prescriptions for antidepressants, hypnotics, anxiolytics but also opioids were significantly higher than in the general study population. However, a diagnosis of somatoform disorder was only made in 3.45% of all patients in that group seen in OOHC in 2014.
(Sandvik and Hunskaar, 2018)	OOH services, Norway	Observational study using routine data	To analyse frequent attenders (FAs) who have visited OOH services in Norway during a 10-year period	FAs constituted 2% of all patients and around 10% of all consultations each year. FAs were most common among the youngest children and the elderly, increasing with age. Females were overrepresented, as were patients with psychosocial problems and various chronic somatic conditions. The majority were only temporary FAs: 59.8% of the FA cohort were not a FA attender. FAs tended to seek help in the late evening and night; they needed longer consultations and more often received a home visit. Predictors of FA were: Female (OR 1.17), age 0–1 years (OR 3.46), age 70+ (OR 1.57), small municipality (OR 1.61), psychological diagnosis (OR 10.00), social diagnosis (OR

				5.97), cancer (OR 6.76), diabetes (OR 4.65), and chronic obstructive pulmonary disease (OR 7.81).
(Heutmekers et al., 2019)	GP OOH co-operatives, the Netherlands	Cross-sectional analysis of routine data	To identify commonly presented health problems of people with intellectual disabilities compared with the general population, in OOH primary health care.	Having an intellectual disability was associated with a higher probability of presenting with epilepsy (OR 45.65), having concerns about medical treatment (OR 23.37), and adverse effects of medical treatment (OR 8.41). Authors suggest that these issues require special attention to improve the accessibility and quality of OOH primary care.
(Keizer et al., 2019)	GP OOH co-operatives, Denmark, the Netherlands & Switzerland.	Cross-sectional survey	To examine factors influencing the intended help-seeking in out-of-hours care for acute health problems during evenings, nights, and weekends. Focus on parents of children aged 0-4 years & on adults aged 30-39 and 50-59 years.	In total, 1015 parents and 2942 adults participated. We identified several significant influential factors. For parents, having a lower level of education (OR 1.56), having migrant background (western: OR 1.23; non-western: OR 1.93), having one child (OR 1.24), perceiving few barriers to using OOH primary care (OR 1.59), perceiving difficulties with organising childcare (OR 1.13), and having a history of frequent contacts with out-of-hours care (OR 1.55) were more inclined to contact out-of-hours care, whereas female (OR 0.85) and non-anxious parents (OR 0.77) were less inclined. Adults who were older (OR 1.01), holding a medical education (OR 1.13), having non-western background (OR 1.28), being unemployed (OR 1.17), perceiving few barriers to using OOH primary care (OR 1.37), and having a history of frequent contacts with a GP (few: OR 1.15; more: OR 1.22) and/or with OOH care (one: OR 1.20; more: OR 1.49) were

				more inclined to contact out-of-hours care, whereas adults with no or little social support (OR 0.84) and adults with high health literacy level on health information (OR 0.91) were less inclined. Dutch parents were less inclined than Danish parents to contact out-of-hours care (OR 0.62), whereas Swiss adults were more inclined than Danish adults to contact out-of-hours care (OR 1.16). Authors suggest that more research is required to understand the underlying explanations for the observed differences.
(Lous et al., 2019)	GP-led OOH service, Denmark	Cross sectional study of 2363 randomly selected contacts	To describe the reasons for encounter (RFE), the most common diagnoses, the provided care, and the parental satisfaction with the GP-led OOH service in a Danish population of children (0–5 years).	The most common RFE was non-specific complaints (40%), followed by respiratory tract symptoms (23%), skin symptoms (9%), and digestive organ symptoms (8%). The most common diagnosis group was respiratory tract diseases (41%), followed by general complaints (19%) and ear diseases (16%). Prescriptions were dispensed for 27% of contacts, of which about 75% were for antibiotics. A total of 12% contacts concerned acute otitis media; antibiotics were prescribed in 70% of these encounters. A total of 38% of contacts concerned fever, and 25% got antibiotics. A total of 7.4% were referred for further evaluation. Parent satisfaction was generally high, but 7.0% were dissatisfied. Dissatisfaction was correlated with low prescription rate.
(O'Connor et al., 2019)	Primary care OOH service	Questionnaire survey of patients	To examine the expectations of patients attending an urban primary	435 patients with acute URTI symptoms

			care OOH service with acute upper respiratory tract infection (acute URTI) regarding clinical examination, symptom management, information on their condition, reassurance, antibiotic treatment and other possible options including referral.	participated in the survey, representing 25.4% of those attending the single branch where the survey was conducted (n=1715). Of the study participants, 43% were aged under 6 years and 60% were women. The most common presenting symptoms were cough (72%), throat ache (46%) and common cold (26%). The most common expectations were for further examination (53%), reassurance (51%), information (49%) and medication for cough (47%). Only 34% expected an antibiotic. Authors suggest that recognising patient expectations may help clinicians decide on management options for patients with acute URTI.
(Seeger et al., 2019)	OOH primary care centre, Germany	Cross-sectional study with prospective data collection	To determine patient characteristics, reasons for encounter (RFE) and its duration, diagnostics provided, medication prescribed, the necessity of hospital admission or hospital treatment as an outpatient, and the assessment of the urgency from the physicians' point of view in an OOH primary care centre.	892/1098 OOH patients participated in the study (RR 81.2%). More than half of the patients were between 18 and 39 years old. A quarter of all RFE were in the ICPC-2 category "skin". More than 60% of patients had the symptoms for more than two days before visiting the OOH primary care centre. In 34.5% of all cases no medication was prescribed and one in six patients received further diagnostic tests such as urinalysis and blood tests 15.8%). From the physicians' point of view, 26.3% of all study participants could have been treated by the family doctor during routine consultation hours.
(Stegink et al., 2019)	OOH calls to national telephone triage	Routine data analysis	To estimate statistical complexity of patients' reasons for encounter (RFE) and to examine associations with	High users comprised 2.4% of adults using the service and accounted for 15% of all contacts. Statistical complexity (as entropy of categories) increased with number of contacts

	service (NHS 24), Scotland		patient demographics and presenting symptoms.	but was not substantially influenced by either patient age or sex. Between 5 and 10 consultations, higher entropy was associated with a reduced likelihood of further consultations. In contrast, the occurrence of one or more contacts for a mental health problem was associated with increased likelihood of further consultations.

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Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	Title refers to A systematic scoping review of international literature.
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	These areas are referred to and reported in the abstract.
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	Page 5, First paragraph of Methods describes the rationale for undertaking a scoping review.
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	Page 5, end of Introduction describes our objectives.
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	Page 5, Method: The study review protocol is available at www.crd.york.ac.uk/PROSPERO (registration number: PROSPERO 2015:CRD42015029741)
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	Page 5-6: Method: Search timeframe was from 1995 to March 2019; all study designs were included. Box 1 gives a detailed description of inclusion and exclusion criteria.
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with	Page 5, Method: Six databases were searched using Ovid and EBSCOHost: CINAHL; Medline; PsyARTICLES; PsychINFO; SocINDEX; and Embase.

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
		authors to identify additional sources), as well as the date the most recent search was executed.	The initial search timeframe was from 1995, when key changes took place in the organisation of UK out-of-hours services, to December 2017. An update was conducted in March 2019.
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	Searches are detailed in Appendix 1.
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	Page 6, Method: Includes a description of the title, abstract and full paper screening conducted in the SR software Distiller SR. Box 1 describes the inclusion and exclusion criteria used.
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	Page 6, Methods: Study characteristics were extracted for all included papers by HF, KM, NB, MG and COD (two reviewers per paper). All data information were extracted from the papers themselves.
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	Page 6, Methods: Thematic analysis focused on the areas of interest to the Scottish Government, who funded the study, Discussion with the Review Group identified four major areas of interest, namely: Patient demand; new models of care; use of information technology; and quality and safety of care
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	Page 6, Methods: Study characteristics were extracted for all included papers by HF, KM, NB, MG and COD (two reviewers per paper). Papers were quality assessed using recognised checklists based on CASP checklists (https://casp-uk.net/casp-tools-checklists/) for observational studies, randomised controlled trials and reviews/systematic reviews. Each paper was appraised by two members of the team, led by COD and HF, supported by KM, NB, MG and SMcD. Papers were judged good if no element of the design was judged to be poor; fair if they were assigned one poor score; and poor if they were assigned two or more poor scores. COD reviewed papers identified in the update search.

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	Page 6, Method: Thematic analysis focused on the aims of the study; the population group; key findings and how this fitted to the key areas of interest to the Scottish Out-of-Hours Review Group. Discussion with the Review Group identified four major areas of interest, namely: Patient demand; new models of care; use of information technology; and quality and safety of care. In this paper, we focus on those papers addressing patient demand, as well as outcomes associated with that demand. The summary table is presented in Appendix 2. Some papers gave an estimated or adjusted rate of contact per annum. If these data were not provided crude contact rates were calculated, if possible. This relied on the paper giving information on (i) the size of population covered; (ii) the number of patient contacts; and (iii) a timeframe for data collection. These were calculated by HF, in discussion with COD.
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	Figure 1 is a detailed PRISM flow diagram. We screened 2548 titles, excluding 1823 of these. 725 full-text papers were reviewed, with 400 included in the full scoping review. Of these, 105 reported on demand use and outcome of OOHS and are reported in this paper.
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	Page 7, Results: Data were extracted on country of study; year of publication; study design; patient focus; main setting in which and study was set. These are reported in Table 1. Appendix 2 expands on this for all 105 studies and reports on the aim and key findings for each paper.
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	Page 7, Results: Study quality was generally fair or good.
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	See Results section, Tables 2 to 4 and Appendix 2.

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	See Results section for syntheses by theme.
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	See Discussion pages 15 to 17.
Limitations	20	Discuss the limitations of the scoping review process.	Limitations are listed in the bullet points of Strengths and Limitations, in the format requested.
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	Conclusions are on Page 17.
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	Page 18: This study was funded by the Scottish Government through the Primary Care Division and Health Improvement Scotland.

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.
* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.
† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).
‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.
§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

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