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Urgent care components and their effectiveness:

A rapid review of evidence and international insights - Technical report

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Details of Evidence Review Report

Title: Urgent care components and their effectiveness: A rapid review of evidence and international insights - Technical report

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Contents

1. Key messages

Overview and scope

- This report examines the **effectiveness and impacts** of **urgent (primary) care model service components** in alleviating pressure on emergency care and improving patient independence
- The **latest evidence** has been gathered from **22 primary research studies** through a systematic rapid review and **international insights** that highlight good practice across the UK and other countries
- **A variety of urgent care components have been explored**, including:
    - Task shifting strategies
    - Access to diagnostic services, such as radiology
    - Decision support tools assisting redirection and digital triage
    - Urgent care / treatment centres
    - Virtual urgent care
- **Effectiveness** is measured across **various outcomes** including cost-effectiveness, patient safety, unplanned health service re-contacts, patient adherence to and compliance with recommended advice, service impact, triage accuracy and appropriateness, waiting times, timely clinical assessment, and patient experience.

Findings and implications for policy and practice

- The report offers **valuable international learning and explores options** to re-design and optimise delivery of urgent care in Wales
- Across the evidence base service components were often entwined across **emergency care, urgent care** and **urgent primary care**
- Overall, despite limitations, the evidence suggests **promising findings**, particularly in reducing elements of service burden and improving patient experience in certain contexts
- Effective service design must **balance safety and efficiency**, with attention to training, clear communication, and ensuring equitable access across diverse population groups seen within urgent care settings
- **Special consideration** should be given to supporting multidisciplinary teams, investing in diagnostic access, and ensuring digital and virtual services are inclusive and responsive to patient needs
- **Public awareness and education** are essential to improve uptake of alternative urgent care options
- It is crucial to consider the **feasibility and applicability** of international evidence and practice to the Welsh context, given specific system and population characteristics, as most studies have been conducted outside of the UK
- Further **quality research and evaluation** is needed to confirm benefits and inform transformation in Wales, considering the small number, methodological weaknesses and mixed results across studies.

2. Introduction

2.1. Current issues with urgent care internationally

Rising levels of demand for urgent and emergency care services is a global trend, with increasing emergency department (ED) wait times, calls to ambulance services, and contacts with other urgent care services (including primary care and telephone-based services) seen across high-income countries. (1, 2) For example, in England there were 26.3 million accident and emergency (A&E) attendances between 2023/2024, an increase of 22.5% since 2011/2012, (3) while in Australia there were 9.0 million ED presentations in public hospitals during 2023/2024, (4) an increase of 38.5% since 2011/2012. (5)

The reasons for these rising levels of urgent care demand include a complex mix of changing demographic, health and social factors. (6) Ageing populations and increased prevalence of chronic diseases account for some of the increases in demand. Research suggests that older populations, particularly those age 80 and over, require and utilise urgent care more than younger population groups (6). Population ageing is expected to intensify over the coming decades across many OECD countries and by 2050, estimates indicate nearly 30% of the EU population will be over 65 (7), which is likely to increase demand for urgent care further. (7)

Non-urgent visits are another important driver for increasing ED visits, with available data for the proportion of non-urgent ED visits ranging from 26% to 60% globally. (8) Various studies have been conducted to understand the reasons people attend EDs including a rapid mapping review by Coster et al. (2017) (9) which mapped reasons for choosing emergency and urgent care, for mainly low-urgency health problems, from a total of 38 studies. Several factors were identified:

- Access to, and confidence in, primary care
- Perceived urgency, anxiety, and the value of reassurance from emergency-based services
- Views of family, friends, or healthcare professionals
- Convenience (location, not having to make appointments, and opening hours)
- Individual patient factors (e.g. cost)
- Perceived need for emergency medical services or hospital care, treatment, or investigations. (9)

Many health systems face a fragmented landscape of urgent and emergency care providers, with services often situated in an uncoordinated and ambiguous space between primary care and emergency hospital care. In response to rising demand and to help reduce avoidable ED visits, several countries are now reforming their urgent care systems. (1)

There is a recognition of the need to explore current evidence and good practices across other countries that can help re-thinking, re-designing and delivery of urgent care in Wales.

2.2. Defining urgent care

Urgent care services are primarily designed to provide care for illnesses and injuries that need attention quickly but are not life or limb-threating. (10) This may include suspected broke bones, sprains and strains, minor head injuries, cuts needing stitches, minor burns, feverish illnesses, abdominal pain, headaches, chest infections, dermatological complaints, genito-urinary problems and urgent mental health concerns. (10) From a patient perspective, this contrasts from urgent primary care which focuses specifically on urgent illness, reflecting the traditional scope of general medical services and excluding injury-related care.

Although there has been a rapid increase in urgent care services globally, there is currently no internationally standardised definition of urgent care. (8) The WHO, in a 2013 bulletin, defined urgent care as "ambulatory care in a facility delivering medical care outside a hospital ED, usually on an unscheduled, walk-in basis". (11) However, the naming, scope, and organisation of urgent care services vary widely across countries. (12) This report follows the definition used by the NHS Wales *Six Goals for Urgent and Emergency Care*, which defines urgent care as health and wellbeing issues that may result in significant or permanent harm if not dealt with within the next eight hours. (13)

2.3. Urgent care model types

In this review, we use the taxonomy developed by Warkentin et al. (2020) (8), which builds on the foundational framework proposed by Cooper et al. (2019) (14) to describe the various types of urgent care services offered around the world. This taxonomy addresses the widespread issue of inconsistent terminology in urgent care by categorising services according to their physical proximity to EDs and their level of integration with emergency or primary care. Warkentin's model (2020) (8) defines in detail five distinct service types (Integrated, Parallel, Advanced, Restricted, and Home Services), positioned along a spectrum from fully integrated ED-based care to services that closely resemble primary care.

To more accurately represent the current landscape of urgent care in the UK, we have introduced an additional category encompassing NHS 111 and other national referral services. This modification ensures our review captures the full spectrum of urgent care delivery models documented in both practice and the literature.

A summary of these models and their associated service components is provided in Table 2 to illustrate their distribution and overlap. The key service components are discussed in Section 5.4.

2.3.1. Emergency Department Integrated Services

The Emergency Department Integrated Services model provides urgent care within the ED for low-acuity patients, with GPs and nurse practitioners (NPs) working alongside ED staff to assess and treat patients. Within this model, there is access to the broad range of hospital diagnostic and imaging

services. These services typically operate extended hours (e.g., 8:00 am to midnight) and are mainly found in urban areas. (8)

- Over the past 15 years, EDs across the UK and Europe have introduced GP services both in and alongside EDs to tackle the rise in demand of perceived GP patients. (15) For example, in England this is often referred to as 'GPs in Emergency Departments', introduced in 2017 to ease ED pressure by directing non-urgent patients to GPs or other primary care clinicians working in or alongside EDs. (16)
- Other parts of the world using this model include Australia, the United States and Canada. For example, in Canada, integrated service models are sometimes known as fast-track systems, with many hospitals having a physically separate fast track unit within or adjacent to the ED, staffed by a team that may include NPs, physician assistants, GPs or emergency physicians. (8)

2.3.2. Hospital Parallel Services

In this model, urgent care services operate alongside but are separate from the ED, typically with a formal, coordinated relationship. Primary care practitioners may redirect ED-triaged patients to the urgent care clinic, which can also act as a gatekeeper for the ED by assessing self-referred patients before granting access to ED or specialised care if needed. These urgent care services usually operate 12 to16 hours a day, seven days a week and frequently have limited access to diagnostic facilities. (8)

In many countries, urgent care services are increasingly co-located with hospital EDs, including the Netherlands, Denmark, Belgium, Australia, Germany and England: (1)

- For example, in the Netherlands, out-of-hours (OOH) primary care is delivered through a well-established system of GP cooperatives (GPC). These are large-scale organisations, often comprising 100 to 250 GPs, who collectively take turns being on duty for their combined patient populations during OOH periods. (17) These GPCs, which operate in dedicated centres, are increasingly located on the site of hospital EDs, but functioning independently. (18) Joint triage with the ED, coordinated by GPs, directs suitable patients to the cooperative. In the Netherlands, financial incentives support this model, with patients paying towards ED visits but not for primary care centre visits. (1)
- Denmark has taken one of the most stringent approaches to reducing ED use. Since 2004, patients must be referred by a GP or urgent care call centre to access the ED; those without a referral are only admitted in clear emergency cases. (1)

2.3.3. Community Advanced Services

In this model, stand-alone facilities provide examination, diagnosis, and treatment of non-life- or limb-threatening illnesses and injuries that are too urgent or acute to be managed within primary care, but do not require the expertise or services of an ED. Patients generally self-refer and are seen on a walk-in basis without appointments. These centres are typically staffed by GPs, emergency physicians, and other providers such as NPs or physician assistants. On-site services often include radiology and laboratory testing but may also include routine primary care and occupational health support. Most operate at least 12 hours a day, seven days a week. (8)

Standalone facilities are used in many countries, including the UK, Australia, Canada, the US and Israel:

- For example, in **England, urgent treatment centres (UTCs)** were introduced in 2017 to standardise the provision of urgent care services, bringing together existing services such as walk-in centres (WICs), minor injury units, and urgent care centres (UCCs) under a more consistent framework. (19) UTCs are increasingly located at hospitals but can also be located as a standalone service off a hospital site. (10)
- In **Canada, UCCs** are clinics that offer same-day treatment for non-life-threatening illnesses or injuries. They provide a broader range of services than primary care walk-in clinics (WICs) but provide fewer comprehensive services than EDs. (20)
- There has been a growth in demand for convenient, walk-in healthcare in the **United States**, leading to a shift in services from primary care practices to **UCCs**. (21) These centres primarily focus on treating lower-acuity conditions, although the type of staff and the availability of diagnostic and radiological services can vary significantly between facilities. (8)

2.3.4. Community Restricted Services

This model delivers urgent care on **a walk-in basis**, without requiring appointments. These facilities typically provide a **narrow range of services for addressing minor medical concerns** and generally lack advanced diagnostic tools such as radiology or comprehensive laboratory testing, that are often available in the community advanced services. NPs often play a central role in delivering care, although some facilities may still be led by GPs. These WICs aim to be convenient and accessible; they often operate during evenings and weekends and are frequently located in community settings like pharmacies or supermarkets. (8)

- In **Canada**, WICs are primarily found in urban areas as an extension of GP clinics, with no appointment required. Typically staffed by GPs and NPs, they are often near but operate independently from, pharmacies and diagnostic services. (8)
- In **Australia**, this predominately nurse-led model provides extended-hours primary care for minor illnesses and injuries, operating under Medicare. (22)
- In the **United States**, walk-in facilities, known as retail clinics, are frequently located in and owned by retail stores or pharmacies. (8) They offer convenient, affordable services for minor health issues, typically covered by insurance or paid out of pocket. (23) However, despite the presence of 1,800 retail clinics nationwide by 2024, hundreds have recently closed due to low profit margins, with Walmart exiting the sector entirely. (24)

2.3.5. Community Home Services

This model **shifts urgent care delivery to the patient's home**, focusing on a '**treat-and-release**' approach to avoid unnecessary hospital visits. These services can be manned by different levels of clinical skill from GPs to paramedics or NPs, and are often run in rural and remote locations. Practitioners work scheduled shifts and use ambulance-based equipment to assess and manage minor issues, consulting remotely with GPs or ED physicians for diagnostic input and treatment

planning when needed. (8)

Community Home Services are part of urgent primary care provision across many countries including the UK, Denmark, the Netherlands, France, Canada and Australia:

- For example, in Canada, programmes like 'Community Paramedic at Home' enable scheduled and on-demand visits for seniors and vulnerable adults and in Australia the 'Extended Care Paramedic' programme delivers treat-and-release care at home in rural and remote regions. (25)
- In France, home visit services are provided by SOS Médecins in urban areas and by local council-organised networks in rural regions. Founded in 1966, SOS Médecins is a nonprofit network of around 1,300 GPs offering 24/7 urgent medical care at patients' homes, primarily for those unable to travel due to illness, age, or mobility issues. The service manages non-life-threatening conditions such as fever, infections, and respiratory issues, with consultations requested by phone or app. (26) Annually, SOS Médecins handles approximately 6.3 million calls and conducts over 2.5 million home visits. (27)

2.3.6. National Referral Service

Many high-income countries have established national or large regional telephone triage and referral services to manage urgent care demand and reduce unnecessary ED visits. Examples include NHS 111 in England and Scotland, and Healthdirect in Australia. Increasingly, these services incorporate online symptom checkers and digital triage tools to complement telephone services. They are often operated by a mix of clinically skilled personnel, with the use of algorithms and decision support tools to assess the most appropriate care according to the patient's needs. (28)

Most countries have different types of call centres for urgent primary care and emergency care. France is an exception, with most regions using a single number for urgent and emergency care call centres that connects patients to ED-based call handlers. (1)

- In England, NHS 111 provides a national 24/7 telephone and online triage service that helps people access urgent care for non-life-threatening conditions. Telephone callers are initially assessed by non-clinical call handlers using decision-support software and directed to an appropriate service (e.g. ambulance, ED, GP) or referred to a clinician, usually a nurse, for secondary triage. (29) NHS 111 Online, is a web-based triage and assessment service which launched in 2017. It allows users to complete a self-assessment and receive advice on appropriate next steps, including self-care, attending a service, or receiving a call-back from a clinician. (30)
- In Scotland, NHS 24's 111 service also operates 24/7, with call handlers assessing patient needs with support from a clinical supervisor. Depending on the nature of the issue, callers may receive self-care advice, be directed to a GP or community service, or be referred for further follow-up. Some callers are advised that they will receive a callback from their local Flow Navigation Centre, which provides clinical triage and virtual assessments, offering early access to senior clinical decision-makers. Following this call, outcomes may include self-care

advice, a scheduled appointment at A&E, direct advice to attend A&E, or referral to another appropriate service. (31)

- In Australia, Healthdirect provides a virtual triage service that includes both a nurse-led telephone line and an online symptom checker. The telephone service functions similarly to NHS 111 but is staffed by nurses from the outset, while the online tool offers self-guided symptom assessment and advice, much like NHS 111 online. Both these services are primarily used outside of GP hours. (30)

3. Aim and Objectives

This review aims to identify the evidence on effective urgent primary care models currently used, with a view to answering the following questions:

- What are the key service components of effective urgent care models?
- Which service components are likely to have the most significant impact on mitigating demand/ flow into secondary care and maintaining patient independence at home/ community?

Initially, we were asked to focus on urgent primary care service components. However, within the evidence base service components were often entwined across emergency care, urgent care and urgent primary care. In addition, many primary studies aimed to reduce the burden experienced within emergency care by incorporating some sort of urgent care service. To overcome the challenges of crossover between services, and the potential applicability of service components across the fields, we broadened our focus to include both aspects of urgent care. We only referred to urgent primary care when explicitly stated by primary study's authors, otherwise we refer to urgent care throughout the report to incorporate both types of urgent care.

Firstly, we highlight key service components frequently implemented across urgent care models, illustrating examples from different countries identified within the comparative studies included in this report. Then we identify which service components are most effective, based on the evidence, in reducing demand and patient flow into secondary care, while supporting patient independence in home and community settings.

This work aligns with and informs the Welsh Government work on the development of a new model of urgent care for the population of Wales that provides seamless advice, assessment and care closer to home (32). This work is overseen by the Welsh Government Urgent Care Steering Group and is supported by the *Six Goals for Urgent and Emergency Care* Programme and the Strategic Programme for Primary Care (13).

4. Methods

4.1. Eligibility criteria

Studies were included that focused on users and providers of urgent care services within emergency and urgent care systems. We considered evidence on specific service components such as telephone triage, online and telephone advice, primary care out-of-hour facilities, minor injury units, extended care paramedics, and supporting systems. We included studies that examined how these components work in practice and assessed outcomes including cost-effectiveness, patient safety, unplanned service recontacts, adherence to advice, referral patterns, triage accuracy, waiting times, timely assessment, and patient experience. We included quantitative, qualitative, and mixed methods studies from any country, provided they were published in English. We excluded descriptive studies without outcome data, opinion pieces, protocols, conference abstracts, book chapters, non-English papers, and studies focused on reporting, attendance reasons, model design, or data collected before 2015. We included the studies if they met all the criteria in Table 1.

Table 1. Selection criteria

Review questions	
1. What evidence is there on effective urgent care models? a. What are their key service components? b. Which components are likely to have the most significant impact on mitigating demand/ flow into secondary care and maintaining patient independence at home/ community?	
Sample	Users and providers of urgent care services within emergency and urgent care system (ambulance services, ED, other urgent care facilities, telephone access services, primary care-based urgent care services)
Phenomenon of interest	Service components of urgent care models. For example, telephone triage, advice services (online and telephone), primary care out-of-hour facility, minor injury units, extended care paramedics (community paramedics, advanced paramedics, paramedic practitioners, emergency care practitioners), computer systems etc.
Design	As the focus of this review is on models of care, that is service and system delivery, we will search for, or consider, evidence related to existing urgent care models in order to provide an overview of what components may or may not work in practice.
Evaluation	1. Cost-effectiveness 2. Safety (patient): 'safe' as described by the primary study authors, adverse events/ near misses, and provision of sufficient/insufficient advice, information and correct/ incorrect assessment 3. Unplanned health service recontacts 4. Adherence/ compliance: patient compliance with advice recommendations given (i.e. to go to A&E/ self-care advice etc) 5. Service impact: (i) Increase or decrease in own or other service use including referral rates as well as types of appointments linked to referrals (ii) Increase or decrease in service/ staff workload (iii) other service impacts: admission avoidance, reducing ED visits (iv) continuity of care within patients' home/ community 6. Triage accuracy and appropriateness: (i) triage decisions rated as appropriate including appropriateness of referrals 7. Waiting times 8. Timely clinical assessment 9. Patient experience: satisfaction, acceptability, appropriateness, experience, access.

Research type	Quantitative, qualitative and mixed methods
Other Study Considerations	Language: English only. Countries: No limit set. The following were excluded: • Descriptive studies with no assessment of outcome • Opinion pieces and editorials • Protocols • Conference abstracts • Book chapters • Studies exploring prescribing in urgent care • Studies describing reasons for attending urgent care • Studies describing frequency of visits • Studies focused on designing models • Studies evaluating data collected pre-2015

4.2. Search methods

We searched Medline ALL (Ovid), Embase (Ovid), and Scopus (Elsevier) on 8 May 2025. Between 28 April and 2 May 2025, we also searched a range of supplementary sources, including:

- Agency for Healthcare Research and Quality (AHRQ)
- Canadian Agency for Drugs and Technologies in Health (CADTH)
- The US Department of Veterans Affairs
- Evidence for Policy and Practice Co-ordinating Centre (EPPI)
- Health Information and Quality Authority (HIQA)
- Health Technology Wales (HTW)
- National Institute for Health Research (NIHR): Public Health Research Journal, Health Technology Assessment Journal and Health and Social Care Delivery Research Journal
- National Institute for Health and Care Excellence (NICE)
- Scottish Intercollegiate Guidelines Network (SIGN)
- Joanna Briggs Institute (JBI)
- Cochrane Database of Systematic Reviews
- The Health Foundation
- The Department of Health and Social Care (DHSC)
- The European Observatory on Health Systems and Policies
- The Health Technology Assessment (HTA) Database
- The King's Fund Library Database
- NHS Confederation
- Nuffield Trust
- PROSPERO
- Google

We limited all searches to English language sources. Search terms were based on the key concept of the review question: urgent primary care models. We also conducted forward citation tracking of primary studies and backward citation tracking of any relevant reviews. In addition, we contacted

topic experts, including researchers at CADTH, to request further information about their report on UCCs. Due to time constraints, we carried out a retrospective peer review of the database search strategies to check for any typographical, syntax, or grouping errors. No major issues were found. Full search strategies and terms are included in appendix section 9.1.1.

4.3. Study record management and selection process

We imported the database search results into EndNote version 20, Philadelphia, PA, Clarivate, and removed duplicates. We then uploaded the deduplicated records into Rayyan AI-Powered Systematic Review Management Platform (33), and screened them within the platform. Records from supplementary sources were managed separately using an Excel spreadsheet saved in Evidence Service Open SharePoint Library.

One reviewer (KS, HS, or HM) screened titles and abstracts. Two reviewers (AP, KS, HS, or HM) independently screened full texts in duplicate. We resolved any disagreements through discussion with a third reviewer. Each stage of the process was recorded in a PRISMA flow diagram (figure 1).

4.4. Critical appraisal

We critically appraised all included studies using the appropriate Critical Appraisal Skills Programme (CASP) checklist, based on the study design as recorded in the data extraction form. We used the relevant CASP checklists for qualitative studies, cohort studies, diagnostic studies, case-control studies, economic evaluations, and cross-sectional studies (34-39). For quasi-experimental studies, we used the Joanna Briggs Institute (JBI) critical appraisal tool. (40) One reviewer completed each checklist, and a second reviewer (LJ or KS) checked for consistency. Any disagreements or points needing clarification were discussed and resolved between the two reviewers. We collated the completed checklists in an Excel spreadsheet and summarised the findings in Appendix 9.1.2. All studies remained in the review regardless of their assessed quality. The summary table includes comments on whether each study provides a sound basis for public health decision-making.

4.5. Data extraction

We extracted data from each included study using a standardised Excel form. One reviewer completed the initial extraction, and a second reviewer checked for consistency (AP/HM/HS). For this report, we presented the extracted data in a formatted table. We included information on the study reference (author and year), study design, data collection period, research aim or question, population or data source, country, organisational model category, urgent care model component, service hours, additional resources, intervention details, outcomes, and results. Where applicable, we only extracted and have reported data that met the inclusion criteria for this rapid review. The full data extraction table of included studies is in Appendix 9.1.3.

4.6. Synthesis

We carried out a narrative synthesis of the evidence for the outcomes of interest across the key components of the identified urgent care models. We did not grade the strength of the evidence. Instead, we focused on summarising and comparing findings from the included studies to highlight patterns, differences, and gaps relevant to the review questions.

5. Findings

5.1. Study Selection

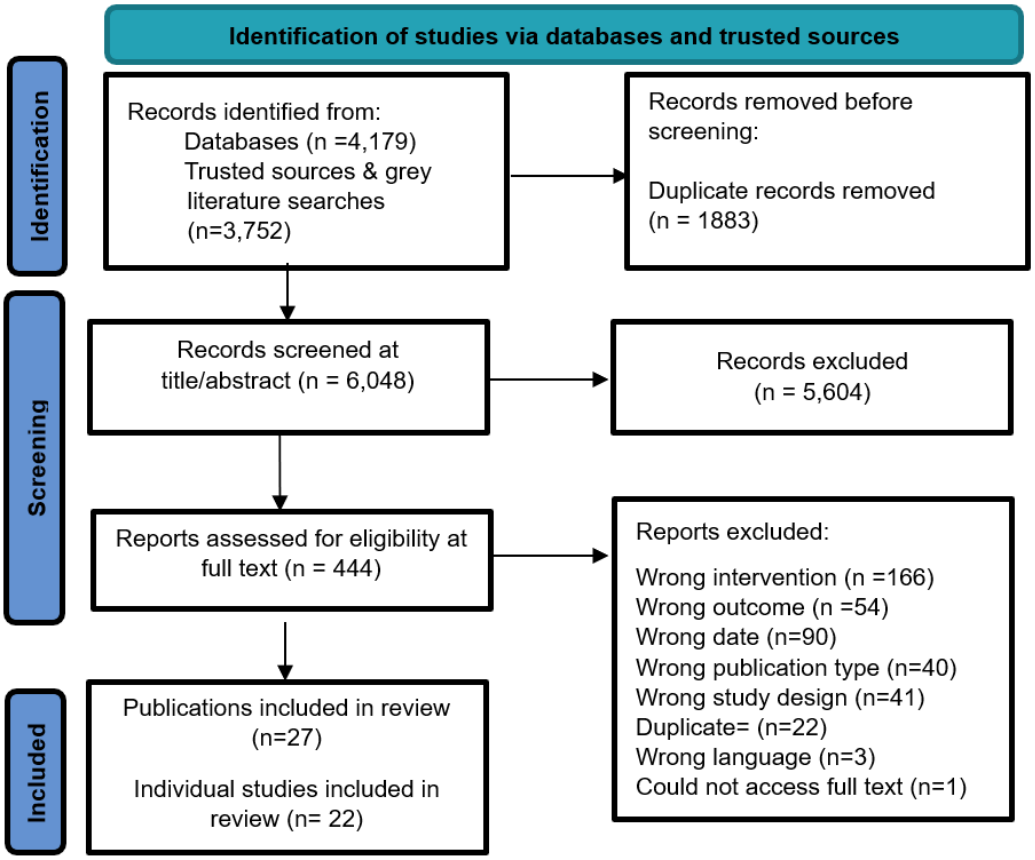
As illustrated in figure 1, we identified 4,179 records from databases and 3,752 from other sources (listed in the Methods section 3.2). Using Endnote, we removed 1,883 duplicates before screening. We screened 6,048 records by title and abstract, which a single reviewer completed, and excluded 5,604 that didn't meet our criteria. Before starting full-text screening, we applied a date limit and excluded all studies published before 2015. These were subsequently added to the exclusions at title and abstract screening. We then reviewed the full text of 444 reports in duplicate. Conflicts were resolved through discussion and, when needed, consulted a third reviewer. We excluded 416 reports for reasons such as wrong intervention (n=166), wrong outcome (n=54), wrong date i.e., data collected before 2015 (n=90) wrong publication type (n=40), wrong study design (n=41), duplicates identified across database and other source searches (n=22), wrong language (n=3), or unavailable full text (n=1). We applied the date limit for outcome data at the full-text screening stage. We included 22 outcome studies published across 27 publications in the final review.

5.2. Study characteristics

Our searches did not identify any robust systematic reviews, or primary studies conducted in Wales directly addressing these questions. We included twenty-two primary studies (27 publications) (18, 21, 28, 29, 41-63) in this rapid review. We grouped the companion publications and counted them as a single study where applicable. These represented a variety of study designs. These comprised of nine cross-sectional studies (21, 44, 46, 48, 49, 51, 54, 56, 58), five quasi-experimental studies (41, 57, 59, 61, 63), four diagnostic accuracy studies (28, 42, 47, 49), two mixed methods studies (29, 43) (including one NIHR-funded study (29) consisting of five sub-studies of which four met our inclusion criteria comprising of an economic evaluation, a qualitative study, a cross-sectional study, and a quasi-experimental interrupted time series analysis), two cohort studies (18, 55) and a nested case-control study (53).

In terms of geographic distribution, the majority of studies originated from the United Kingdom, specifically England (n=6) (28, 29, 43, 44, 51, 59), followed by the Netherlands (n=4) (18, 45, 61, 63) and Belgium (n=3) (42, 47, 58). Two studies were conducted in Denmark (49, 55), and one study each was identified from Australia (56), Canada (53), USA (21), Germany (41), Portugal (48), France (54) and Sweden (57).

Figure 1. Study flow diagram



None of the included studies explicitly identified or named the models of urgent primary care evaluated in this rapid review. Instead, we used the reported details such as service setting, operational hours, staffing, and available resources, to determine the model categories, following the classification described by Warkentin et al. (2020) (8).

We classified the intervention evaluated in each study as a model component. Although we made every effort to classify the models accurately, the limited detail in most studies reduced our confidence in these classifications. Six model components were identified:

1. Access to radiology
2. Decision support tool: Digital Triage System
3. Decision support tool: Redirection
4. Introducing an Urgent Care Centre (UCC)
5. Task shifting
6. Virtual urgent care (VUC)

As shown in Table 2, different models serve distinct purposes, and countries often implement more than one model of urgent care. For instance, we classified the four studies from the Netherlands (18,

45, 46, 61, 63) under three different models: Community Advanced Services, Community Home Services, and Hospital Parallel Services. Despite this variation, the model components were often similar. For example, two of the four studies assessed task shifting, even though they represented different model types. (61, 63)

We also observed considerable variation in the settings where urgent primary care was delivered, and in the methods used to evaluate effectiveness, efficiency, and patient experience. Because stakeholders were primarily interested in identifying service components most likely to reduce demand on secondary care and support patient independence in the community, we extracted relevant information wherever possible. Appendix 9.1.3 provides full details of the included studies.

5.3. Critical appraisal

We assessed the quality of each study using common features from critical appraisal checklists. We summarised the findings in Appendix 9.1.2. We highlighted strengths in green, limitations in pink, and unknown features in blue. White cells show where a quality feature was not relevant to a particular study. We made an overall judgement on whether each study could be used to inform public health decisions, based on the balance of strengths and limitations. We marked recommended studies in green and those with limitations that may affect conclusions in pink.

We found that all studies provided some descriptive data relevant to understanding how different components of urgent care systems work. All but two studies (21, 47) used real-world data, either collected objectively from patient or service records (18, 21, 28, 29, 41-43, 45, 51, 57, 59, 61, 63) or subjectively through audits or patient surveys (29, 43, 44, 47, 49, 54, 56, 58, 61). Higher quality studies included 2/2 cohort (18, 55), 1/1 nested case-control (53), 7/12 cross-sectional (29, 43-45, 49, 51, 58), 3/4 diagnostic, 1/1 economic evaluation (29), and 3/9 quasi-experimental studies (41, 59, 63). These studies often used large, representative samples with minimal selection bias and relied on objective data where measurement error or bias were explored and found to be low. They tested observed differences statistically, often using multivariable models to reduce confounding, and reported precise estimates to help interpret the size and practical importance of effects.

As no study was excluded based on its quality, studies of varying quality are included in this rapid review. The study on decision support tools for redirection (54) was rated as poorer quality and is not advisable for use in policy or decision-making. In contrast, we assessed several studies as higher quality, including 3 of 7 on task shifting (43, 51, 63), 1 on access to radiology (18), 7 of 9 on digital triage systems (28, 29, 42, 45, 49, 58, 59), 2 of 5 on UCCs (41, 44), and both studies on VUC (53, 55). Findings from poorer quality studies should be treated with caution, as they may not be reliable. Even studies we have rated as higher quality should be considered carefully to assess whether their findings are relevant and applicable to the Welsh context. We explore the specific strengths and limitations for each component in Section 5.4.

Table 2. Summary of urgent care models

Model	Model components	Country	Outcomes
Emergency Department Integrated Services (50-53, 62)	Task shifting Virtual urgent care	Canada UK	Cost-effectiveness Unplanned health services Service impact Waiting times Patient experience
Hospital Parallel Services (18, 41, 44, 54, 57, 58, 63)	Access to radiology Decision support tool: Digital triage system Decision support tool: Redirection Introducing an UCC Task shifting	Belgium France Germany Netherlands Sweden UK	Cost-effectiveness Safety Unplanned health service recontacts Adherence/ patient compliance Service impact Triage accuracy/ appropriateness Waiting times Patient experience
Community Advanced Services (21, 42, 45-49, 55)	Decision support tool: Digital triage system Introducing an UCC Virtual urgent care	Belgium Denmark Netherlands Portugal USA	Cost-effectiveness Safety Unplanned health service recontacts Service impact Triage accuracy/ appropriateness
Community Restricted Services (56)	Introducing an UCC	Australia	Service impact Patient experience
Community Home Services (43, 61)	Task shifting	Netherlands UK	Safety Unplanned health service recontacts Service impact Timely clinical assessment Patient experience
National referral Services (28, 29, 59, 60)	Decision support tool: Digital triage system	UK	Cost-effectiveness Unplanned health service recontacts Adherence/ patient compliance Service impact Triage accuracy/ appropriateness Waiting times Patient experience

5.4. Key service components of effective urgent care models

The taxonomy described by Warkentin, et al (2020) offers a broad definition that enables categorisation of the different urgent care services offered around the world. (8) These are predominantly structured by where the urgent care service is located and the type of facilities available. Each model is made up of various components which ensure the urgent care provision is timely and appropriate, according to the needs of those using the service. The components within each of the different models often overlap and are not unique to a single model, reflecting the complexity and diversity of urgent primary care delivery. (8)

This section highlights key service components frequently implemented across urgent care models, as identified within the studies included in this report. These components include task shifting strategies, access to diagnostic services like radiology, decision support tools (such as digital triage and patient redirection), urgent care or UTCs, and VUC. While other components may exist in urgent care models more broadly, they were not identified in the comparative literature reviewed here. Only outcomes meeting the review inclusion criteria were extracted.

5.4.1. Task shifting

Overview and country examples

There is growing international interest in task shifting within urgent care, in response to rising patient demand, workforce shortages, and broader systemic pressures. Health systems and policymakers are increasingly endorsing the integration of advanced practitioners such as NPs and advanced physiotherapy practitioners (APPs), to help sustain service delivery and reduced GP workload. (63)

Emerging evidence from both the Netherlands and England demonstrates how task shifting is being applied across a range of urgent care models, including ED-integrated services, parallel hospital-based services, and community-based home visiting care. While the specific roles and contexts may vary, these initiatives essentially look at the same goal: optimising urgent primary care delivery by leveraging different skill sets.

- In the Netherlands, task shifting, particularly from GPs to NPs, has emerged as a strategy in response to growing demand, workforce shortages, and increasing complexity in OOH care within GPCs. (63) Two studies provide insight into how this model operates in different settings within GPCs:
    - Van der Biezen et al. (2017) (63, 64) investigated the integration of NPs into OOH primary care teams at a GPC situated within a hospital in Southeast Netherlands, comparing care models involving only GPs with those combining GPs and NPs. (63) Patients seeking OOH acute care call a regional telephone number, where triage nurses use the Netherlands Triage Standard to assess urgency and place eligible patients on a presentation list. The GPC uses team-based care involving both GPs and NPs, with GPs and NPs selecting and attending to patients on the list (64)

  - Smits et al. (2020) evaluated **task shifting from GPs to NPs in the context of OOH home visits**. In this model, NPs were transported in car ambulances and delivered care for 24 low-complex health conditions to patients at home during weekday evenings and weekends. For each of these 24 conditions, NPs were provided with a protocol against national standards and received specific training. NPs were assigned patients with one of these specified conditions after telephone triage and operated under the supervision of a GP. (61)
- In **England**, task shifting in urgent primary care has also emerged in response to increasing pressure on urgent and OOH services. The NHS has integrated non-medical advanced practitioners such as Advanced Nurse Practitioners (ANPs) and APPs, into various services to help manage demand. Two studies provide insight into how this model operates in different settings in England:
  - A 3-month pilot study was conducted in Manchester to evaluate the delivery of musculoskeletal care by **APPs in a UTC co-located with a hospital ED** of a busy major trauma centre and tertiary referral centre. The UTC was staffed by Emergency NPs, GPs, and APPs. The NPs provided 22 hours of cover, GPs provided 16 hours, and APPs covered seven and a half hours from 11:00 to 19:00, the period of greatest attendance. All APPs in this study were trained to Master's degree level and were independent non-medical prescribers, allowing them to autonomously manage all patient needs during their visit. (51)
  - Collins et al. (2019) conducted a service evaluation to assess the effectiveness of **ANPs delivering urgent OOH home visits**. The specific OOH service evaluated in this study provided urgent care across a northern English county with a significant rural population. NPs within this service began providing home visits on the same basis as GPs in 2013. While APPs may occasionally work alongside a GP, such as in a second response vehicle or at a treatment centre during night shifts, they often operate independently across a defined geographical area. In these cases, GPs based elsewhere in the county are available to provide telephone support if needed. (43)

Evidence of effectiveness

We included four studies that reported outcomes on the impact of utilising task shifting. (43, 51, 61, 63)

Cost-effectiveness: We identified only one high quality quasi-experimental study, conducted by van der Biezen et al. (2017) (63), that evaluated the cost implications of different staffing configurations in OOH care settings using a cost-minimisation analysis. The study compared three team models comprised of different ratios of skill sets: Team 1 (four GPs – control group), Team 2 (three GPs and one NP – 25% nurses), and Team 3 (two GPs and two NPs – 50% nurses). Personnel costs per consultation were slightly lower in teams with more NPs (€23.85 in Team 1, €23.65 in Team 2, and €23.41 in Team 3). When all direct healthcare costs were included, such as diagnostics, medication, and ED referrals, the mean total cost per consultation was highest in Team 3 at €65.68 (Standard deviation [SD] = 94.11), compared to €62.23 (SD = 90.49) in Team 2 and €59.22 (SD = 86.63) in Team

1. After adjusting for patient characteristics (age, gender, urgency, and ICPC group), costs in Team 3 (50% nurses) were significantly higher than in Team 1 (0% nurses) by €4.55 (95% CI €0.09 to €8.94) per consultation (p = 0.04).

Two sensitivity analyses were conducted producing mixed results. In Sensitivity Analysis 1, which applied valid GPC personnel costs, X-ray costs, and maximum drug prices, Team 3 demonstrated a small, statistically non-significant cost reduction compared to Team 1 (mean difference: €–4.45; 95% Confidence Interval [CI]: –8.83 to 0.05). Similarly, Team 2 showed no significant cost difference relative to Team 1 (mean difference: €–3.07; 95% CI: –7.65 to €1.09). In Sensitivity Analysis 2, which used GP employment tariffs, X-ray and minimum drug prices, neither Team 2 nor Team 3 showed statistically significant cost differences compared to Team 1. The mean cost difference for Team 2 was €–1.68 (95% CI: –6.00 to €2.81), and for Team 3 it was €–1.76 (95% CI: –6.15 to €2.70).

We found that none of the comparisons reached statistical significance, indicating that observed cost differences likely reflect random variation rather than true differences in cost-efficiency. For example, in Sensitivity Analysis 1, we observed that Team 3 showed a mean cost reduction of €–4.45 compared to Team 1, but the 95% confidence interval (–8.83 to 0.05) included zero, meaning the result was not statistically reliable. All confidence intervals across analyses crossed zero, and the absolute cost differences were small (under €5 in Sensitivity Analysis 1 and under €2 in Sensitivity Analysis 2), limiting their practical relevance.

These findings suggest that small, non-significant savings may not justify changes in service delivery. We also found that cost-effectiveness varied depending on the pricing model used, highlighting the influence of underlying assumptions and broader resource use. We recommend further research to explore long-term and societal cost impacts, including potential savings from reduced ED referrals or improved chronic disease management.

Safety: We examined one cross-sectional survey from a mixed methods study (43) and two quasi-experimental studies (61, 63) that explored the safety of task shifting from GPs to NPs or ANPs or APPs in different urgent care settings. Their findings suggested that such models can be implemented safely when supported by appropriate protocols and supervision.

Collins et al. (2019) (43) conducted a random audit of documentation from an OOH primary care service in rural England, reviewing 162 ANP and 1,675 GP home visit cases. The ANP visits accounted for only 1% of total adverse incidents, indicating a low rate of safety concerns. However, the study did not report the rate of adverse incidents among GPs, so we could not determine whether the safety profile was comparable. In a quasi-experimental study, Smits et al. (2020) (61) compared 358 NP home visits (under GP supervision) and 281 GP home visits at an OOH primary care service. They used 24 protocol-based care pathways for low-complexity conditions. (61) We found that NPs adhered to protocols significantly more often than GPs (84.9% vs. 76.2%), and protocol adherence as rated by patients' own GPs was also higher for NPs (99.5%) compared to GPs (92.3%). Although incorrect deviations from the protocol (most commonly related to medication prescribing) were observed (13.1% for NPs vs. 18.1% for GPs), these differences were not statistically significant.

Follow-up data (n=420) showed no significant differences in missed diagnoses or complications between groups, though two preventable complications were identified in each group, with slightly greater severity in the NP group.

We noted that both studies (43, 61) had relatively small sample sizes. Smits et al. (2020) (61) provided a power calculation confirming that their sample was underpowered. As a result, we interpreted the lack of statistically significant differences in patient safety between GPs and nurses with caution, recognising a high likelihood of false negative findings in both studies. However, we also reviewed a higher quality study by van der Biezen et al. (2017) (63), which included over 2,500 patients in each group. This study reported no difference in adverse events or near misses during their evaluation of task shifting in urgent care. These findings reduced the uncertainty from smaller studies and supported the safety of NP-led care.

Overall, these findings suggest that with structured protocols, supervision, and appropriate triage, task shifting to NPs or ANPs can be a safe and effective strategy to enhance urgent care delivery.

Unplanned health service recontacts: We identified one cross-sectional (51) and one quasi-experimental study (61) that examined the impact of task shifting on unplanned health service recontacts. These studies focused on whether substituting GPs with ANPs or emergency nurse practitioners (ENPs) affected reattendance rates.

In the retrospective service evaluation at a UK UTC, McDonough et al. (2022) (51) found that 30-day reattendance rates to the ED for the same condition were 4% for patients seen by ENPs compared to 6% for APPs and 7% for GPs. Although these differences were not statistically tested, they may reflect variation in case complexity across professional groups. Importantly, no hospital admissions resulted from any reattendances, suggesting that care provided across all groups was generally safe. However, it is important to note that differences in caseload complexity limited direct comparability. In a quasi-experimental study, Smits et al. (2020) (61) conducted a one-month follow-up of patients who received home visits from either NPs or GPs. Using postal questionnaires completed by patients' own GPs, the study found no significant differences between groups in the frequency or type of follow-up contacts within 72 hours or one month of the initial visit. However, the sample with data on follow-up care was biased as GPs conducting the record review were not blinded to whether a nurse or GP provided treatment; the response rate was much higher for patients treated by nurses; and the sample available for analysis was under-powered, increasing the likelihood of false null findings.

Overall, these findings suggest that task shifting to NPs in urgent care settings doesn't increase the likelihood of unplanned recontacts, and with structured protocols, supervision, and appropriate triage, it may offer a safe alternative to GP-led care. However, limitations in the quality of the available evidence mean it remains uncertain whether there is truly no difference in patient safety when care is shifted from GPs to nurses.

Service Impact: We reviewed four studies (43, 51, 61, 63) that examined the impact of task shifting and multidisciplinary staffing models on service use and staff workload. These studies highlighted both efficiencies and variations in clinical practice.

We found that Collins et al. (2019) (43) reported a lower referral rate to emergency services for ANPs conducting home visits (12.87%) compared to GPs (16.26%), with no adverse impact on daytime primary care. Similarly, McDonough et al. (2022) (51) reported that ENPs admitted only 5% of their caseload, compared to 9% for APPs and 11% for GPs. These differences likely reflected variation in case complexity. Collins et al. (2019) (43) reported that the top ten conditions managed by ANPs closely matched those seen by GPs, with the top two conditions aligning almost exactly and covering a range from minor illness to complex care such as terminal cases. In contrast, McDonough et al. (2022) (51) found that GPs saw the broadest range of pathologies, while ENPs and APPs managed a similar variety of patient presentations. However, neither study accounted for potential confounding factors which limits our ability to conclude whether the observed differences in service impact were caused by the type of health professional or broader contextual factors such as patient demographics (e.g., age or comorbidities), referral pathways, triage protocols, local service models, or the visit timing.

The study by Smits et al. (2020) (61) observed that NPs prescribed medication significantly less often than GPs (19.9% vs. 30.6%) but referred more patients to the ED (24.1% vs. 15.9%; both $p < 0.05$). Despite these differences, continuity of care and referral appropriateness were rated similarly between groups, while appropriate prescribing was rated significantly higher for NPs (93.7%) than for GPs (79.5%).

It is important to note that NPs received training on treatment protocols as part of the study immediately before the data collection, while GPs relied on prior training and experience. This difference in the recency of training may explain the higher rates of appropriate referrals and prescribing among nurses. However, the results supported that NPs can perform as well as GPs, and that regular training for any health professional is likely to be an important factor in ensuring adherence to consultation and treatment protocols.

We reviewed the study by van der Biezen et al. (2017) (63) which assessed workload across three team configurations. We found that the mean number of consultations per shift was highest in GP-only teams (Team 1: 93.9; SD 9.0), compared to mixed teams (Team 2: 90.5; SD 7.2) and NP-heavy teams (Team 3: 87.1; SD 6.2), with the difference between Team 3 and Team 1 reaching statistical significance ($p < 0.001$). Resource use (e.g. X-rays, prescriptions, ED referrals) did not differ significantly across teams, except for a higher drug prescribing rate in Team 2 compared to Team 1 (44.2% vs. 41.3%; $p = 0.033$), and a significantly higher ED referral rate in Team 3 (14.7%) compared to Team 1 (12%; $p = 0.028$).

These findings suggest that while task shifting and team diversification can maintain or improve care quality, they may influence patterns of service use and workload distribution, particularly in relation to prescribing, referral behaviour, and consultation volume.

Timely clinical assessment: We identified two studies (43, 61) that evaluated this outcome. Of these, the study conducted by Collins et al. (2019) (43), reported on productivity outcomes associated with task shifting in urgent care, comparing ANPs and GPs conducting home visits. The average duration of an ANP home visit was slightly shorter than that of a GP (33 minutes vs. 37 minutes), with both groups sharing a median visit time of 26 minutes. However, in the absence of any variation reported or any statistical testing of the difference it's unclear whether the shorter visit length is statistically significant. Notably, 72% of home consultations by both ANPs and GPs were completed in under 40 minutes. In terms of responsiveness, ANPs met the one-hour response target in 33.85% of applicable cases, though this represented only 4% (n=65) of their total caseload. For routine and high-priority cases (four- and six-hour response windows), which accounted for 70% of ANP visits, the 95% national quality requirement target was consistently met. The number of home visits completed per night shift was comparable between ANPs and GPs, particularly in quieter localities. However, GPs tended to see more patients overall due to higher base activity levels. However, no data were reported.

The study by Smits et al. (2020) (61) reported that the NPs also spent more time per home visit (mean 34.1 minutes vs. 21.1 minutes for GPs) and consulted supervising GPs in 21.5% of visits, with only one case requiring escalation to a GP home visit.

These findings suggest that ANPs can deliver home visits with similar efficiency and responsiveness to GPs, supporting their role in enhancing workforce capacity without compromising productivity. However, it is worth noting that the National Quality Requirements used in this study issued by the Department of Health in 2006, were superseded by the Integrated Urgent Care Key Performance Indicators and Quality Standards, published by NHS England in June 2018. Given the limitations of Collins et al. (2019) (43) in the completeness of reporting and absence of statistical testing of differences reported, the meaning of findings remain uncertain.

Waiting time: We identified two studies (51, 63) that examined the impact of different professional roles and team configurations on waiting time performance in urgent care settings. McDonough et al. (2022) (51) reported high compliance with the NHS four-hour target for admission or discharge across all professional groups: APPs achieved 99.5% compliance, GPs 99.3%, and ENPs 97.5%. The number of investigations used was similar between GPs and APPs, averaging 1.19 and 1.15 investigations per patient, respectively, suggesting comparable clinical efficiency. However, the type of investigations used differed by health professional, with blood and urinalysis more common for GPs and x-rays more common for APPs. Analysis of differences by McDonough et al. (2022) (51) was limited by not considering potential confounding, which could explain the differences observed in waiting times. An important possible confounder was that different health professionals had patients presenting with different symptoms in their caseload, with APPs treating more limb and lower back pain problems while GPs and nurses had a more diverse variety of symptoms at presentation. In contrast, van der Biezen et al. (2017) (63) compared three team configurations—Team 1 (four GPs), Team 2 (three GPs and one NP), and Team 3 (two GPs and two NPs)—and found that the proportion of patients not seen within the targeted timeframe (as defined by the Netherlands Triage System)

was lowest in Team 1 (3.5%), and significantly higher in Team 2 (5.2%; p = 0.001) and Team 3 (8.3%; p < 0.001) after adjusting for confounders. However, as van der Biezen et al. (2017) (63) did not collect data on health service re-contacts or patient satisfaction it's unclear if the shorter consultation time by the GP only team vs. teams with more nurses, is favourable overall or not.

These findings suggest that while all professional groups can deliver timely care, GP-only teams may offer more consistent adherence to triage-based consultation targets, whereas increasing the proportion of NPs may introduce modest delays in time-to-consultation. However, it remains uncertain whether the difference in consultations times is associated with positive or negative consequences for health service recontacts or patient satisfaction.

Patient satisfaction: We included two poorer quality studies (43, 61) that reported on patient satisfaction and complaints about care provided by NPs in urgent care settings. Both studies indicated generally positive experiences. Data from service and patient records identified only four patient complaints in the Collins et al. (2019) (43) study, about ANP home visits over a 12-month period, representing just 5% of all complaints and 0.05% of total patient contacts. All complaints (related to care management and communication) were graded as low to medium risk and resolved satisfactorily. However, the study did not report comparable complaint data for GPs, so we cannot tell whether the rates, types and resolution of complaints for nurses are typical of the OOH service.

Smits et al. (2020) (61) used a validated Patient Reported Experience Measure to assess patient experiences following home visits. Of the 629 responses received, patients rated NPs significantly higher than GPs on several dimensions, including confidence in the provider's expertise (95.8% vs. 94.6%), usefulness of advice (95.3% vs. 87.7%), information about symptom progression (92.9% vs. 85.2%), and interest in the patient's personal situation (95.7% vs. 91.9%). Overall satisfaction, measured on a 1–10 scale, was also significantly higher for NPs (mean score 8.6, 95% CI: 8.5 to 8.8) than for GPs (mean score 8.3, 95% CI: 8.2 to 8.4). However, the response rate differed between groups: 56% for NPs and 34% for GPs, so may better reflect patients seen by nurses, which could influence the satisfaction scores.

These findings may suggest that patients perceive NP-led care as competent and person-centred, with satisfaction levels comparable to or exceeding those for GP-led care in urgent and OOH settings. However, further high-quality studies are needed to confirm these results and address remaining uncertainties.

5.4.2. Access to radiology

Overview and country example

Access to diagnostic services, such as conventional radiology, is a key component of effective urgent and emergency care. In many systems, however, access varies significantly depending on the time of day and the care setting. OOH general practice services may lack the same diagnostic access as EDs, which can contribute to unnecessary ED referrals and inefficiencies in patient flow. While

international literature on this specific service feature is limited, one example comes from the Netherlands:

- In the Netherlands, GPs typically have access to hospital-based radiology during regular office hours, but OOH GPCs have historically faced restrictions. This has often necessitated referral to EDs for imaging, even in cases where the GP could manage the patient independently with access to diagnostics
- To address these inefficiencies, particularly in the management of musculoskeletal injuries, a number of Dutch GPCs co-located with EDs introduced direct access to hospital radiology services during OOH periods. This change aimed to reduce ED overcrowding, avoid duplication of clinical assessments, and enhance the GP's gatekeeping role
- A study by Rutten et al. (2018) evaluated the effect of radiology access by GPCs on the provided care and patient flow for patients referred for conventional radiology for trauma. This study collected data from five GPCs and compared patient and care characteristics, indication for diagnostics, and outcomes across GPCs operating under three distinct organisational models: those with unlimited access to radiology, those with partial (limited) access, and those without direct access to radiology. (18)

Evidence of effectiveness

We identified only one study (18) that assessed the impact of access to radiology by healthcare staff in an urgent primary care setting.

Service impact: Only one study (18) reported on the service impact of GP access to radiology during OOH primary care across five GPCs in Netherlands with varying levels of access (none, limited, unlimited). The study found that 84.5% of radiology referrals were medically indicated, and access to radiology significantly reduced referrals to EDs, from 100% in the no-access model to around 39% in models with access (limited access: 38.4% and unlimited access: 39.4%). The findings suggest that enabling GP access to diagnostics, such as radiology, can reduce unnecessary ED use and support more efficient patient management, thereby improving the service impact. There were less follow-up treatments or visits planned at the hospital in the model without access (63.8%) compared to 90.4% and 93.0% in the models with (limited) access. Patients were more often referred back to the GP in the general practice at which they were registered in the model without access (16.1%).

This is a higher quality study that has used objective outcome measures from medical records with a low risk of bias and statistical tests help to support chance as an explanation for the differences observed. However, potential confounding was not accounted for in the analysis, data were clustered by centre and radiology access, which may over-estimate differences between groups. The sample is not representative as GPs selected patients for radiology and there was only one GP centre with unlimited access to radiology, which means further research could provide more certainty about associations. Furthermore, as the study was conducted in the Netherlands, generalisability to Wales is limited by differences in healthcare infrastructure, patient behaviour, and service models. That said, if EDs act as gatekeepers to radiology in both countries, there may be greater generalisability than expected despite these differences.

Consideration must also be given to radiology capacity, workforce availability, and the feasibility of implementing similar access models in the Welsh context. Whilst this study suggests that improving GP access to diagnostics, especially in urgent care could reduce pressure on EDs and improve patient flow, any changes in Wales would need to consider local infrastructure, workforce capacity, and patient expectations. Therefore, further research in the Welsh context would help determine whether similar benefits could be achieved.

5.4.3. Decision support tool: Digital triage system and redirection

Overview and country examples

Digital triage systems, including telephone-based services, clinician-supported decision-support tools, and patient-facing self-triage apps, are now widely implemented across health systems globally, with examples in the literature including Belgium, Denmark, the Netherlands, Portugal and the UK. (28)

Digital triage refers to the process where a call handler or healthcare professional uses a digital tool to evaluate a patient's symptoms and provide guidance. This guidance usually directs patients to appropriate local services based on the urgency of their condition, such as ED, OOH clinics, GP appointments and in some cases self-care advice. These tools have expanded substantially in use over the past decade, especially accelerated by the COVID-19 pandemic, and aim to optimise care pathways, improve access to OOH services, and reduce unnecessary ED visits. (28)

Their implementation varies significantly across countries in terms of their scope (national, regional, or local), the technology used (telephone-based, online platforms, or mobile applications), and the type of personnel involved (non-clinical call handlers, nurses, or GPs). Numerous examples of digital triage tools are reported in the literature; three country examples have been selected for this review based on the level of detail provided in the studies and to illustrate a range of approaches currently in use:

- Belgium utilises both national telephone triage and a patient self-triage application:
    - In 2019, the government introduced a nationwide telephone triage number, 1733, for non-life-threatening OOH care, aiming to standardise call management and streamline referrals (58)
    - 1733 is part of a national urgent care reform designed to improve access to OOH primary care and reduce unnecessary ED visits. The service is integrated into a broader urgent care model, linking GPCs, ambulance services, and hospital EDs. (58)
    - Callers are triaged by an operator into appropriate care pathways, ranging from ambulance dispatch and urgent OOH care to planned primary care, via a structured menu system (58)
    - The service operates on weekends and public holidays and, in many regions, weekday evenings (65)
    - The rollout is phased, with all regions moving from phase 1 to 2 in the future:
        - Phase 1: Menu connects callers directly to GPC staff or on-call doctors.

        - Phase 2: Menu connects callers to medically trained operators who triage symptoms and guide next steps. (65)
    - An **interactive patient self-triage App,** ODISSEE (Outil Décisionnel et Informatif des Structures de Soins Efcientes Existantes), has also been piloted in Belgium. The ODISSEE platform is an interactive tool that enables patients to self-triage and receive informed guidance on the most appropriate level of care for their condition. It is composed of 18 icons leading to algorithmic questions that finally provide an advised orientation (emergency or primary care services) (47)
    - The platform is patient-operated via a digital interface (tablet or web-based), without direct input from healthcare professionals. Designed for use outside clinical settings, it aims to reduce unnecessary ED visits, with particular relevance during OOH periods when access to care is more limited (47)
    - The app prototype is based on validated triage algorithms for OOH care, featuring 18 icons representing common conditions to guide patients through algorithmic flowcharts for referral advice into four triage categories based on urgency. (47)
- In the **Netherlands**, a digital decision support system for **telephone triage** (the 'Netherlands Triage Standard') was introduced in 2011 and has been widely adopted by OOH primary care services:
    - Patients primarily contact the OOH primary care service for medical assistance outside office hours, although in life-threatening situations they may call the emergency number for ambulance dispatch or go directly to the ED.
    - Triage nurses, under the supervision of a GP, handle all incoming OOH calls using the Netherlands Triage Standard. This is a five-level triage tool, derived from existing Dutch national telephone guidelines for primary care office hours, and the Manchester Triage System. Nurses select from 56 main complaints and follow a structured algorithm of questions to assign an urgency level, which can be adjusted after consulting a supervising GP. (46)
- In **France**, a **physician-led redirection** procedure exists where selected primary care patients presenting to the ED can be redirected towards an easily accessible OOH general practice. While not explicitly a digital tool, it represents a clinical decision-making process to manage patient flow and reduce ED admissions, especially during periods of overcrowding. (54)

Evidence of effectiveness: Decision support tools- Digital triage

The nine studies evaluating the impact of digital triage systems (28, 29, 42, 45, 47-49, 58, 59) reported the following outcomes:

Cost-effectiveness: One economic evaluation from a mixed methods study (29) comparing NHS 111 Online and NHS 111 telephone service was included. The cost per initial contact was lower for the online service (£1) than for the telephone service (£11). However, the cost-consequence analysis found that the overall NHS cost per user was £68 higher for the telephone service, due to differences in how patients used services afterwards. In a parallel service model, where both services operate

side by side, cost savings are possible if at least 38% of NHS 111 online contacts offset telephone calls.

The study has several strengths. It used real-world data and based its estimates on relevant survey data, providing a practical view of service use and costs. However, there are important limitations. The analysis only considered direct healthcare costs over a short time frame (7 days post-contact), and did not include longer-term costs, wider societal, or patient outcomes and experience. The sample was unlikely to be representative, and the cost estimates were based on different self-selected patient groups. Users of the online service likely had lower acuity needs than those using the telephone service, meaning the cost differences may reflect differences in patient complexity rather than service efficiency. Cost data for telephone services were estimated using personal contacts in two clinical commissioning groups only as they are commercially sensitive, meaning estimates may not be representative of all services commissioned. Costs for NHS services drew on public sources from 2018/2019. The analysis used deterministic sensitivity testing rather than probabilistic methods. Although the study was conducted in England, its findings may not fully apply to the Welsh context.

Differences in digital access, patient behaviour, and service configuration could affect both usage patterns and cost impacts. Therefore, further research is needed to understand whether similar cost savings and service use patterns would be seen in Wales.

Safety: We included a single cross-sectional study (49) that evaluated the safety, efficiency, and health-related quality of two telephone triage models in OOH primary care. It compared triage by GPs, nurses using a computerised decision support system, and physicians from various specialties. For the outcome of safety, nurses had significantly lower relative risks (RRs) of poor quality than GPs across four indicators, including communication and clinical questioning (RR = 0.61 for "identifies problems"; 95% CI: 0.47 to 0.80). In contrast, physicians had significantly higher RRs of poor quality than GPs for three indicators, such as prioritising symptoms (RR = 1.28; 95% CI: 1.05 to 1.57). Perceived patient safety was also significantly lower for physicians compared with GPs (median score 7 vs. 8; $P = 0.03$). Nurses and GPs had the same median safety score of 8, suggesting that both groups were similarly effective in using the decision support model, rather than reflecting differences in clinical skill.

The study was assessed as higher quality due to its use of a random sample of calls, statistical testing of differences and reporting of precision. However, there are important limitations. The analysis did not account for confounding or clustering by service, which could mean differences between health professionals are overestimated. For example, variations in patient or call characteristics across GP, nurse and physician staffed service may explain some of the observed differences.

Unplanned health service recontacts: Two studies explored user behaviour relating to unplanned health service recontacts following NHS 111 contact (29, 59). Sen et al. (2019) (59), used data from more than 10,000 call records, identified 8% of cases seen by emergency practitioners and 8.8% by non-physician clinical advisors recontacted NHS 111 within 24 hours. This was primarily due to queries about centre opening times, transport delays, or prescription collection issues. In contrast, the cross-

sectional patient survey by Turner et al. (2021) (29) found that NHS 111 online users were significantly less likely than telephone users to contact emergency services within 7 days, (1% vs. 9% for 999 calls and 7% vs. 33% for ED visits; $p < 0.001$). The online users were also more likely to report no further contact with health services (31% vs. 16%; $p < 0.001$). These findings suggest differing patterns of service use and follow-up between online and telephone triage users. However, data from Turner et al. (2021) (29) also found that 4% of online vs. 46% of telephone users would have contacted 999 or gone to A&E if 111 was not available, therefore differences in patterns of service use and follow-up could be driven by differences in the original reason for patients making contact via telephone or online.

Patient compliance: We included two studies (29, 34) reporting on patient compliance with advice given by NHS 111 services. In the study by Sen et al. (2019) (59), compliance was assessed using linked secondary care data from 1,558 calls when emergency practitioners acted as clinical advisors, with 97% of patients following the advice provided. It is unknown how this compares with non-physician clinical advisers. In contrast, a cross-sectional survey by Turner et al. (2021) (29) found that among 3,728 NHS 111 online users compared to 795 telephone users, online users were significantly less likely to self-report full compliance (67.5% vs. 88%; $p < 0.001$). This difference remained significant after adjusting for demographic and the presence of a long-term health conditions, suggesting lower adherence among online users. However, there were differences in response rate (12% and <1% for telephone and online respectively), data collection (telephone users typically had longer between contact and survey) and the reason for online contacts were typically less urgent. Thus, differential selection or recall bias could also explain the self-reported differences in compliance.

Service impact: We identified three studies (29, 48, 59) reporting on the impact of digital and telephone triage services on service use and staff workload. Of these, one study (48) evaluated the SNS 24 telephone triage system in Portugal. It reported substantial reductions in non-referred episodes to the ED (58.7% to 43.2%), with referrals from SNS 24 increasing from 9% to 25% in the first phase. In the second phase, referrals to general and paediatric EDs rose significantly (e.g., from 37.7% to 70% in general ED), and one region saw a 53-percentage point drop in non-referred ED episodes, suggesting improved triage and potential admission avoidance. This was a poorer quality study affected by selection bias, where the centres were chosen because they had previously reported positive service evaluations, which may mean the results appear more favourable than would be observed in a representative sample. The study only reported percentages without providing total numbers, and it did not include statistical testing or consider potential confounders. As a result, it is unclear whether the reported reductions can be attributed to the telephone triage system or to other methodological or contextual factors. These limitations reduce confidence in the findings and limit their generalisability. While the study may offer some insight, its applicability to Wales is uncertain without further evidence from more robust and representative evaluations.

Sen et al. (2019) (59) examined referral patterns in an urban regional NHS 111 call centre in England after the introduction of a clinical assessment service (secondary triage). Emergency physicians and non-physician clinical advisors significantly reduced ED referrals for urgent cases compared to

baseline (25.4% and 18.5% vs. 80.2% respectively). Emergency physicians more frequently recommended self-care (38.1% vs. 15.7%, difference=22.4%; 95% CI: 19.0% to 25.7%), while non-physician clinical advisors more often referred to OOH services (42.1% vs 4.5%, difference=37.6%, 95% CI: 34.3% to 40.8%). These findings highlight how clinician type influences referral decisions and service distribution.

The study has several strengths. It used real-world data, included a pre-intervention control group, and reported precise estimates. The outcomes were based on objective call records. However, the analysis did not account for confounding factors, and differences between phases may reflect changes in timing or call characteristics rather than the impact of clinician type. For example, baseline data were collected over 12 months, while the intervention phases were shorter (5 months for emergency physicians and 3 months for non-physician clinical advisors). The study did not report statistical testing for comparisons, and it is unclear whether the sample was representative overall or from one phase to another. Selection bias is unknown, as differences in the types of calls included or referred to clinical assessment service were not explored.

While the findings might be relevant to Wales, differences in service configuration, workforce models, and patient behaviour may affect how similar a clinical assessment service model would perform. Further evaluation in the Welsh context would help determine whether similar reductions in ED referrals and shifts in service use could be achieved.

We reviewed a quasi-experimental and cross-sectional sub-study by Turner et al. (2021) (29) on NHS 111 online. The study found that the online service had little impact on the number of triaged telephone calls, with a 1.3% increase per 1,000 online contacts (Inter-rater reliability [IRR]= 1.013, 95% CI: 0.996 to 1.029; p = 0.127), and an average increase of 0.8% in overall call volumes (95% CI: −0.8% to 2.5%). However, it was associated with statistically significant increases in: ED recommendations (5% increase; IRR= 1.050, 95% CI: 1.010 to 1.092, $p = 0.014$); ambulance recommendations (6.7% increase; IRR = 1.067, 95% CI: 1.035 to 1.100, $p < 0.001$) and primary care recommendations (5.1% increase; IRR = 1.051, 95% CI: 1.027 to 1.076, $p < 0.001$). Clinician call-backs significantly decreased by 5.4%, suggesting a shift in workload.

In the cross-sectional part of the study (29) users were also asked what they would have done if NHS 111 had not been available. Only a small proportion of NHS 111 online users said they would have contacted high-acuity services (1% for 999, 3% for ED), while 43% said they would not have contacted any service. Compared to telephone users, online users were significantly more likely to report they would not have sought alternative care, even after adjusting for demographic and health factors ($p < 0.001$). It must be noted that these findings reflect perceived intentions rather than actual behaviour.

The interrupted time-series study (34) used real-world data and included a large sample, with seasonal confounding accounted for in the analysis. However, it had several limitations: no control group, no follow-up data to confirm whether recommended services were used, and high variation in results across areas. The sample was not fully representative, covering only 18 of 38 areas, and relied

on convenience sampling. Despite these issues, the findings are considered applicable to Wales, although the high variation in estimates across areas suggests that the impact of the introduction of online 111 on telephone is likely to be affected by local factors affecting the implementation of web and telephone services.

Triage accuracy and appropriateness: We found five studies (28, 42, 45, 47, 49) that reported on the appropriateness or accuracy of telephone triage and advice services highlighting variability in performance across tools, clinical roles, and triage settings. The definitions of accuracy and appropriateness varied, making it difficult to compare results. The SALOMON algorithm (42), a Belgian tool, demonstrated moderate diagnostic accuracy, correctly identifying for predicting ED need, with a sensitivity of 76.6% of patients who truly needed ED care (sensitivity: 76.6%, 95% CI: 75.6 to 77.6) and correctly ruling out ED need in 98.3% of cases that didn't require it (specificity: 98.3%, 95% CI: 97.9 to 98.6). Its high positive predictive value (PPV = 85.5%) and negative predictive value (NPV = 96.9%) suggest that its recommendations were usually accurate.

The study used real-world data from over 10,000 calls collected across five years, with triage outcomes compared to patient records. Triage decisions were made before outcomes occurred, helping reduce bias. However, the study excluded 2,200 callers who refused nurse triage, and no missing data analysis was done to assess whether exclusions differed from those included. This introduces potential selection bias. The study did not explore how symptoms or reasons for contact may have influenced triage accuracy, which could confound results.

While the findings indicate SALOMON algorithm as a valid nurse telephone triage tool, they are not directly applicable to Wales due to differences in healthcare systems and population characteristics. The sample may not be representative, and the study was conducted in a Belgian region serving 8 to 13 EDs. Therefore, generalisability is limited, and caution is needed when considering the algorithm's use in a Welsh context.

We reviewed a study evaluating the ODISSEE self-triage tool (47), which was tested by volunteers using clinical scenarios created by a panel of clinicians. A moderate overall accuracy (68.4%, 95% CI: 0.63 to 0.74) and substantial agreement with expert judgement (Fleiss' kappa = 0.557 to 0.687). Sensitivity for distinguishing emergency vs. primary care needs was very high (97%, 95% CI: 0.95 to 0.98), meaning it rarely missed urgent cases, while specificity was moderate (69%, 95% CI: 0.64 to 0.74), indicating some over-referral. PPV (82%) and NPV (94%) suggest that most recommendations were appropriate. However, agreement was lower when distinguishing between levels of emergency care (kappa = 0.552), indicating challenges in finer triage distinctions.

The study design had several limitations. Volunteers entered scenarios rather than real patients, and more volunteers were university-educated than not, limiting generalisability to the wider population. Importantly, the same panel of clinicians designed both the scenarios being tested and the reference outcomes, which may have inflated agreement. In real-world use, patients would present their own symptoms and outcomes would be based on actual service use, making the comparison more independent giving a less biased estimate of tool performance.

While the study used structured scenarios and reported diagnostic accuracy clearly, it did not use real-world patient data and may not reflect how the tool performs in practice. These limitations mean the findings are not directly applicable to Wales, and further testing in a real-world setting with a representative population would be needed to assess its usefulness locally.

A study from the Netherlands evaluating the Netherlands Triage Standard (45), a decision support tool used for telephone triage, had poor specificity (0.46 to 0.48) and moderate sensitivity (0.71 to 0.72) for identifying high-urgency stroke/TIA cases/life threatening emergencies. It must be noted that while the moderate sensitivity indicates it detected most urgent cases, about 28–29% of high-urgency cases were missed. Additionally, the poor specificity indicates that the tool flagged many non-urgent ones as high urgency. After clinician overruling, sensitivity improved to 0.86, but specificity remained low (0.38 to 0.40), indicating a large proportion of non-urgency cases were incorrectly classified as high urgency.

The study used real-world data from over 1,200 randomly selected calls and compared triage decisions to outcomes recorded in GP records. Missing data analysis confirmed no selection bias, and the sample was considered representative of OOH primary care settings in the Netherlands. However, 20% of triage assessments were unclear and required review by a GP panel, and 15% of recorded urgency levels were overruled. These issues introduce measurement error and lower confidence in the consistency of triage coding. This is a higher quality study providing useful insights into triage accuracy, the findings are not directly applicable to Wales owing to differences in healthcare systems and service structures. Additional research using UK-based data would be needed to assess how well the Netherlands Triage Standard or similar systems perform in a Welsh context.

A Danish study by Graversen et al. (2020) (49), compared triage accuracy across nurses, GPs, and physicians in an OOH primary care setting. It found that nurse-led triage had the lowest rate of clinically relevant undertriage: (3.7%) compared to GPs (7.3%) and physicians (6.1%). Nurses were about half as likely to miss urgent cases as GPs0.51 (95% CI: 0.28 to 0.93). However, nurses and physicians had higher overtriage rates than GPs (GPs: 4.3%; nurses: 9.1%, RR = 2.13, 95% CI: 1.22 to 3.73; physicians: 8.2%, RR = 1.93, 95% CI: 1.10 to 3.39), meaning they more often recommended higher levels of care than necessary. Perceived quality and efficiency were significantly lower for nurses and physicians compared to GPs (median score 6 vs. 7 out of 10, $p = 0.001$).

The study used real-world data and randomly sampled calls, with adjustments made for potential bias in ratings by health professionals. However, triage accuracy was assessed subjectively by a panel of clinicians rather than using objective follow-up data from patient records on service use or medical outcomes, which may have introduced bias. To enable comparisons the sample was stratified by health professional type, but the physician group was more likely to be representative due to a smaller eligible call population. The study may have been slightly underpowered, with fewer calls for GPs included than required to detect differences, so any conclusions that health professionals did not differ may be true or could be because power was too low.

Confounding factors such as differences in patient characteristics across services and regions were not considered, and clustering by service may have inflated differences between groups. These limitations, along with the use of subjective outcome measures, reduce confidence in the findings. As the study was conducted in Denmark, the results are not directly applicable to Wales. Differences in service models, triage systems, and population characteristics mean further research would be needed to assess whether similar patterns hold in a Welsh context.

Finally, an observational retrospective study by Sexton et al. (2025) (28) analysed triage call records from three urgent care providers in North West England, comparing non clinician-led primary using NHS Pathways digital triage software and clinician-led secondary triage in a co-located urgent care model. Secondary triage consistently showed higher specificity (an indicator of accuracy and efficiency) across all urgency levels. For example, at the "care within one hour" threshold specificity was 97.7% in secondary triage compared to 65.4% in primary triage. Positive predictive value was also higher in secondary triage (66.7% vs. 24.0%), meaning it was better at correctly identifying non-urgent cases.

In contrast, primary triage had higher sensitivity for predicting ED attendance (93.5% vs. 80.4%) and inpatient admission (94.1% vs. 81.5%), suggesting it was more effective at identifying urgent cases. However, potential undertriage was identified in 1.7% of calls, and 18.6% of admitted patients had received a non-urgent triage outcome, highlighting safety risks in secondary triage.

The study used real-world data from over 15,000 calls between April and October during the COVID-19 pandemic. It included a large, representative sample, with 81% of eligible calls linked to patient records. The analysis was strengthened by adjusting for confounding and accounting for clustering by clinician. The pandemic context may have influenced call patterns and ED attendance. It also assumed that symptoms recorded at triage matched those presented at ED, which may not always be the case.

This is a higher quality study considered applicable to Wales due to similarities in service models and population characteristics. The findings offer useful insights into the trade-offs between sensitivity and specificity in different triage approaches and highlight the importance of balancing safety with efficiency in urgent care settings.

Collectively, these findings suggest that both digital and clinician-led triage systems can achieve high accuracy, but trade-offs between sensitivity and specificity, and between safety and efficiency, remain central to triage model design. Systems that prioritise avoiding missed urgent cases, such as primary triage or tools with high sensitivity but lower specificity, tend to over-refer, increasing workload and resource use. Conversely, models that aim to reduce unnecessary referrals, such as secondary triage or tools with high specificity but lower sensitivity, risk undertriage and potential safety concerns. For example, the Netherlands Triage Standard (45) and secondary triage in Sexton et al. (2025) (28) showed moderate to high specificity but lower sensitivity, while tools like ODISSEE and primary triage had high sensitivity but more over-referral. These patterns were consistent across different settings, roles, and tools, though definitions of accuracy varied and many studies had limitations in design, generalisability, or data quality. Understanding these metrics, and the context in

which they were measured, can help inform decisions about triage model design, workforce composition, and the balance between patient safety and service efficiency in Wales.

Waiting times: We identified one study by Sen et al. (2019) (59) reporting on waiting times within a redesigned NHS 111 clinical assessment service. The service introduced emergency physicians and non-physician clinical advisors to review cases initially triaged for ED attendance. The study used system-generated timestamps to measure various stages of the call process, including call handler time, "stack time" (delay before clinician pick-up), and clinical consultation duration. This provided a detailed and objective assessment of call handling performance using real-world data.

The service met its performance targets in most cases: 96% of calls requiring ED attendance within 1 hour and 100% of those within 4 hours were handled within the expected timeframes. However, the introduction of clinical assessment significantly increased the overall call duration. The median total call time post-intervention was 23 minutes and 45 seconds (interquartile range [IQR]: 14:05–20:38), compared to a pre-intervention average of 10 minutes and 17 seconds (IQR: 09:46–11:36). This reflects the added time required for clinical input, which may improve triage accuracy and reduce unnecessary ED referrals but also affects service efficiency and call centre capacity. The study included a large sample and used objective data from electronic call records. However, comparisons between phases were not statistically tested, and confounding factors, such as differences in timing and duration of data collection, were not considered. The representativeness of the sample was unclear, potential selection bias was not explored and the study did not assess patient perceptions of waiting or the impact of longer calls on outcomes. Despite these limitations, the study is considered applicable to Wales due to its UK setting and relevance to NHS 111 service design.

Patient Satisfaction: We identified two studies that explored patient satisfaction with telephone and digital triage services, highlighting both shared benefits and key differences in user experience. (29, 58) In a Belgian survey-based study, Schoenmakers et al. (2021) (58), most respondents (82.7%) preferred a co-located OOH primary care model, mainly due to faster service (25.7%) and more appropriate referrals (13.4%). Telephone triage was also valued for its speed (26.7%), reassurance (18.3%), and ability to reduce unnecessary transfers (20.5%). However, concerns were raised about the limitations of remote assessment, including the lack of physical examination (30.4%), potential misinterpretation of symptoms (12.4%), and absence of access to patient records (8.7%). Patients who supported co-location were more likely to prefer speaking to a physician rather than a non-clinical operator (Odds Ratio [OR] = 0.93, 95% CI: 0.88 to 0.96), be younger (OR = 0.98, 95% CI: 0.98 to 0.99), and be satisfied with telephone advice (OR = 1.25, 95% CI: 1.14 to 1.38). They were also more likely to agree with the need for referral if it reduced waiting times (OR = 1.25, 95% CI: 1.15 to 1.37; OR = 1.11, 95% CI: 1.01 to 1.22).

We advise caution when interpreting these findings. The study used real-world data, statistically tested differences, reported precision and considered confounding factors and thus reducing uncertainty. But it relied on self-reported questionnaires with unknown validation and a convenience sample of patients attending the GP, meaning the views of patients not attending during data

collection are missed out. As the study was conducted in Belgium, its findings may not apply directly to Wales due to differences in healthcare systems, patient expectations, and service delivery models.

In a qualitative and survey-based evaluation, Turner et al. (2021) (29) which explored user experiences with NHS 111 online. Half of users were 'very satisfied' and 57% were 'very likely' to recommend the service. However, satisfaction was significantly lower than for NHS 111 telephone users, even after adjusting for age, gender, ethnicity, and long-term conditions ($p < 0.001$). Users valued the speed and convenience of the online format, especially for minor issues or when other services were hard to access. Dissatisfaction was linked to the simplicity of the questions, which reduced confidence in the advice. While 84% of users received at least some of what they needed, 16% did not, and 9% said they were unlikely to use the service again, often due to poor advice or problems accessing recommended services. Despite this, 56% were 'very likely' to use it again. Preferences varied: some users appreciated the accessibility of the online service, while others preferred the reassurance of speaking to someone. Although 75% found the advice helpful, telephone users were more likely to rate it as 'very helpful' ($p < 0.001$). Barriers to following advice included limited GP access, especially at weekends, and transport issues.

The cross-sectional survey sub-study had strengths such as real-world data, a large sample with confounding adjusted using multivariable logistic regression but relied on self-reported outcomes and a convenience sample with a low response rate, which is unlikely to be representative of all users. By using English NHS 111 user data it is applicable to Wales, but the generalisability of the sample is a concern. Questionnaire validation and statistical precision were not reported. The qualitative sub-study used framework analysis and a topic guide, maintained audit trails, and applied purposive sampling to improve diversity. However, the final sample was skewed towards white, middle-aged women who received a call-back, limiting insight into other patient experiences. Transcripts were coded by a single researcher, and there was no reflection on how researcher bias may have influenced the analysis. Data were collected during the COVID-19 period, which may have shaped responses. Both sub-studies were conducted in England and offer useful insights, but limitations in the study designs mean findings should be interpreted with caution when informing decisions in Wales.

Together, these studies offer useful insights into patient experiences with telephone and digital triage, showing benefits like speed and convenience but also concerns about remote assessment and advice quality. Schoenmakers et al. (2021) (58) found strong support for co-located urgent care, though its relevance to Wales is limited due to differences in healthcare systems. Turner et al. (2021) (29) reported mixed views on NHS 111 online; while the cross-sectional survey is more applicable to Wales, both sub-studies face limitations in generalisability due to sampling issues, selection bias, and contextual differences. Findings should be interpreted with caution when informing decisions in Wales.

Evidence of effectiveness: Decision support tools- Redirection

We included one low quality cross-sectional study (54) that looked at patient satisfaction and service outcomes following a physician-led redirection procedure from an ED to an OOH GP clinic.

Patient satisfaction: Satisfaction was assessed by asking redirected patients whether the redirection was justified based on their primary complaint. Among the 221 patients interviewed, 176 (79.6%) felt the redirection was appropriate. Reasons for dissatisfaction included the absence of radiology or laboratory facilities (12 patients), lack of access to specialist consultations (8 patients), severe pain (4 patients), belief that ED care was more appropriate (4 patients), and excessive waiting times (4 patients). These findings suggest that while most patients accepted the redirection, satisfaction was influenced by the perceived adequacy of services available at the OOH GP clinic.

Patient compliance: This was measured using an "accessibility rate," defined as the proportion of redirected patients who attended the OOH GP clinic. Of the 221 patients contacted, 199 (90%) followed through with the referral. Reasons for non-attendance included long waiting times (9 patients), unsuitable opening hours (5 patients), and consultation costs (4 patients). Notably, 29% of redirected patients had never heard of the OOH GP clinic prior to their ED visit, indicating a gap in public awareness of alternative urgent care options.

Unplanned health service recontacts: These were tracked for recontacts with the ED within 72 hours. Only 9 patients (4.1%) returned to the ED for the same complaint, of these only one was redirected to the ED from the OOH GP clinic. This low rate of recontact and adverse outcomes suggests that the redirection procedure was clinically safe.

Service impact: 288 of 9,551 ED attendees presenting over the two-month period from February 1st to March 31st, 2016, were redirected to the OOH GP clinic, resulting in an overall redirection rate of 3%. The rate was significantly higher during weekends and holidays (5.7%) compared to weekdays (1.9%, $p < 0.001$), likely reflecting reduced access to regular GP services during OOH periods. Most redirected patients (86%) reported having a regular primary care physician, but many did not attempt to contact them before attending the ED, often due to perceived unavailability.

Overall, we rated this study as poorer quality in our critical appraisal. It was conducted at a single centre, which limits how well the findings apply to other settings. The study relied on subjective measures with unknown validity, did not report statistical comparisons or precision and did not account for confounding factors. There was also evidence of selection bias. Patients who responded to the questionnaires were more likely to already have a GP at the OOH GP clinic. This means the results reported above for the outcomes of patient satisfaction, compliance, unplanned recontacts and service impact may not reflect the experiences of patients redirected to clinics where they do not have an existing relationship. These limitations should be considered when applying the findings to decision-making or service planning.

Additionally, when considering the relevance to Wales, differences in healthcare infrastructure, patient behaviour, and service models must be taken into account. For example, the structure and availability of OOH GP services may differ, and public awareness of alternative urgent care options may vary. These factors could influence how patients respond to redirection and whether similar outcomes would be observed. Therefore, while the findings suggest that redirection can be safe and acceptable, further research in the Welsh context is needed to assess feasibility, patient experience, and service impact more accurately.

5.4.4. Introducing an urgent care centre

Overview and country examples

Urgent care centres (UCCs), represent a global strategy to alleviate pressure on EDs and provide more efficient management of non-emergency cases. While sharing a common goal of offering timely care for urgent but not life-threatening conditions, their implementation varies significantly across different countries and regions, in terms of their location, operational hours, staffing, and integration with existing healthcare systems. Their names also vary, for example in England they are termed urgent treatment centres (UTCs).

Internationally, countries facing rising ED pressures are increasingly adopting walk-in UCCs to manage non-emergency cases more efficiently, aiming to offer timely, primary care-led interventions for low-urgency patients. These centres are frequently co-located with or adjacent to hospital EDs (the hospital-parallel model), to reduce unnecessary ED use and improve patient flow, as seen in Germany and Sweden. However, UCCs can also operate as stand-alone services. In the United States, they take the form of community advanced models with extensive staffing and diagnostic capacity, while in Australia, they represent community restricted models, operating with more limited human and technical resources.

Specific international examples illustrate these variations:

- In Germany, a walk-in UCC was established in 2019 adjacent to the ED at the university hospital in Hamburg. This GP-led clinic operates during evenings and aims to divert low-urgency patients from the ED by offering immediate access to general medical care within the hospital setting. Patients triaged at the ED registration desk can be referred directly to the UCC (41)
- Sweden's first UCC, introduced in 2018, is co-located and closely integrated with a hospital ED. It is staffed by primary care physicians and nurses and shared triage lines ensure appropriate routing of patients between the ED and the UCC (57)
- The United States has seen a rapid expansion of UCCs, often integrated within primary care practices. An example is the model adopted by the University of North Carolina's Family Medicine Center in 2018, where an UCC was established within the practice to provide enhanced access for patients with acute problems. This UCC operates during extended hours and is supported by additional staff (physicians, nurses, medical assistants) and diagnostic services like laboratory and radiology (21)

- In Australia, the Bathurst After Hours General Practice Clinic, operational since 2012, serves a regional population. Situated next to the local hospital's ED, this walk-in GP clinic provides an accessible alternative for non-emergency patients when regular GP services are closed. The clinic is routinely staffed by a receptionist, registered nurse and a GP, and functions as the only after-hours service in the local area (56)
- In England, UTCs were introduced in 2017 to bring greater consistency to urgent care delivery. The 2023 Delivery Plan for Recovering Urgent and Emergency Care Services reinforced the expectation for systems to increasingly adopt a model where UTCs increasingly function as the primary entry point to EDs, allowing emergency medicine specialists to focus on higher acuity patients (66)
    - Integrated Care Boards are responsible for determining the most effective location for UTCs, whether co-located with an ED and increasingly functioning as the front door, or a standalone service either on or off a hospital site. (10)
    - The 10-year health plan for England (2025) also aims to expand co-located UTCs and go further in splitting urgent and emergency care into separate streams. (67)
    - Regardless of location, UTCs are expected be open a minimum of 7 days a week, 12 hours a day. They are designed to see both booked and walk-in patients and are equipped to treat patients of all ages for minor ailments and injuries that are urgent but not life or limb threatening. (10)

Evidence of effectiveness

We identified five studies (21, 41, 44, 56, 57) evaluating the impact of introducing a UCC on various outcomes.

Cost-effectiveness: We included two studies (21, 57) that assessed the cost-effectiveness of introducing UCCs as an alternative to ED care. Both studies suggested potential financial benefits to the health system, however we rated these to be of poor quality and therefore the findings should be interpreted with caution.

Barzin et al. (2020) (21) analysed revenue and cost data from a UCC launched within an existing practice in North Carolina, serving around 19,000 patients. They estimated a break-even point at three years when including all initial staffing and supply costs, and profitability by the fifth quarter when excluding upfront costs. The study projected savings of $568,000 to $1,136,000, based on an assumed $200 to $400 saving per ED visit avoided. However, actual changes in ED use were not measured. Savings were based on patient or clinician judgement that an ED visit was avoided, which may introduce bias. Costs were projected rather than observed, so findings should be seen as indicative rather than definitive.

Raidla et al. (2020) (57) conducted a quasi-experimental study in Sweden, comparing actual costs of UCC and ED visits after co-locating a UCC with an ED. UCC visits were €67 to €210 cheaper on average, largely due to fewer diagnostic tests. The average cost of medical services per patient was €37.28 lower at the UCC, with additional savings of €16.62 in radiology and €20.66 in lab testing. Though the findings suggest that UCCs may offer a more resource-efficient model of care for lower-

acuity patients, particularly by avoiding unnecessary diagnostics. Selection bias was evident, with EDs seeing more patients with symptoms like headache, fever, and shortness of breath, while UCCs saw more chest pain and non-specific symptoms. Thereby, indicating that these differences may have influenced the cost comparison.

Neither study considered potential confounding factors, and both were conducted outside the UK, limiting their applicability to Wales. Differences in healthcare funding, service models, and patient behaviour mean the findings may not translate directly. While study by Raidla et al. (2020) (57) used observed cost data, the study by Barzin et al. (2020) (21) relied on projections, highlighting the need for real-world validation. Further research in the Welsh context is needed to assess whether UCCs could deliver similar cost savings and service efficiencies.

Safety: We included findings from the national *Urgent and Emergency Care Survey* (44), which collected data patient experiences at Type 3 UTCs across England in February 2024. The survey focused on communication between health professionals and patients, including explanations about conditions and tests. Most respondents felt adequately heard: 76% said they 'definitely' had enough time to discuss their condition, and 80% felt the health professional 'definitely' listened to them. A further 19% and 15% responded 'to some extent', respectively. In terms of clarity, 73% said their condition or treatment was 'completely' explained in a way they could understand, while 7% felt it was not explained clearly.

Among patients who underwent tests at the UTC, 76% said staff 'completely' explained why the tests were needed, and 72% said the results were 'definitely' explained in an understandable way. However, 10% reported that test results were not explained to them. These findings suggest that while most patients had positive experiences with communication at UTCs, a notable minority reported gaps in explanation, particularly around test results. This highlights the need for consistent, clear communication to support patient understanding and satisfaction.

The survey results are quality assured and considered accurate and reliable. Only 70 of 165 UTCs in England were included, and none were co-operatively run. As the survey did not include any UTCs in Wales, and service models, staffing, and patient expectations may differ, the findings may not fully reflect experiences in the Welsh context. Further research would help assess whether similar communication patterns and patient experiences are observed in Wales. (44).

Unplanned health service recontacts: We identified two studies (44, 57) that reported on unplanned recontacts with urgent care services, offering insights into both short-term and longer-term patterns of service use. A small quasi-experimental study (57), found that 3% of patients who initially attended the ED reattended within 72 hours, compared to 1% of those referred to an UCC. While this suggests a lower short-term reattendance rate for UCC referrals, the study did not report odds ratios, confidence intervals, or p-values, making it difficult to assess the precision or statistical significance of the difference. Selection bias was also observed, as patients attending EDs presented with different symptoms than those seen at UCCs, which may have influenced reattendance rates.

In contrast, the national *Urgent and Emergency Care Survey* (2024) (44) reported that 20% of respondents had previously attended a UTC for the same condition. Of these, 5% had reattended within the past week, 6% between one week and one month earlier, and 9% more than 30 days earlier. These findings reflect broader patterns of repeat use over extended timeframes, rather than acute reattendance. The difference in timeframes between the two studies is a key consideration: while Raidla et al. (2020) (57) focused on immediate (72-hour) recontacts, the national survey (44) captured any prior attendance for the same condition, regardless of urgency or recency.

Together, these findings suggest that while short-term reattendance may be relatively low, particularly following UCC referral, a substantial proportion of patients continue to seek care for the same condition over time. However, neither study included statistical testing to support the findings, and both have limitations that affect their reliability. The Raidla et al. (2020) (57) study was conducted in Sweden, and the national survey (44) only included UTCs in England. Differences in service models, patient behaviour, and healthcare access mean the findings may not fully apply to Wales. Further research is needed to understand recontact patterns in the Welsh context and to assess whether similar trends are observed.

Service impact: We included four studies (21, 41, 56, 57) that reported the impact of urgent care services on their own operations or on other parts of the health system. These studies explored changes in service demand, staff workload, and patient flow. Overall, urgent care services were associated with reduced pressure on EDs, improved patient flow, and more efficient use of healthcare resources, although the extent and nature of these impacts varied.

A common finding was the diversion of non-urgent cases away from EDs. In Barzin et al. (2020) (9), which investigated the impact of integrating a UCC into a family medicine centre in North Carolina, over 33% of UCC visits were judged by providers or patients to have prevented an ED attendance. Similarly, in the study by Payne et al. (2017) (56) found that 60% of patients (n=125/205) said they would have gone to the ED if the Brisbane Bathurst After Hours General Practice Clinic had not been available, with 86% of these (n=107) describing their visit as essential. While these findings suggest that urgent care services can absorb demand that might otherwise burden EDs, they rely on patient self-report and provider judgement, which may not accurately reflect actual ED use.

Bessert et al. (2023) (41), a higher-quality quasi-experimental study, used objective service data to show a statistically significant reduction in ED use after introducing a WICs. The proportion of self-referring patients dropped from 78.6% to 61.2% ($p < 0.001$), and daily patient numbers fell by 37.3% (95% CI: 30.9% to 43.8%). Reductions were seen across 7 of 10 ED specialties, with no increases in any specialty. However, inpatient admissions rose from 21.9% to 28.3% ($p < 0.001$), possibly reflecting a shift in case mix, where less acute cases were diverted, leaving more complex patients in the ED. More robust analysis accounting for confounders would strengthen confidence in these findings.

Differences also emerged in how services addressed broader care needs. Barzin et al. (2020) (9) reported that 25% of UCC patients received preventive or chronic disease care, and an average of

115 new patients per quarter established ongoing care. (21) In contrast, Payne et al. (2017) (56) focused on outcomes, with 79% (n=174) reporting their issue was resolved. Among those whose issue was unresolved (n=45), 73% (n=33) saw another GP and 22% (n=10) subsequently attended the ED, indicating that while most needs were met, a small proportion still required escalation.

Efficient utilisation of resources was another area of convergence. Raidla et al. (2020) (57) found that UCC visits required significantly fewer laboratory tests than ED visits ($Z = -6.723$, $p < 0.001$), with 63 out of 100 cases showing reduced laboratory use in UCCs, 5 showing increased use, and 32 showing no difference. (26) The Z-score reflects a strong effect size, and the p-value confirms statistical significance, suggesting that UCCs may offer a more streamlined diagnostic approach.

In summary, these studies suggest that urgent care services can reduce ED demand, support appropriate redirection of care, and improve efficiency. Where statistical data were reported, findings were generally significant. However, all studies were conducted outside the UK and involved single-centre evaluations. Differences in healthcare systems, funding models, and patient behaviour limit the generalisability of these findings to Wales. Further research in the Welsh context is needed to assess whether similar impacts would be observed.

Triage accuracy and appropriateness: We included one prospective, single centre quasi experimental study conducted at a university hospital in Hamburg, Germany (41), which evaluated the impact of introducing a walk-in clinic (WIC) adjacent to the ED. ED registration nurses referred low-acuity patients to the WIC, with the option to escalate care if needed.

During the post-intervention period, 1,643 patients attended the WIC, and 73.1% (n=1,201) consented to participate in the study. Of these, 80.5% (n=956) were referred from the ED registration desk, and 82.6% (n=790) received definitive care within the WIC. Only 17.4% (n=166) were referred back to the ED. Overall, 16.4% (n=197) of all WIC patients were escalated to the ED, suggesting that most low-urgency cases could be managed safely outside the ED.

A key outcome was the reduction in low-urgency ED presentations (triage level 5), which fell from 21.4% to 9.0% after the WIC was introduced ($p < 0.001$). This statistically significant change suggests that the WIC helped divert non-urgent cases, improving triage efficiency and potentially reducing ED overcrowding.

Overall, the findings suggest that co-located WICs staffed by primary care professionals can reduce low-acuity ED attendances and manage a high proportion of patients independently. However, the study was conducted at a single site in Germany, and generalisability to Wales is limited. Differences in healthcare systems, referral pathways, and patient behaviour may affect how similar models would perform in the Welsh context. Further multi-site evaluations using standardised outcome measures (e.g. odds ratios, relative risks, and confidence intervals) and accounting for potential confounders would strengthen the evidence base and support more confident application to Wales.

Waiting time: We included three studies (41, 44, 57) that examined the impact of UCCs or WICs on patient waiting times and length of stay. All three studies reported improvements in service efficiency, though with variation across settings and patient groups.

Two quasi-experimental studies by Bessert et al. (2023) (41) and Raidla et al. (2020) (57) reported statistically significant reductions in length of stay following the introduction of urgent care services (41, 57). In Bessert et al.(2023) (41), while the overall mean length of stay for walk-in ED patients receiving outpatient care in the WIC did not change over time, specific subgroups experienced improvements. Among self-referring patients, length of stay decreased by 17.6 minutes (95% CI: 7.4 to 27.8; $p = 0.02$) and trauma surgery patients saw a reduction of 18.3 minutes (95% CI: 4.8 to 31.9; $p = 0.008$). Conversely, dermatology patients experienced an increase in length of stay by 35.1 minutes (95% CI: –65.4 to –4.9; $p = 0.024$), suggesting that impacts may vary by specialty. On weekends and public holidays, length of stay among all walk-in ED patients fell by 18.8 minutes (95% CI: 3.7 to 33.8; $p = 0.014$), indicating time-of-week effects on service efficiency.

Raidla et al. (2020) (57) compared length of stay and time to physician between ED and UCC settings, finding that UCC patients spent on average 2.11 hours less in hospital than ED patients. Time to physician was also 1.57 hours shorter in UCCs. These differences were statistically significant, with length of stay showing a strong effect ($Z = –7.547$; $p < 0.001$) and time to physician similarly reduced ($Z = –6.928$; $p < 0.001$). The Wilcoxon signed-rank test revealed that 82 participants had shorter length of stay in UCCs (negative ranks), compared to 16 with longer length of stay (positive ranks), and 2 with no difference, indicating a consistent trend toward faster care delivery in UCCs.

The *Urgent and Emergency Care Survey* (2024) (44) conducted across England, provided national-level insights into patient-reported visit durations and assessment times at Type 3 UTCs. Most respondents (82%) reported visits lasting up to 4 hours, with 30% completing their visit in under 1 hour. However, 18% stayed longer than 4 hours, and this group reported worse experiences on 16 out of 20 survey questions, particularly regarding communication with clinical staff. This suggests that prolonged stays may negatively affect patient experience. Regarding initial assessment, only 34% of walk-in patients were assessed within the NHS England target of 15 minutes, while 19% waited over 60 minutes. Among those with pre-booked appointments, 64% were assessed within 30 minutes, though 18% still waited over an hour, indicating variability in adherence to national standards.

Two of the studies were assessed as higher quality (41, 44) while Raidla et al. (2020) (57) was poor quality. Neither quasi-experimental study accounted for possible confounders in their analyses and differences in effect by the timing of appointments or sub-specialty may explain some of the observed effects. However, the national survey provides reliable UK data that supports the broader findings and is considered applicable to Wales.

Collectively, the studies suggest that urgent care services can reduce waiting times and length of stay, particularly for low-acuity or self-referring patients. Statistically significant reductions in length of stay and time to physician (41, 57) support the efficiency of UCCs, while national survey data highlight the importance of timely assessment in shaping patient experience. However, variation

across specialties and appointment types suggests that tailored operational strategies and consistent adherence to service standards are needed. Further research in the Welsh context would help confirm whether similar improvements in efficiency and patient experience can be achieved.

Patient experience: We identified evidence from the *Urgent and Emergency Care Survey* (2024) (44) and a study by Payne et al. (2017) (56) both of which reported on patient experiences with UTCs and after-hours general practice clinics. Overall, both sources highlighted generally positive experiences, with satisfaction closely linked to waiting times, communication, and continuity of care.

The *Urgent and Emergency Care Survey* (2024) (44) conducted across England, found that while overall experiences of urgent and emergency care services were mixed, patients attending UTCs reported more favourable experiences than those using A&E. Timeliness was a key determinant: patients assessed within 15 minutes of arrival reported better-than-average experiences across all 20 survey questions, while those waiting over 60 minutes reported worse-than-average experiences on every measure. Similarly, patients whose visits lasted more than four hours consistently reported poorer experiences, particularly in communication with clinical staff. Thereby, indicating that delayed waiting for an initial assessment (beyond the nations target of 15 minutes) was associated with lower satisfaction, underscoring the importance of timely care.

Communication and involvement in care were generally rated positively. At UTCs, 81% of patients said they were treated with respect and dignity 'all of the time', and 71% felt 'definitely' involved in decisions about their care. However, only 39% were informed about how long they would have to wait, and this lack of communication increased with visit duration. Emotional support was also variable: 57% said their anxieties and fears about their condition and treatment were 'completely' discussed, while 19% said they were not addressed at all. Pain management was a concern, with only 47% saying staff 'definitely' did everything they could to control their pain.

In contrast, Payne et al. (2017) (56) reported high satisfaction with the Bathurst After Hours General Practice Clinic (BAHGPC). In a follow-up survey of 219 clients, 59% rated their visit as 10 out of 10, and 86% rated it between 8 and 10. Nearly all respondents (99%) said they would use the clinic again and recommend it to others. Qualitative feedback was also positive: 90% (n=147) of those who provided comments praised the service, while only 3% (n=5) expressed dissatisfaction, citing issues such as limited equipment, lack of privacy at reception, and being turned away shortly before closing. These findings suggest that when urgent care services are accessible, respectful, and responsive, they can achieve very high levels of patient satisfaction. However, the study had several limitations. It was conducted in a single centre in Australia, making it not applicable to Wales. The sample was not representative, with evidence of selection bias and a low response rate (25%). Additionally, the surveys were administered by clinic staff, introducing potential social desirability bias, and no statistical comparisons or precision estimates were reported. And the validity of the survey questions was also unclear.

Both sources emphasised the importance of post-visit support. At UTCs in England, 82% of patients discharged home were told who to contact if they had concerns, most commonly their GP (45%).

Similarly, 82% received information on how to care for their condition at home, and 77% said they understood this information 'very well' (44). In Payne et al. (2017) (56), the high ratings linked to client satisfaction with the clinic service overall, were likely reinforced by clear communication and continuity of care, with patients feeling confident in the service and its staff.

Given its higher quality, UK-based data, the *Urgent and Emergency Care Survey* (44) provides more reliable and applicable evidence for informing decisions in Wales. While Payne et al. (2017) (56) offers useful insights, its methodological limitations and lack of relevance to the Welsh context mean its findings should be interpreted with caution.

5.4.5. Virtual urgent care (VUC)

Overview and country examples

Although remote healthcare technologies have been available for decades, the COVID-19 pandemic significantly accelerated the adoption and expansion of virtual care. (50) This digital transformation has led to various models for delivering urgent care remotely. Two distinct approaches in the literature include a Danish model integrating one-way video into OOH primary care and a Canadian model implementing ED-led VUC programmes:

Video triage in OOH primary care - Denmark

- Many countries have integrated video into primary care and telephone triage, particularly in OOH services. By allowing clinicians to visually assess patients, video can help resolve more cases remotely, potentially reducing the need for resource-intensive clinic visits or home consultations
- The Danish model, utilising **GP-led** telephone triage within OOH primary care services operating outside regular office hours, incorporates **one-way video consultations** where the GP can see the patient, but the patient cannot see the GP. Triage GPs perform telephone triage and assess whether the problem is suitable for a video contact. If suitable and the patient consents, a one-way video link is sent via text. When the patient accesses the video link, the GP is able see the patient
- This intervention aims to enhance triage effectiveness, reduce the need for resource-intensive clinic consultations or home visits, and increase the probability of managing cases with self-care advice. (55)

ED-led virtual care - Canada

- In contrast, the Canadian pilot was an **ED-led VUC programme** launched across 14 EDs in 2020, aiming to improve access for patients with low-acuity concerns and reduce in-person ED visits. As the pilot was launched during the COVID-19 pandemic, VUC provided timely alternatives to the usual in-person visits, as well as taking advantage of technological familiarity, now firmly established within the digital age
- A defining feature of this pilot was its **flexible implementation**, allowing each participating ED to design its VUC programme based on specific local needs. This resulted in significant

variations across sites in areas such as triage models (self-screening, nurse-led, or physician-driven), staffing models (ranging from exclusively physician-staffed to multidisciplinary teams), and the technology platforms used, as there was no single provincial electronic health record or common virtual "front door". (50)

While both leveraging virtual care, these examples exhibit several key differences in their design and operation including their setting and scope, the video interaction, staffing models and flexibility. While the Danish model focused on a specific, integrated enhancement to existing OOH primary care, the Canadian pilot emphasised broad ED diversion through diverse, localised VUC designs. (50, 55)

Evidence of effectiveness

We identified two studies which investigated the impact of VUC models on service delivery and patient management in urgent and OOH care (53, 55). One poorer quality nested case-control study (outlined in 3 articles; 52, 53, 62) examined the implementation of VUC services across multiple hospital organisations in Ontario, Canada, during the COVID-19 pandemic. Each site independently designed its service model under broad funding guidelines, resulting in considerable variation in governance, staffing, technology platforms, and patient engagement. Triage approaches included self-screening, nurse-led triage, and one site led by a NP, with staffing models ranging from physician-only to mixed teams involving nurses, physician assistants, and NPs. The absence of a provincial electronic health record or unified virtual access point contributed to technological fragmentation. Physicians were reimbursed on a fee-for-service basis, and no standardised design requirements were imposed by Ontario Health or the Ministry of Health, highlighting the decentralised nature of the initiative. In contrast, a higher quality prospective cohort study (55) evaluated the use of video in telephone triage within OOH primary care across four Danish regions. GPs initiated one-way video consultation, when clinically appropriate, with patient consent. Triage outcomes included remote consultation, clinic visit, home visit, or hospital admission, and all patients were followed for seven days post-contact to assess outcomes. GPs were also reimbursed on a fee-for-service basis using specific codes. While the former study (53) focused on system-level implementation and variability, the latter (55) explored the clinical integration of video technology and its association with triage decisions and follow-up care. Together, these studies illustrate the growing role of virtual modalities in urgent care, while also highlighting the importance of governance, triage design, and technological infrastructure in shaping service effectiveness and equity.

Cost-effectiveness: We found only one study that reported cost-effectiveness. (62), A population-based, nested case-control study in Ontario, Canada, compared 30-day costs of VUC with in-person ED visits. Using administrative data from December 2020 to September 2021, the study analysed two VUC cohorts: those referred to ED within 72 hours (n=2,129) and those managed entirely through VUC (n=14,179), each matched to in-person ED users. All costs are expressed in Canadian dollars with a currency exchange rate of CAD $1=US $0.76. In Cohort 1, the 30-day mean cost per patient was higher for VUC users (CAD $2,805; SD $7,026) than for in-person ED users (CAD $2,299; SD $6,174), resulting in a significant cost difference of CAD $506 (95% CI: $139–$885). This was largely due to the inclusion of VUC operational costs (mean $163 per patient). In contrast, Cohort 2 showed that VUC was significantly less costly than in-person ED care, with a 30-day mean cost of CAD $758 (SD

$3,129) versus CAD $1,270 (SD $3,846) (p < 0.001), yielding a cost saving of CAD $511 per patient (95% CI: $434–$595). Over 90% of this saving was attributed to reduced 30-day ED costs (CAD $237) and fewer physician visits (CAD $243). Even after accounting for VUC operational costs (mean $149), VUC remained more cost-effective. At the population level, the total 30-day cost for the two VUC cohorts was CAD $18.9 million, compared to CAD $22.9 million for the matched in-person ED cohorts. These findings may suggest that VUC, particularly when it avoids subsequent ED referral, can offer substantial cost savings to the health system while maintaining access to urgent care services.

Unplanned health service recontacts: Only Nebsbjerg et al. (55) investigated unplanned recontacts via the impact of video use during telephone triage in OOH primary care across four Danish regions, linking electronic triage records to national health registers. The study compared outcomes between contacts where video was used with those managed by telephone only. Using adjusted incidence rate ratios (aIRRs), the study found that patients who received a video contact were significantly more likely to avoid follow-up contact within seven days compared to those who had a telephone-only consultation (aIRR 1.09; 95% CI: 1.08 to 1.09), suggesting that video support enables more definitive triage decisions than telephone contact. Among patients that required follow-up, those receiving video contact were slightly more likely to go to their own GP (aIRR 1.02; 95% CI: 1.01 to 1.03), and less likely to use an OOH primary care (aIRR 0.96; 95% CI: 0.95 to 0.97) or the hospital (aIRR 0.75; 95% CI: 0.74 to 0.76). As GPs decided whether to use video triage, differences in recontact may have been affected by the initial presenting symptoms. However, the study is higher quality incorporating almost 3 million calls representative of four Danish regions using objective real-world data and robust statistical models that enable precise estimates and confounding to be controlled. These findings suggest that integrating video into triage may reduce reliance on acute care services and promote continuity of care through the patient's regular GP, potentially improving efficiency and patient outcomes in urgent care pathways.

Service impact: Two studies we identified (53, 55) reported the impact of VUC and video triage on service utilisation and workload across urgent and OOH care systems. In McLeod et al.'s (2023) population-based study in Ontario, Canada, of 17,034 patients with a known VUC disposition, 17.2% (n=2,931) were referred to the ED, but 22.8% of these did not present within 72 hours (53). Among those who did attend the ED within 72 hours (n=2,262), matched comparisons showed similar 30-day ED visit and hospital admission rates to in-person ED users, though mean hospital length of stay was significantly longer for VUC-referred patients (7.5 vs. 5.1 days; difference 2.4 days, 95% CI: 1.6 to 3.2). These patients were also more likely to have a follow-up VUC visit or specialist consultation within 7 days (24.0% vs. 17.5%; difference 6.5%, 95% CI: 4.1 to 9.0) and 30 days (48.6% vs. 37.3%; difference 11.3%, 95% CI: 8.4 to 14.3). Among VUC users not referred to ED (n=16,664), matched to in-person ED patients discharged home, VUC users had higher rates of ED attendance within 72 hours (13.7% vs. 7.0%; difference 6.7%, 95% CI: 6.1 to 7.5), but similar hospital admission rates at 72 hours (1.1% vs. 1.3%) and 7 days (1.6% vs. 1.9%). However, 30-day hospital admissions were slightly lower in the VUC group (2.6% vs. 3.4%; difference –0.8%, 95% CI: –1.2 to –0.4), and mean hospital stay was longer (6.2 vs. 5.2 days; difference of 1.0 day, 95% CI: 0.7 to 1.2 days). In Denmark, Nebsbjerg et al. (2024) (55) found that video triage in OOH primary care was associated with a significantly higher likelihood of concluding the contact with advice and self-care (aIRR 1.21, 95% CI: 1.21 to 1.21), and a lower

likelihood of referral to clinic consultations (aIRR 0.59, 95% CI: 0.59 to 0.60) or home visits (aIRR 0.31, 95% CI: 0.29 to 0.32). However, video contacts were associated with a higher rate of hospital admissions (aIRR 1.20, 95% CI: 1.17 to 1.23). Together, these findings suggest that virtual and video-enabled urgent care models may reduce unnecessary in-person consultations and promote self-care but may also shift follow-up demand toward specialist services and increase hospital length of stay in some cases, highlighting the need for careful triage and follow-up planning.

Patient experience: Only McLeod et al. (2023) (52) reported patient satisfaction following VUC visits, using a standardised 25-item online survey distributed via email. Among respondents, 94% rated their overall experience as 8 out of 10 or higher, with an average satisfaction score of 9.2 on a 10-point Likert scale. Patients expressed high satisfaction with the ease of registration and scheduling (90% rated ≥8/10), the usability of the virtual platform (88% rated ≥8/10), and wait times, which received an average rating of 9.4. Comfort with virtual interaction was also high, with 96% agreeing they felt comfortable connecting with the provider, and 95% reporting their privacy was respected. Most patients felt their provider spent sufficient time with them (94%) and that the consultation was thorough (91%). Preferences for care modality were mixed, 50% preferred in-person care, 35% preferred virtual, and 15% were unsure. Patient-reported outcome measures were also strong, over 80% of respondents agreed they understood their health concern, felt reassured, and had a clear plan for managing their condition.

This prospective, multicentre cohort study, conducted across 14 ED-led sites in Ontario, also found that most VUC users had a primary care provider but lacked timely access, and that many presenting complaints were low acuity and managed virtually without the need for ED referral. While the overall impact on ED volumes was limited, the high satisfaction levels suggest VUC can effectively meet patient needs for timely, low-acuity care. However, given the demographic profile of VUC users, the authors highlight the need for future work to address health equity and ensure accessibility for equity-deserving and underserved populations. Additionally, considering ongoing ED staffing challenges, the study raises important questions about whether VUC services could be safely and more cost-effectively delivered by non-emergency physicians, such as NPs or physician assistants, without compromising quality or patient experience.

It is worth noting that VUC is an emerging area of research. We reviewed a small but high-quality evidence base on VUC, which gives us confidence in the conclusions. However, none of the studies apply directly to Wales. We need to consider how differences in health systems between Denmark, Canada, and Wales might affect how well VUC works or how efficient it is in other settings.

6. Discussion

6.1. Summary of evidence

6.1.1. Welsh context

Overview of urgent and emergency care in Wales

- Wales continues to face significant pressure on its urgent and emergency care services, with record levels of demand (13)
- In 2023/24 there were nearly 1.1 million attendances at EDs across Wales, the highest on record (68)
- A growing number of patients are also presenting at GP practices and OOH/111 services with urgent care needs which are not always being met by existing capacity and services (32)
- Inconsistencies in urgent care provision, depending on time of day and geographical location, have also been identified as a significant challenge across primary and community care settings (32)
- Some individuals are more likely to require urgent or emergency care due to risk factors such as age, frailty, long-term conditions, other vulnerabilities, or the impact of health inequalities. (13)

Urgent care definition

- Internationally, the terms "emergency" and "urgent care" are often used interchangeably. This can lead to misunderstandings among both healthcare professionals and the public which may hinder individuals from accessing the most appropriate service promptly. To address this in Wales, clear definitions have been determined:
  - Urgent care: means health and wellbeing issues that may result in significant or permanent harm if not dealt with within the next 8 hours.
  - Emergency care: means health and wellbeing issues that may result in significant or permanent harm or death if not dealt with immediately. (13)

Urgent care models in Wales

- In 2022, Welsh Government launched the *Six Goals for Urgent and Emergency Care Programme*, setting out the priorities for urgent and emergency care to ensure that patients get the right care, in the right place, first time (13)
- It outlines the expectations for health, social care, independent and third sector organisations to provide timely and appropriate care, ensuring individuals receive the right care, in the right place, the first time for physical and mental health (13)
- Under the joint leadership of the Strategic Programme for Primary Care and *Six Goals for Urgent and Emergency Care Programme*, Urgent Primary Care Centres (UPCCs) have been established to offer rapid assessment and treatment for urgent primary care needs (within eight hours of contact) without a conventional GP appointment or ED visit (13, 32). The goal is to ensure locally delivered, coordinated care that is consistent across different organisations (32)

- This approach aligns with the commitments of A Healthier Wales (2018), the Workforce Strategy for Health and Social Care (2020), the Programme for Government (2021), the Primary Care model for Wales and the National Clinical Framework (2021). (13)

Figure 2: Six goals for urgent and emergency care (13)

6.1.2. Evidence on effectiveness

We reviewed evidence on six urgent primary care model components/ interventions: task shifting, access to radiology, digital triage, redirection, UCCs, and VUC. Each component showed potential to improve service delivery, though findings varied by context, population, and implementation.

Task shifting

We found that shifting tasks from GPs to nurse practitioners (NPs) or ANPs can be safe and effective when supported by clear protocols and supervision. Studies showed similar or better protocol adherence and patient satisfaction for NPs compared to GPs, with no significant increase in adverse events or unplanned recontacts. However, cost-effectiveness varied depending on pricing models, and evidence on service impact was mixed. While NPs referred more patients to EDs and prescribed fewer medications, they also demonstrated higher rates of appropriate prescribing. These findings suggest that task shifting can support workforce capacity and maintain care quality, but its impact on costs and service use depends on team composition and training.

Access to radiology

One high-quality study showed that giving GPs access to radiology during out-of-hours care reduced ED referrals from 100% to around 39%, without compromising clinical appropriateness. However, the

study was based in the Netherlands, and differences in healthcare systems limit its direct relevance to Wales. Implementing similar access in Wales would require consideration of radiology capacity, workforce availability, and local infrastructure.

Decision-support tool: Digital triage system

Digital and telephone triage systems showed trade-offs between safety, efficiency, and patient experience. Online services were cheaper per contact and associated with fewer emergency service recontacts but had lower patient compliance and satisfaction compared to telephone services. Triage accuracy varied across tools and roles, with some systems prioritising sensitivity (avoiding missed urgent cases) and others favouring specificity (reducing unnecessary referrals). These findings highlight the need to balance safety and efficiency when designing triage systems for Wales.

Decision-support tool: Redirection

A single study found that physician-led redirection from EDs to out-of-hours GP clinics was generally safe and acceptable to patients, with high compliance and low recontact rates. However, satisfaction depended on the availability of diagnostics and specialist care. The study's limitations and single-centre design mean further research is needed to assess whether redirection would be feasible and effective in the Welsh context.

Introducing an Urgent care centre

Evidence suggests that UCCs can reduce ED demand, improve patient flow, and deliver care more efficiently, particularly for low-acuity cases. Some studies reported cost savings and shorter waiting times, while others highlighted improved patient satisfaction linked to timely assessment and communication. However, most studies were conducted outside the UK, and differences in service models and patient behaviour limit their applicability to Wales. Further evaluation is needed to understand how UCCs might perform locally.

Virtual urgent care (VUC)

VUC models, including video triage, showed promise in reducing unnecessary in-person consultations and promoting self-care. One study found that video-supported triage led to fewer follow-up contacts and greater use of patients' own GPs. Another reported high patient satisfaction and lower costs when VUC avoided ED referrals. However, VUC users referred to ED had longer hospital stays, suggesting the need for careful triage and follow-up planning. As all studies were conducted outside Wales, further research is needed to assess feasibility, equity, and effectiveness in the Welsh context.

6.2. Strengths and limitations

We found that the studies varied widely in design and were almost all non-randomised. Most had short study periods that were too brief to assess the impact of the intervention. Many were carried out at single sites, which limited generalisability. We also found that differences in outcome measures made it difficult to compare results across studies.

We found that many included studies used real-world data and often involved large or representative samples, which helped improve the relevance of their findings. Several studies used objective data

from medical or service records and applied methods to reduce bias, such as random sampling or adjusting for confounding factors. Some studies also reported precise estimates and used validated tools. However, only a small number of studies were directly applicable to Wales. Six studies were conducted in England, which may offer some contextual relevance. In contrast, most studies were carried out in other countries, including the Netherlands (n=4), Belgium (n=3), Denmark (n=2), and one each from Canada, the USA, Germany, Portugal, France, Australia, and Sweden. These settings differ in healthcare systems, service models, and population characteristics, which limits how confidently we can apply their findings to the Welsh context. We also found that confounding was common and often not fully addressed. Several studies lacked statistical comparisons or did not report precision, which reduces confidence in their findings. Selection bias and missing data were frequent issues, especially in studies with low response rates or unclear sampling. Some studies were underpowered, and others relied on subjective assessments without checking for consistency between reviewers. A number of studies lacked control groups or used only descriptive analysis, which limits how confidently we can interpret their results.

We used a rapid review approach and searched electronic databases, grey literature sources, and citation lists to find relevant studies. A pragmatic approach was taken when designing the main search strategy in Medline (Ovid), focusing on the key concept of the review question. This helped reduce irrelevant results unrelated to urgent care models and saved time during screening. However, this may have led to missing studies that evaluated specific components of a model. Because the search returned a large number of results, we limited the date range to exclude outcome data before 2015. While this helped manage the volume of evidence, it may have led to some relevant studies being missed or introduced bias.

Not all outcomes assessed in the included studies met our inclusion criteria, so we only extracted relevant outcomes. In some cases, the study design was unclear, or the paper was part of a larger service evaluation. To help us appraise these studies appropriately, a reviewer assessed the study design, and two reviewers critically appraised each study independently in duplicate, with study specific critical appraisal tools. However, these tools did not provide an overall quality rating. To support our judgement of study quality, one reviewer then used the information and critique captured in the critical appraisals to create a simplified overview and judgement of each studies quality, displayed in Appendix 9.1.2.

One reviewer screened titles and abstracts, while two reviewers carried out full-text screening, data extraction, and quality checks. We did not apply country limits, so the findings may not fully reflect the Welsh context.

6.3. Implications for practice, policy, and future research

The findings from this rapid review offer valuable insights for *Six Goals for Urgent and Emergency Care Programme* which aims to design and deliver a new model of urgent care for the population of Wales. It is crucial to consider the applicability of international evidence to the Welsh context, given the unique healthcare infrastructure, patient behaviours, and service models.

Urgent care model components such as task shifting, digital triage, access to diagnostics (radiology), redirection, introduction of UCCs, and virtual care can improve service efficiency, reduce ED demand, and maintain care quality when implemented with clear protocols, supervision, and appropriate triage. Policymakers should consider supporting multidisciplinary teams, investing in diagnostic access, and ensuring digital and virtual services are inclusive and responsive to patient needs. Public awareness and education are essential to improve uptake of alternative urgent care options. Service design must balance safety and efficiency, with careful attention to training, communication, and equity across different population groups.

Further research is needed to evaluate these interventions in the Welsh context, considering differences in infrastructure, workforce, and patient behaviour. Studies should explore long-term cost impacts, equity of access, and effectiveness across diverse populations. Robust, multi-site evaluations using standardised outcome measures and controlling for confounders will strengthen the evidence base. Research should also assess how digital and virtual models affect underserved groups and whether alternative staffing models can safely deliver urgent care without compromising quality or patient experience.

7. Conclusions

We found that several urgent care models such as task shifting, digital triage, access to diagnostics, redirection, UCCs, and VUC can improve service delivery and reduce pressure on EDs. Task shifting from GPs to NPs appears safe and effective when supported by clear protocols and supervision, though its impact on costs and service use varies. Digital and telephone triage systems offer different strengths, with online services being cheaper but less trusted by patients. Giving GPs access to radiology may reduce unnecessary ED referrals, and redirection from EDs to out-of-hours GP clinics can be safe and acceptable. UCCs and virtual care models show promise in improving efficiency and patient satisfaction, but most evidence comes from outside Wales. We found that study quality varied, with many studies limited by short timeframes, small samples, or lack of statistical testing. While the findings suggest that these models can support more efficient and patient-centred urgent care, further high-quality research is needed to understand how they would work in the Welsh context.

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9. Table of abbreviations

Abbreviation	Full version
A&E	Accident and Emergency
AHRQ	Agency for Healthcare Research and Quality
AIRR	Adjusted Incidence Rate Ratios
ANP	Advanced Nurse Practitioner
APP	Advanced Physiotherapy Practitioner
CADTH	Canadian Agency for Drugs and Technologies in Health
CASP	Critical Appraisal Skills Programme
CI	Confidence Interval
DHSC	The Department of Health and Social Care
ED	Emergency Department
ENP	Emergency Nurse Practitioner
EPPI	Evidence for Policy and Practice Co-ordinating Centre
GP	General Practitioner
GPC	General Practitioner Cooperative
HIQA	Health Information and Quality Authority
HTA	Health Technology Assessment
HTW	Health Technology Wales
IQR	Interquartile Range
JBI	The Joanna Briggs Institute
NICE	The National Institute for Health and Care Excellence
NIHR	National Institute for Health Research
NP	Nurse Practitioner
OOH	Out of Hours
OR	Odds Ratio
RR	Relative Risk
SD	Standard Deviation
SIGN	The Scottish Intercollegiate Guidelines Network
UCC	Urgent Care Centre
UTC	Urgent Treatment Centre
VUC	Virtual Urgent Care
WIC	Walk-in Clinic

10. Additional information

10.1. Supplementary information/ Appendices

10.1.1. Search strategies

Ovid MEDLINE(R) ALL <1946 to May 07, 2025>		
1	((Urgent or acute or rapid access) adj5 (primary or GP or general practi*) adj5 (model* or system* or service* or framework* or program*)).ti,ab.	618
2	(Same-Day Urgent Care adj5 (primary or GP or general practi*) adj5 (model* or system* or service* or framework* or program*)).ti,ab.	0
3	(OOH-PC adj10 (model* or system* or service* or framework* or program*)).ti,ab.	16
4	(Out of* hours adj5 (primary or GP or general practi*) adj5 (model* or system* or service* or framework* or program*)).ti,ab.	355
5	(after hours adj5 (primary or GP or general practi*) adj5 (model* or system* or service* or framework* or program*)).ti,ab.	44
6	(See and* Treat adj5 (primary or GP or general practi*) adj5 (model* or system* or service* or framework* or program*)).ti,ab.	2
7	("24/7" adj5 (primary or GP or general practi*) adj5 (model* or system* or service* or framework* or program*)).ti,ab.	10
8	(Walk-in adj5 (primary or GP or general practi*) adj5 (model* or system* or service* or framework* or program*)).ti,ab.	19
9	or/1-8	1038
10	(canterbury adj (model or system)).ti,ab.	1
11	Primary Health Care/og [Organization & Administration]	16857
12	exp General Practice/og [Organization & Administration]	6717
13	11 or 12	22405
14	exp After-Hours Care/og [Organization & Administration]	453
15	13 and 14	153
16	9 or 10 or 15	1156
17	limit 16 to english language	1097

Embase <1974 to 2025 Week 18>		
1	((Urgent or acute or rapid access) adj5 (primary or GP or general practi*) adj5 (model* or system* or service* or framework* or program*)).ti,ab.	866
2	(Same-Day Urgent Care adj5 (primary or GP or general practi*) adj5 (model* or system* or service* or framework* or program*)).ti,ab.	0
3	(OOH-PC adj10 (model* or system* or service* or framework* or program*)).ti,ab.	13
4	(Out of* hours adj5 (primary or GP or general practi*) adj5 (model* or system* or service* or framework* or program*)).ti,ab.	439
5	(after hours adj5 (primary or GP or general practi*) adj5 (model* or system* or service* or framework* or program*)).ti,ab.	59
6	(See and* Treat adj5 (primary or GP or general practi*) adj5 (model* or system* or service*	2

	or framework* or program*)).ti,ab.	
7	("24/7" adj5 (primary or GP or general practi*) adj5 (model* or system* or service* or framework* or program*)).ti,ab.	27
8	(Walk-in adj5 (primary or GP or general practi*) adj5 (model* or system* or service* or framework* or program*)).ti,ab.	29
9	or/1-8	1406
10	(canterbury adj (model or system)).ti,ab.	1
11	exp primary health care/ or general practice/	301580
12	out-of-hours care/	722
13	"organization and management"/	431507
14	11 and 12 and 13	31
15	9 or 10 or 14	1428
16	limit 15 to english language	1350

Scopus
(TITLE-ABS ((canterbury) W/0 (model OR system) W/5 (primary OR gp OR "general practi*"))) OR (TITLE-ABS (("Walk-in") W/5 (primary OR gp OR "general practi*") W/5 (model* OR system* OR service* OR framework* OR program*))) OR (TITLE-ABS (("24/7") W/5 (primary OR gp OR "general practi*") W/5 (model* OR system* OR service* OR framework* OR program*))) OR (TITLE-ABS (("See and Treat") W/5 (primary OR gp OR "general practi*") W/5 (model* OR system* OR service* OR framework* OR program*))) OR (TITLE-ABS (("after hours") W/5 (primary OR gp OR "general practi*") W/5 (model* OR system* OR service* OR framework* OR program*))) OR (TITLE-ABS (("Out of hours") W/5 (primary OR gp OR "general practi*") W/5 (model* OR system* OR service* OR framework* OR program*))) OR (TITLE-ABS (("OOH-PC") W/10 (model* OR system* OR service* OR framework* OR program*))) OR (TITLE-ABS (("Same-Day Urgent Care") W/5 (primary OR gp OR "general practi*") W/5 (model* OR system* OR service* OR framework* OR program*))) OR (TITLE-ABS ((urgent OR acute OR "rapid access") W/5 (primary OR gp OR "general practi*") W/5 (model* OR system* OR service* OR framework* OR program*))) AND (LIMIT-TO (LANGUAGE , "English"))

10.1.2. Critical appraisal summary of included studies

Study Reference - outcome[1]	Sample and sampling					Data collection		Statistical analysis			Other	Design
	General[3]	Size[4]	Frame[5]	Unbiased[6]	Power[7]	Objective[8]	Unbiased[9]	Tests[10]	Precision[11]	Unbiased[12]		
1. Task-shifting												
Collins (43)- EMR[2]	☑ - rE	☑☑	☑	?	?	☑	?	☒	☒	☒ - C	☒ - Partial descriptives	CS
Collins (43)- MRA[2]	☑ - rE	☑	☑	?	?	☒	?	☒	☒	☒ - C	☒ - Partial descriptives	CS
McDonough (51)[2]	①	☑☑	☑	☑	?	☑	?	☒	☒	☒ - C	-	CS
van der Biezen (63)	①	☑☑	☑	☑	?	☑	☒	☑	☑	☑	☒ - Allocation bias ☒ - Direct costs only	QE
Smits (61)- MRA	☒	☑	?	?	☒	☑	☒	☑	☒	☒ - Cl	☑ - Control group	QE
Smits (61)- GP-RR	☒	☑	?	?	☒	☒	☒	☑	☒	☒ - Cl	☑ - Control group	QE
Smits (61)- PES	☒	☑	?	?	☒	☒	☒	☑	☑	☒ - Cl	☑ - Control group	QE
2. Access to radiology												
Rutten (18)	☒	☑	☒	☒	?	☑	☑	☑	☒	☒ - C, Cl	-	Coh
3. Decision support tool: Digital triage system												
Graversen (49)- MRA	☒	-	☑	?	☒	☒	☒	☑	☑	☒ - C, CL	-	CS
Graversen (49)- TA	☒	-	☑	?	-	☒	☒	☑ - SS	☑	☒ - C, CL	-	Di
Erkelens (45)	☑ - Ne	☑☑	☑	☑	-	☑	?	☑ - SS	☑	☑	-	CS
Schoenmakers (58)	☒	☑	☒	☒	?	☒	?	☑	☑	☑	-	CS
Brasseur (42)	☒	☑☑☑	☑	?	-	☑	☑	☑ - SS	☑	☒ - C	☒ - Inflated agreement	Di

Sexton (28)[2]	©	☑☑☑	☑	☑	-	☑	☑	☑ - SS	☒	☑	-	Di
Sen (59) - CD[2]	☑ - uE	☑☑	☒	?	?	☑	☑	☑	☒	☒ - C	☒ - No control group	QE
Sen (59)- LSCD[2]	☑ - uE	?	☒	?	-	☑	☑	☒	☒	☒ - C	☒ - No control group ☒ - Partial descriptives	QE
Goiana Da Silva (48)	☒	☑	☒	☒	?	?	?	☒	☒	☒ - C	☒ - No control group ☒ - Partial descriptives	CS
Gilbert (47)	☒	☑	☒	☒	-	☒	?	☑ - SS	☑	☒ - C, Cl	☒ - Scenarios only ☒ - Inflated agreement	Di
Turner (29)- CS[2]	☒	☑☑	☒	☒	?	☒	?	☑	☒	☑	-	CS
Turner (29)- QE[2]	☒	☑☑☑☑	☒	☒	?	☑	☑	☑	☑	☒ - C	☒ - No control group ☒ - Advised data only ☒ - Variable by area	QE
Turner (29)- EE[2]	☒	☑☑	-	☒	-	☑	☑	☑	☑	☒	☒ - 7 day costs only ☒ - No patient outcomes/experience	EE
Turner (29)- Qual[2]	☒	☑	-	☒	-	-	☑	-	-	-	☑ Topic Guide ☑ Framework analysis ☒ Limited reflexivity ☒ Single transcript coder	Qual
4. Decision support tool: redirection												
Morin (54)	①	☑	☑	☒	☑	☒	?	☒	☒	☒ - C	-	CS
5. Introducing an urgent care centre												

UEC survey (44)[2]	☒	☑☑☑	☑	☒	?	☒	☑	☒	☒	☑	☒ February ☒ Not co-op run UCs	CS
Bessert (41)	①	☑☑	☒	?	?	☑	☑	☑	☑	☒ - C	☒ - No control group	QE
Barzin (21)	①	☑☑☑	?	?	?	☑	?	☒	☒	☒ - C	☒ - Projected data only	CS
Payne (56)	①	☑	☒	☒	?	☒	☒	☑	☒	☒ - C	-	CS
Raidla (57)	①	☑	☒	☒	☑	☑	?	☑	☒	☒ - C	-	QE
6. Virtual urgent care												
Nebsbjerg (55)	☑ - De	☑☑☑☑	☑	☑	?	☑	☑	☑	☑	☑	☒ - Allocation bias	Coh
McLeod (53)	©	☑☑	☒	-	?	☑	☑	☒	☒	? - RC	-	nCC

Footnotes and abbreviations: White - = not relevant; Blue = unknown or not reported; 1. Orange indicates a strength or a strong overall quality evidence recommended for making decisions, Pink indicates a limitation or a limited overall quality evidence to interpret with caution; 2. indicates if a study is applicable to Wales based on being in the UK NHS; 3.☑ indicates sample generalisable to population, ☒ indicates unrepresentative sample i.e. selection or non-response bias, © indicates data collection during COVID, ① indicates data from a single centre; 4.☑ indicates n<500, ☑☑ indicates n=500 to <10k, ☑☑☑ indicates n=10k to <1 million, ☑☑☑☑ indicates 1 million+ patients, GPs, nurses, calls, or contacts; 5.☑ indicates whole population or random sample, indicates non-random sample; 6.☑ indicates sample/population investigated and had no evidence of selection bias, ☒ indicates sample investigated and had evidence of selection bias, 7.☑indicates power was calculated and the sample used was sufficient, ☒ indicates power was calculated and the sample used was under-powered; 8.☑ indicates objective data from registry, patient, service, or call records, ☒indicates subjective data from audit data or self-report; 9.☑ indicates adequate measurements , ☒ indicates bias in measures e.g. non-response , social desirability, recall, differential missingness, or error; 10.☑ indicates statistical testing of differences between groups was performed, ☒indicates no statistical testing of comparisons so reported differences may not be reliable ; 11.☑ indicates that precision of differences are reported e.g. 95% confidence interval, ☒indicates estimates have no precision reported leaving uncertainty ; 12.☑ indicates sources of bias have been accounted for e.g. confounding or clustering of data, ☒indicates sources of bias could explain differences reported; C = Confounding; CD = call data; Cl = Clustering; Co = Cohort; De = Denmark; Di = Diagnostic; EE = Economic Evaluation; EMR = Electronic Medical Records; LSCD = Linked secondary care data; MRA = Medical record audit; nCC = Nested case-control; Ne = The Netherlands; PES = Patient experience survey; QE = Quasi-experimental; Qual = Qualitative; rE = Rural England; SS = Sensitivity & specificity; TA = Triage accuracy; uE = Urban England; UEC - Urgent and emergency care

10.1.3. Data extraction

Citation Country Study design Study aim/ research question Data collection period Model Service Hours	Model component description Note: Where applicable, only data meeting the inclusion criteria of this rapid review were included and are reported below.	Outcome Results
Access to radiology		
Rutten 2018 (18) Netherlands Cohort study To examine the effect of radiology access by the GPC on the provided care and patient flows. April 2014 to October 2015 Hospital Parallel	A prospective observational record review study was conducted among all patients referred for conventional radiology due to trauma by one of five general practitioner cooperatives (GPCs) between April 2014 and October 2015 in the Netherlands. The study encompassed **three organisational models of radiology access: unlimited access, partial access, and no direct access.** **Organisation A:** No access to radiology by GPC from April–July 2014. And referral to the ED necessary. From June–September 2015, it had limited access to radiology. GPC access to conventional radiology on weekdays and during weekends and public holidays, with nightly exclusion. Analysis under responsibility of the radiologist in an associated hospital elsewhere. Outside these hours referral to the ED for conventional radiology is necessary.	**Efficiency: Service impact** Referral rates: The radiological examination was requested for 84.5% on a strict medical indication, in 4.3% on demand of the patient and in 11.2% for both reasons. **Referral to Emergency Department (ED)** **No Access**: 100% of patients (226) were referred to the ED. **Limited Access**: 38.4% (118 of 307) were referred. **Unlimited Access**: 39.4% (47 of 119) were referred. **Total:** 60.5% (391 of 646) were referred. Follow-up **ED Follow-up**: No Access: 100% (224) Limited Access: 38% (104) Unlimited Access: 39.8% (43) Total: 60.5% (371) **Hospital Follow-up**: No Access: 63.8% (143) Limited Access: 90.4% (94)

Citation Country Study design Study aim/ research question Data collection period Model Service Hours	Model component description Note: Where applicable, only data meeting the inclusion criteria of this rapid review were included and are reported below.	Outcome Results
Services Service hours: variable between the 5 GPCs (see description)	**Organisation B:** No access to radiology by GPC from October–December 2014. And referral to the ED necessary. **Organisation C**: GPC had Limited access to conventional radiology during weekends and public holidays only, possibilities between 11:00–12:00 and 17:00–18:00 from December 2014–April 2015). Analysis under responsibility of the hospital radiologist. Outside these hours referral to the ED for conventional radiology is necessary. **Organisation D**: from May–June 2015 had GPC on the premises of the hospital with no ECAP. GPC access to conventional radiology on weekdays between 17:00 and 20:00 and during weekends and public holidays between 10:00 and 20:00. Analysis under responsibility of the hospital radiologist. Outside these hours referral to the ED for conventional radiology is necessary. **Organisation E**: from July–October 2015. had Unlimited access by the GPC during their opening hours. Analysis under responsibility of the hospital radiologist.	Unlimited Access: 93% (40) Total: 74.7% (227) **No Follow-up**: No Access: 20.1% (45) Limited Access: 6.7% (7) Unlimited Access: 4.7% (2) Total: 14.6% (54) **Registered GP (if needed)**: No Access: 16.1% (36) Limited Access: 2.9% (3) Unlimited Access: 2.3% (1) Total: 10.8% (40)
Decision support tool: Digital triage system		
Brasseur 2021 (42) Belgium	Telephone triage tool for out-of-hours primary care calls: **the SALOMON algorithm.**	**Efficiency: Triage accuracy and appropriateness** Sensitivity and specificity of the SALOMON algorithm to predict the need for ED care was 76.6% (95% CI: 75.6–77.6) and 98.3% (95% CI: 97.9– 98.6) respectively, with

Citation Country Study design Study aim/ research question Data collection period Model Service Hours	Model component description Note: Where applicable, only data meeting the inclusion criteria of this rapid review were included and are reported below.	Outcome Results
Diagnostic study To evaluate the reliability and criterion validity in real-life settings of the SALOMON triage algorithm 2011 to 2016 Community Advanced Services 7 days a week, from 10 pm to 7 am	The SALOMON telephone triage system was implemented in the Liège region of Belgium in 2011 to standardise out-of-hours primary care (OOH-PC) call management. Prior to its introduction, primary care physicians (PCPs) individually managed urgent care calls in their local areas. With SALOMON, all OOH-PC calls were redirected to a central nurse-led triage centre located at the University Hospital of Liège (CHU Liège). The SALOMON algorithm consisted of 54 flowcharts based on common adult and paediatric complaints, developed by a multidisciplinary team of ED physicians, PCPs, and triage nurses. Nurses used these flowcharts to assign patients to one of four triage categories, based on urgency and care setting: immediate or delayed referral to either emergency or primary care services. This retrospective study covered a five-year period (2011 to 2016) and included calls from rural, suburban, and urban areas across the Liège Province. Ten emergency care nurses, trained through a structured programme (24 hours theoretical, 8 hours practical, and 8 hours residency at the 112 dispatch centre), conducted the triage. Nurses could consult ED physicians when triage decisions were complex. The	a 85.5% (95% CI: 85.2–86.3) positive-predictive value and 96.9% (95% CI: 96.6– 97.3) negative-predictive value. Those results are depicted in Table 5. For the paediatric population, sensitivity and specificity were 56.9% (95% CI: 53.9 – 59.7) and 97.1% (95% CI: 96.1–98.1), respectively.

Citation Country Study design Study aim/ research question Data collection period Model Service Hours	Model component description Note: Where applicable, only data meeting the inclusion criteria of this rapid review were included and are reported below.	Outcome Results
	triage centre coordinated care across eight of the region's 13 EDs.	
Erkelens 2020, Erkelens 2019 (45, 46) Netherlands Cross-sectional study To determine the accuracy of the Netherlands Triage Standard (NTS) urgency allocation in patients calling the OHS-PC with symptoms suggestive of TIA or stroke, with presence or absence of the final clinical outcomes TIA,	Telephone triage tool at Dutch out-of-hours primary care services (OOHS-PC): The **Netherlands Triage Standard (NTS)**. A cross-sectional study was conducted using real-life telephone triage recordings from nine out-of-hours primary care (OHS-PC) locations near Utrecht, the Netherlands, between 2014 and 2016. These services covered approximately 1.5 million people and handled around 400,000 triage calls annually. Triage was conducted using the Netherlands Triage System (NTS), which began with a mandatory ABCD check (airway, breathing, circulation, disability). Life-threatening cases triggered immediate ambulance dispatch. For other cases, triage nurses selected one of 56 main complaints, each linked to a structured algorithm of hierarchically ordered questions. The NTS automatically generated an urgency level (U0–U5) based on patient responses, indicating the required response time. Triage nurses could override the assigned urgency level, typically after consulting a	**Efficiency: Triage accuracy and appropriateness** Accuracy of the NTS urgency and TIA/stroke, or TIA/ stroke/other LTEs as the reference: The sensitivity of the NTS for allocating a high urgency to patients with TIA/stroke was 0.71 (95% CI 0.68– 0.75), and for patients with TIA/stroke/other LTEs 0.72 (0.68–0.75). The specificity was 0.46 (0.42–0.50) and 0.48 (0.43–0.52), respectively. The positive and negative predictive values were 0.41 (0.38–0.43) and 0.75 (0.72– 0.78) for TIA/stroke, and 0.62 (0.60–0.64) and 0.58 (0.54–0.62) for TIA/stroke/other LTEs, respectively. Accuracy of the final urgency (including overruling) and TIA/stroke, or TIA/stroke/other LTEs as the reference: The sensitivity of the final urgency allocation for allocating a high urgency to patients with TIA/stroke was 0.86 (0.84–0.89), and for TIA/stroke/other LTEs 0.86 (0.83– 0.89). The specificity was 0.38 (0.34–0.42) and 0.40 (0.36–0.44), respectively. The positive and negative predictive values for TIA/stroke were 0.42 (0.40–0.44) and 0.84 (0.81–0.87), respectively, and for TIA/stroke/other LTEs 0.63 (0.62–0.65) and 0.70 (0.66–0.74), respectively.

Citation Country Study design Study aim/ research question Data collection period Model Service Hours	Model component description Note: Where applicable, only data meeting the inclusion criteria of this rapid review were included and are reported below.	Outcome Results
stroke and other (neurologic) life-threatening events (LTEs) as the reference. 2014 to 2016 Community Advanced Services Evenings, nights and weekends	supervising GP. Although reasons for overrides could be recorded, this was not mandatory within the system.	
Gilbert 2022 (47) Belgium Diagnostic study To investigate the usability of this self-triage prototype assessing the	Self-triage platform (application): **ODISSEE**. The ODISSEE platform is a French-language interactive mobile application designed to support patient self-triage and guide users to the most appropriate level of care. It was developed using the SALOMON triage algorithms, previously validated in hospital settings for out-of-hours primary care. The app featured 18 icons representing common unscheduled care conditions. Users selected the icon	**Efficiency: Triage accuracy and appropriateness** 1. Level of Care Classification (N = 750) for Emergency vs Primary care: Sensitivity: 0.97 (95% CI: 0.95–0.98) Specificity: 0.69 (95% CI: 0.64–0.74) Positive Predictive Value (PPV): 0.82 (95% CI: 0.79–0.85) Negative Predictive Value (NPV): 0.94 (95% CI: 0.90–0.97) % Agreement: 85.6% Fleiss' Kappa: 0.687 (95% CI: 0.604–0.779) 2. Level of Urgency Classification (n = 642) for Emergency Care (n = 432):

Citation Country Study design Study aim/ research question Data collection period Model Service Hours	Model component description Note: Where applicable, only data meeting the inclusion criteria of this rapid review were included and are reported below.	Outcome Results
ODISSEE accuracy using simulated clinical case scenarios and exploring whether potential patient characteristics could favourably or negatively affect the tool's performance. Unclear Community Advanced Services Not applicable	matching their symptoms and were guided through algorithmic flowcharts to receive one of four referral outcomes, based on two levels of care (emergency vs. primary care) and two levels of urgency: – **Emergency Level 1**: Emergency Medical Services (The patient is advised to immediately contact the 112-dispatching center) – **Emergency Level 2**: ED Referred Consultation (The patient is advised to attend an Emergency Department) – **Primary Care Level 1**: Immediate GP Visit (The patient is advised to call the primary care physician on duty) – **Primary Care Level 2**: Delayed GP Visit (The patient is advised to schedule a consultation in a primary care facility) A prospective preliminary study was conducted at the University Hospital Center of Liège to assess the platform's triage accuracy. A total of 100 clinical case scenarios, covering all algorithms, were developed by a multidisciplinary team of emergency physicians, GPs, and nurses. Each scenario included relevant clinical details and, where necessary, images (e.g., rashes or wounds). Of the 100 scenarios, 62% were categorised as requiring emergency care (60% Emergency Level 1; 40%	Sensitivity: 0.83 (95% CI: 0.78–0.87) Specificity: 0.72 (95% CI: 0.65–0.79) PPV: 0.81 (95% CI: 0.76–0.86) NPV: 0.74 (95% CI: 0.67–0.81) % Agreement: 78.7% Fleiss' Kappa: 0.552 (95% CI: 0.446–0.659) 3. Level of Urgency Classification (n = 642) for Primary Care (n = 210): Sensitivity: 0.91 (95% CI: 0.85–0.95) Specificity: 0.65 (95% CI: 0.53–0.76) PPV: 0.83 (95% CI: 0.77–0.89) NPV: 0.80 (95% CI: 0.67–0.89) % Agreement: 82.4% Fleiss' Kappa: 0.583 (95% CI: 0.399–0.768)

Citation Country Study design Study aim/ research question Data collection period Model Service Hours	Model component description Note: Where applicable, only data meeting the inclusion criteria of this rapid review were included and are reported below.	Outcome Results
	Emergency Level 2), and 38% as primary care (68% Primary Care Level 1; 32% Primary Care Level 2).	
Goiana-da-Silva 2024 (48) Portugal Cross-sectional study This is a service evaluation of a pilot 'Call first, save lives', consisting of two phases. 24 May 2023 to Mar 2024 Community Advanced Services 24/7 for clinical	Telephone triage: **SNS 24**. In January 2024, hospital and primary care services (PCS) in Póvoa de Varzim and Vila do Conde, Portugal, were integrated into a single organisational structure - the Local Health Unit (LHU) - as part of a planned transition initiated in 2023. A pilot project, *"Call First, Save Lives"* (*"Ligue Antes, Salve Vidas"*), was launched to promote the use of the national health helpline (SNS 24), aiming to improve timely access to appropriate care, reduce unnecessary emergency department (ED) use, and enhance health outcomes. The project was led by the Executive Board of the Portuguese National Health Service (DE-SNS), in collaboration with the Ministry of Health's Shared Services (SPMS) and local government partners. **Phase 1** (24 May 2023 to 15 January 2024) focused on strategic planning and implementation of key measures, including: – A *reverse referral protocol* allowing EDs to redirect low-urgency adult patients (18+) to PCS.	**Efficiency: Service impact** First phase impact on ED Admissions: General ED: -Non-referred episodes decreased by 16 percentage points (from 58.7% to 43.2%). -Referrals via SNS 24 increased from 9% to 25%. Paediatric ED (reverse protocol not implemented): Non-referred episodes decreased by 14 percentage points (from 87.9% to 74.0%). Referrals via SNS 24 increased from 7% to 20%. Second phase: -In Gaia/Espinho ED:Early weeks showed a decline in non-referred ED episodes compared to the previous year. By end of March: Referrals to General ED increased from 37.7% to 70%. Referrals to Paediatric ED increased from 20% to 67%. A reverse referral protocol was already in place. Integration challenges with Primary Care Services (PCS) were noted as a barrier. -In Entre Douro e Vouga ED: Observed a 53 percentage point reduction in non-referred ED episodes shortly after project implementation.

Citation Country Study design Study aim/ research question Data collection period Model Service Hours	Model component description Note: Where applicable, only data meeting the inclusion criteria of this rapid review were included and are reported below.	Outcome Results
support; administrative support is available daily from 8 am to 10 pm	– Direct appointment booking by SNS 24 into primary care systems. – Remote issuance of self-certified sick leave. – Improved access to acute primary care. **Phase 2** (from 16 January 2024) introduced new legislation mandating that patients triaged as green or blue under the Manchester Triage System - unless medically excluded - be referred from the ED to PCS for a scheduled consultation within 24 hours. This replaced the previous voluntary referral model with a compulsory framework, ensuring timely care within the NHS. In both phases, the reverse referral protocol was applied only in the general ED of the LHU. Phase 3 (planned to start in April 2024 and is not covered by this report.	
Graversen 2020 (49) Denmark Cross-sectional study	Study conducted in two OOH-PC services in Central Demark region. One was a **GP-led telephone triage** (GPC), and the other the medical helpline 1813 (**MH-1813**), where triage is performed by registered nurses **with a computerised decision support system (CDSS)** and physicians with different medical specialities. Three	**Effectiveness: Safety** Nurses vs GPs: Nurses had a significantly lower risk of poor quality for four items: Asks to speak to the patient: RR = 0.71 (95% CI: 0.51–0.98), P = 0.04 Identifies problems: RR = 0.61 (95% CI: 0.47–0.80), P = 0.001 Asks essential questions: RR = 0.77 (95% CI: 0.63–0.94) Asks about medical history: RR = 0.74 (95% CI: 0.59–0.93), P = 0.01

Citation Country Study design Study aim/ research question Data collection period Model Service Hours	Model component description Note: Where applicable, only data meeting the inclusion criteria of this rapid review were included and are reported below.	Outcome Results
To explore and compare safety, efficiency, and health-related quality of two different telephone triage models in out-of hours primary care (OOH-PC) services performed by general practitioners (GPs), nurses using a computerised decision support system (CDSS), or physicians with different medical specialities. Nov to Dec 2016	groups were examined: GPC, Nurses MH-1813 and Physicians MH-1813. A natural quasi-experimental study was conducted in two out-of-hours primary care (OOH-PC) services in Denmark: the GP-led telephone triage service in the Central Denmark Region and the Medical Helpline 1813 (MH-1813) in the Capital Region. MH-1813 was established in January 2014 and used registered nurses supported by a computerised decision support system (CDSS), with the option to redirect calls to physicians from various specialties. All triage nurses at MH-1813 held a 3.5-year professional bachelor's degree in nursing and completed a six-week induction course. Regular audits of nurse calls were conducted. Physicians at MH-1813 included a mix of specialties and experience levels, with only a minority being GPs. The CDSS was available to physicians but not mandatory. Both services operated outside office hours (weekdays 4 PM–8 AM, weekends and holidays 24 hours), offering telephone consultations, clinic visits, and home visits. MH-1813 operated 24/7, but only out-of-hours calls were included in the study to align with GPC hours. All	For four items the adjusted RR of poor quality was significantly lower for nurses compared with GPs: "asks to speak to patient" (RR = 0.71 (0.51–0.98)* P = 0.04, "identifies problems" (RR = 0.61 (0.47–0.80)* P = 0.001, "asks essential questions" (RR = 0.77, 95% CI: 0.63–0.94), and "asks about medical history" (RR = 0.74 (0.59–0.93)* P = 0.01. Physicians vs. GPs: Physicians had a significantly higher risk of poor quality for three items: Prioritises problems appropriately: RR = 1.28 (95% CI: 1.05–1.57), P = 0.02 Asks all essential questions: RR = 1.20 (95% CI: 1.01–1.42), P = 0.04 Gives relevant self-care advice: RR = 1.30 (95% CI: 1.03–1.64), P = 0.03 (Note: Asking about medical history and medications was not statistically significant: RR = 1.15, P = 0.09) Perceived Patient Safety: Physicians: Median score = 7 (10th–90th percentile: 2 to 10), P = 0.03 Nurses: Median score = 8 (10th–90th percentile: 3 to 10), P = 0.09 **Efficiency: Triage accuracy and appropriateness** Under-triage (clinically relevant cases missed): GPs: 7.3% under-triaged. Nurses: 3.7% of calls under-triaged. Significantly lower risk compared to GPs: aRR = 0.44 (95% CI: 0.24–0.80) Physicians: 6.1% under-triaged. No significant difference compared to GPs: aRR = 0.97 (95% CI: 0.56–1.67), P = 0.5 Over-triage (clinically non-relevant cases escalated): GPs: 4.3% over-triaged

Citation Country Study design Study aim/ research question Data collection period Model Service Hours	Model component description Note: Where applicable, only data meeting the inclusion criteria of this rapid review were included and are reported below.	Outcome Results
Community Advanced Services GPC: weekdays from 4 pm to 8 am, weekends/ national holidays: all day, and national holidays. MH-1813: 24 h/ per day, but for the study only calls outside office hours were included to match the GPC opening hours.	calls were audio-recorded and logged in administrative systems. Data on patient ethnicity, education, socio-economic status, and comorbidities were not available.	Nurses: 9.1% over-triaged. Significantly higher risk: aRR = 2.12 (95% CI: 1.01–4.48) Physicians: 8.2% over-triaged. Borderline significance: RR = 1.91 (95% CI: 0.99–3.71) Perceived Quality and Efficiency: Overall quality (median score, 10th–90th percentile): Nurses vs. GPs: 6 (2 to 9), P = 0.001 Physicians vs. GPs: 6 (2 to 9), P = 0.001 Overall efficiency: Nurses vs. GPs: 6 (2 to 9), P = 0.001 Physicians vs. GPs: 7 (2 to 10), P = 0.001
Schoenmakers 2021* (58) Belgium Cross-sectional study	**Introduction of an UCC, and OOH telephone line: 1733.** This cross-sectional study explored stakeholder views-patients, general practitioners, and emergency physicians - on the co-location of GPCs and EDs for unplanned care. Custom questionnaires were developed through a multi-stage process involving prior	**Patient experience: Acceptability** Support for co-location: 82.7% (n = 334) of patients favoured a co-location model. Main perceived advantages: Fast service: 25.7% Adequate referral: 13.4%

Citation Country Study design Study aim/ research question Data collection period Model Service Hours	Model component description Note: Where applicable, only data meeting the inclusion criteria of this rapid review were included and are reported below.	Outcome Results
What is the view of patients and physicians (GPs and emergency physicians) on the co-location of a GPC and an emergency service? 1st July and 31st December 2019 *This study utilised two model components: Digital triage system and Introducing an UCC. Hospital Parallel Services	research, expert consultation, and input from the federal 1733 taskforce and advisory board. Final versions were reviewed for feasibility and acceptability by the GPC field coordinator. Context: To address low-acuity use of emergency services and improve efficiency in general practitioner cooperatives (GPCs), Belgium introduced a nationwide number (1733) for unplanned, non-life-threatening out-of-hours care. Trained operators used digital algorithms and protocols - developed collaboratively by academic institutions, the Federal Public Service of Health, and experts in general practice and emergency medicine - to direct callers to appropriate care levels, including ambulance services, out-of-hours primary care, or planned care.	Perceived Benefits of Telephone Triage: Fast service: 26.7% Reassurance: 18.3% Advice: 12.9% Reduction in unnecessary transfers: 20.5% Perceived Disadvantages of Telephone Triage included risk of inadequate assessment due to: Lack of clinical examination: 30.4% Misinterpretation of symptoms: 12.4% Lack of access to patient records: 8.7% Patients supported mandatory referral if it reduced waiting times (i.e., Conditional Acceptance of Referral Requirement): 60.9% for GP care 71.5% for ED care For musculoskeletal issues or cutting wounds, most patients preferred ED: 76% and 75.7%, respectively 87.4% of patients expressed confidence in GP capabilities Factors Associated with Support for co-location: Preference for speaking to a physician over an operator OR = 0.93 (95% CI: 0.88–0.96)

Citation Country Study design Study aim/ research question Data collection period Model Service Hours	Model component description Note: Where applicable, only data meeting the inclusion criteria of this rapid review were included and are reported below.	Outcome Results
Unclear, perhaps same as ED		Younger age OR = 0.98 (95% CI: 0.98–0.99) Satisfaction with telephone advice OR = 1.25 (95% CI: 1.14–1.38) Agreement with no self-referral: GP: OR = 1.25 (95% CI: 1.15–1.37) and ED: OR = 1.11 (95% CI: 1.01–1.22)
Sen 2019 (59) UK (England) Quasi-experimental study To compare outcome of clinical advice given by emergency physicians (EPs) versus non-physician clinical advisors (NPCAs) on a UK National Health Service 111 centre. Pre-intervention	Regional NHS 111 call centres in Newcastle upon Tyne. This prospective observational service redesign study was conducted in the North East of England, focusing on NHS 111 call centres operated by the North East Ambulance Service in Newcastle upon Tyne. The region, with a population of 2.6 million, is served by nine emergency departments (EDs). NHS 111 calls were initially filtered through an interactive voice recording system, directing callers to appropriate services. Remaining calls were triaged by call handlers to dispositions such as 999, ED, or primary care. Calls requiring further assessment or where patients declined the disposition were escalated to Clinical Advisors via warm transfers or callbacks. As part of the redesign, a new clinical assessment service was introduced to review calls triaged as 'attend ED within 1 hour' or 'attend ED within 4 hours'. These calls exited the standard NHS Pathways protocol early and were assessed by either emergency physicians (EPs)	Effectiveness: Unplanned health service recontacts Recontact with 111 Service Within 24 Hours Recontact Rates for Emergency Physicians (EPs): 8.0% and Non-Physician Clinical Advisors (NPCAs): 8.8% Main Reasons for Recontact were: Enquiries about centre opening times Delays in transport Prescription collection issues Efficiency: Adherence/compliance When Emergency Physicians (EPs) acted as clinical advisors, 97% of patients complied with the advice given. Efficiency: Service impact Referral rates and disposition decisions: Baseline Year (Study Hours): Of 7,709 calls flagged as "refer to ED within 1 or 4 hours," 80.2% (6,182) were advised to attend the ED. Remaining callers were redirected to Minor Injury Units (MIUs), GP out-of-hours, or other services. Phase 1 for Emergency Physician (EP) Model: Of 1,558 ED-flagged calls passed to EPs, 25.4% (396) were advised to attend the ED. For NPCA Model: Of 1,048 ED-flagged calls passed to Non-Physician Clinical Advisors (NPCAs), 18.5% (194) were advised to attend the ED.

Citation Country Study design Study aim/ research question Data collection period Model Service Hours	Model component description Note: Where applicable, only data meeting the inclusion criteria of this rapid review were included and are reported below.	Outcome Results
period: July 2014 to June 2015 Post-intervention period: Phase 1= July 2016 to Nov 2016, Phase 2= Dec 2016 to February 2017 National Referral Service Study hours: Monday–Friday 18:00–22:00 and Saturday and Sunday 08:00–16:00	or non-physician clinical advisors (NPCAs). The intervention was implemented in two phases: Phase 1 (July–November 2016) used EPs, and Phase 2 (December 2016–February 2017) used NPCAs recruited from NHS 111 band 6/7 clinical advisors and advanced clinical practitioners. Study hours were Monday–Friday 18:00–22:00 and weekends 08:00–16:00, aligned with peak call volumes.	Disposition Differences: The alternative dispositions for these calls differed between advisor groups Self/Home Care was recommended by EPs: 38.1% and NPCAs: 15.7%. Difference: 22.4% (95% CI: 19.0–25.7) Out-of-Hours (OOH) Primary Care was recommended by EPs: 4.5% and NPCAs: 42.1%. Difference: 37.6% (95% CI: 34.3–40.8) EPs were more likely to refer to in-hour primary care, MIUs, walk-in centres, and encouraged use of own transport. **Efficiency: Waiting time** Target Achievement: 96% of calls flagged as 'Attend ED within 1 hour' met the target of clinician response within 15 minutes. 100% of 'Attend ED within 4 hours' calls met the 30-minute clinician response target. Call Duration: Post-intervention median call time: 23 minutes 45 seconds. Interquartile Range (IQR): 14:05–20:38 Pre-intervention average call time: 10 minutes 17 seconds. IQR: 09:46–11:36 Note: Call handling times were derived from performance logs tracking: Time call was received and answered, Duration of call handler triage, Time call exited to Clinical Assessment Service (CAS), Duration of clinician consultation 'Stack time' was used to measure the delay between call entry into CAS and the start of clinical consultation
Sexton 2025 (28) UK (England) Diagnostic study	Two-step triage system. Primary triage by non-clinicians using the **NHS Pathways digital triage software**. Secondary triage by clinicians using **digital triage software Odyssey**.	**Efficiency: Triage accuracy and appropriateness** Specificity (accuracy/ efficiency indicator) was greater in secondary triage than primary triage at all urgency levels. For example, at care within one hour, specificity was 65.4% and 97.7%, and PPV was 24.0% and 66.7.5%, in primary and secondary triage respectively.

Citation Country Study design Study aim/ research question Data collection period Model Service Hours	Model component description Note: Where applicable, only data meeting the inclusion criteria of this rapid review were included and are reported below.	Outcome Results
To compare the accuracy of primary and secondary triage as delivered within a two-step triage model. 1 April 2019 to 1 October 2020 National Referral Service Unclear, presumably, 24hrs with particular demand during the period outside of GP opening hours.	This was a retrospective observational study analysing triage call records from three urgent care providers in Northwest England. Call records were linked to Hospital Episode Statistics (HES) and the Emergency Care Dataset (ECDS), accessed via NHS England's Data Access Request Service (DARS). The participating services received NHS 111 calls that had undergone initial triage by non-clinicians using the NHS Pathways digital triage system. Calls identified as requiring urgent care were then subject to secondary clinical triage, typically by nurses, using the Odyssey digital triage software. All three services had a similar clinical skill mix.	Under-triage: 1.7% calls (n = 1725/98946) were identified as meeting one or both definitions of potential-under-triage. Sensitivity (safety/risk aversion) of primary triage was greater for both ED attendance and hospital admission than in secondary triage at all urgency levels. For example, at triage levels indicating care needed within 6 h, the sensitivity for ED attendance was 93.5% at primary triage compared to 80.4% at secondary triage, and 94.1% and 81.5% respectively for inpatient admission. Of patients attending ED, 3003 (18.5%) were assigned to 'very urgent' or 'immediate resuscitation' level care on arrival in the ED, and of these 16.4% (n = 493) patients met the criteria of potential under-triage having been assigned a level less urgent than "within 6 hours" in secondary triage. Inpatient admission: Of 7931 calls where the patient was admitted for inpatient care, 1477 (18.6%) met the criteria for potential under-triage, having had a non-urgent secondary triage outcome (care needs less urgent than "within 6 hours"). 20,745 (21.0%) patients attended ED and/or were admitted for inpatient care within 24 h post-secondary triage. Of these, 12,814 (61.8%) only attended ED, 5955 (28.7%) were admitted to inpatient care from ED, and 1976 (9.5%) were directly admitted to inpatient care.
Turner 2021, Simpson 2022	Web-based version or a smartphone application: NHS 111 Online.	Effectiveness: Cost The overall cost per contact (including subsequent health-care contacts) is £68

Citation Country Study design Study aim/ research question Data collection period Model Service Hours	Model component description Note: Where applicable, only data meeting the inclusion criteria of this rapid review were included and are reported below.	Outcome Results
(29, 60) UK (England) Mixed methods To explore the impact of NHS 111 Online on the related telephone service and urgent care system activity and the experiences of people who use those services. 2017 to April 2020 National Referral Service 24hr service	This mixed-methods study comprised five work packages: (1) a rapid evidence review; (2) an interrupted time series (ITS) analysis; (3) a comparison of NHS 111 Online and telephone users using descriptive statistics and qualitative interviews; (4) a qualitative study of staff and stakeholders; and (5) a cost–consequences analysis. The ITS analysis assessed changes in NHS 111 telephone activity before and after the introduction of NHS 111 Online across 18 of 38 provider sites in England. Data included NHS 111 telephone records (2017–2019) and NHS 111 Online contacts (2019). The primary outcome was change in call volume; secondary outcomes included changes in service recommendations (e.g., ambulance, ED, primary care). Demographic comparisons between user groups were also conducted. For the service user perspective, survey data were collected from 3,728 NHS 111 Online users and 795 telephone users (Sept 2019–May 2020). Additionally, 32 semi-structured interviews explored user experiences, preferences, and future intentions.	higher for the telephone NHS 111 service, primarily because users of the online service accessed fewer emergency services and total services within 7 days of their contact. We estimated that the annual costs would be £537M for an online-only service and £1471M for a telephone-only service. If the online service were used in parallel with and with no substitution from the telephone service, then the annual costs would be higher, at £1551M; however, if ≥ 38% of telephone contacts moved to online, then there would be a cost saving in comparison with a telephone-only service. **Effectiveness: Unplanned health service recontacts** The response rate was 12–13% for the telephone user surveys and 0.7% for the online service. Data from telephone users in Hampshire were excluded because of differences in the phrasing of this question. In the 7 days after their contact with NHS 111 Online, users were less likely to report contacting the 999 ambulance service (1% vs. 9%; $p < 0.001$) or visiting an emergency department (7% vs. 33%; $p < 0.001$) than telephone users and were more likely to report not making any contact with a health service (31% vs. 16%; $p < 0.001$). **Efficiency: Adherence/compliance** This question was not asked of users of the NHS 111 telephone service in Yorkshire and the Humber. NHS 111 Online users were less likely to report full compliance with the advice given by NHS 111 (67.5% vs. 88%; $p < 0.001$): Just over two-thirds (67.5%) of online users reported complying with the advice provided. When considering differences between telephone and online users, telephone users were more likely to report that they fully complied with the advice, even after adjusting for age, gender, ethnicity and long-term condition ($p < 0.001$).

Citation Country Study design Study aim/ research question Data collection period Model Service Hours	Model component description Note: Where applicable, only data meeting the inclusion criteria of this rapid review were included and are reported below.	Outcome Results
	The cost–consequences analysis estimated per-contact costs for NHS 111 Online and telephone services, both individually and in parallel, using 2018/19 unit costs and 7-day service use data from the user survey.	**Efficiency: Service impact** (i)Referral rates: [Interrupted time-series analysis sub-study Simpson 2022] ED attendances: results for the primary analysis, for each NHS 111 area code and overall. The overall IRR per 1000 online contacts is 1.050 (95% CI: 1.010 to 1.092, p=0.014). This means that on average for every 1000 online contacts, the number of recommendations to attend has increased by 5% (95% CI: 1.0% to 9.2%). This result is considered a statistically significant effect, suggesting that on average the online 111 service has caused an increase in the number of ED recommendations overall. The overall results of the main analysis method and various sensitivity analyses. Again, excluding the Isle of Wight has little effect on the estimate. Similarly for the AR(1) model. The non-linear model changes the direction of the effec, however this result is no longer significant (p=0.110). (ii) Increase or decrease in types of appointments – home visits, primary care etc. (linked to referral): [Interrupted time-series analysis sub-study Simpson 2022] Contact with primary care: The outcome for this analysis focuses on the number of primary care only recommendations for both NHS 111 telephone and online. Results for the primary analysis, for each NHS 111 area code and overall. The overall IRR per 1000 online contacts is 1.051 (95% CI: 1.027 to 1.076, p<0.001). This means that on average for every 1000 online contacts, the number of primary care only recommendations has increased by 5.1% (95% CI: 2.7% to 7.6%). This result is considered a statistically significant effect, suggesting that on average the online 111 service has caused an increase in the number primary care only recommendations overall. The overall results of the main analysis method and various sensitivity analyses. Again, excluding the Isle of Wight has little effect on the estimate. Similarly for the non-linear model and the AR(1) model. The non-linear model has slightly smaller

Citation Country Study design Study aim/ research question Data collection period Model Service Hours	Model component description Note: Where applicable, only data meeting the inclusion criteria of this rapid review were included and are reported below.	Outcome Results
		estimates but is no longer statistically significant (p=0.168). (iii) Increase or decrease in own or other service use: Cross-sectional sub-study: The response rate was 12–13% for the telephone user surveys and 0.7% for the online service. This is a hypothetical question and that a perception of intention may not reflect actual behaviour. Service users were asked if they would have contacted another service had NHS 111 not been available. A small proportion of NHS 111 Online users reported that they would have made contact with high-acuity services such as 999 ambulance (1%) or an ED (3%); 43% reported that they would not have contacted another service if NHS 111 Online had not been available. When considering differences between telephone and online users, we found that respondents using the telephone service were more likely to report contacting a higher-acuity service (e.g. the 999 ambulance service, ED or general practice) than those using the online service. Users of the online service were more likely to report that they would not have contacted another service if NHS Online had not been available. These differences persisted even after adjusting for age, gender, ethnicity and long-term condition ($p < 0.001$). Interrupted time-series analysis sub-study Simpson 2022: Pooled data from 18 sites showed that the online service had little impact on the number of triaged calls to the NHS 111 telephone service during the first year of operation. On average, for every 1000 contacts with NHS 111 Online, there was a 1.3% increase in calls triaged by the telephone service, but this was not statistically significant (incidence rate ratio per 1000 online contacts 1.013, 95% confidence interval 0.996 to 1.029; $p = 0.127$). For secondary outcomes, there was an increase of between 4.2% and 6.7% in recommendations to attend an emergency or urgent care service for each 1000 NHS 111 Online contacts. This suggests a potential net increase in demand for

Citation Country Study design Study aim/ research question Data collection period Model Service Hours	Model component description Note: Where applicable, only data meeting the inclusion criteria of this rapid review were included and are reported below.	Outcome Results
		emergency and urgent care services. The exception was clinician call-backs to service users, which decreased by 5.4%. These analyses reflect recommendations for care, not actual care accessed. Ten per cent of contacts with the online service are offered a clinician call-back. The assessment process is rapid, with most contacts completed within 6 minutes and 95% of contacts reaching a disposition. (iv) Total calls: Interrupted time-series analysis sub-study Simpson 2022: The overall IRR per 1000 online contacts is 1.008 (95% CI: 0.992 to 1.025, p=0.313). This means that on average for every 1000 online contacts, the number of calls to NHS 111 has increased by 0.8% (95% CI: −0.8% to 2.5%). However, this result is not significant. The forest plot for the overall results of the main analysis method and various sensitivity analyses. Excluding the Isle of Wight has little effect on the estimate. Including a non-linear term for time has increased the SE and decreased the IRR, there is now a 3%–4% decrease in calls per 1000 online contacts, but the overall conclusion remains the same. The AR(1) model provides similar incidence rate estimates and CIs. (v) Emergency ambulance dispositions: One of the dispositions at the end of a 111 contact is referral to or to call 999 for an emergency ambulance response. The outcome for this analysis is the number of 999 ambulance dispositions for both NHS 111 telephone and online. results for the primary analysis, for each NHS 111 area code and overall. The overall IRR per 1000 online contacts is 1.067 (95% CI: 1.035 to 1.100, p<0.001). This means that on average for every 1000 online contacts, the number of recommendations for ambulance response has increased by 6.7% (95% CI: 3.5% to 10.0%). This result is considered a statistically significant effect, suggesting that on average the online 111 service could cause an increase in the

Citation Country Study design Study aim/ research question Data collection period Model Service Hours	Model component description Note: Where applicable, only data meeting the inclusion criteria of this rapid review were included and are reported below.	Outcome Results
		number of ambulance dispatches overall if online users follow this advice. The overall results of the main analysis method and various sensitivity analyses. Again, excluding the Isle of Wight has little effect on the estimate. The non-linear model also has little effect on the estimate and CIs, the estimates have decreased slightly. Similarly for the AR(1) model. **Patient experience: Acceptability** Qualitative sub-study: Just over half of participants did not follow some aspect of the advice given by NHS 111 Online. Those advised to contact a higher-acuity service such as 999/ED did not follow the advice because they did not agree with it. Those advised to contact a GP agreed with the advice but felt that it was difficult to act on. Most participants reported they would use NHS 111 Online again, most likely for help with simple health problems or when it was difficult to access other forms of health care. More than half expressed a preference for using NHS 111 Online before accessing the telephone service, whereas others preferred the reassurance and greater depth offered by verbal interaction with the telephone service. A quickly accessible online format was preferable for some people, such as those with busy lives or those with communication difficulties. NHS 111 Online was also seen as service that used minimal NHS resources, which became important to participants during the COVID-19 pandemic. Cross-sectional sub-study: The response rate was 12–13% for the telephone user surveys and 0.7% for the online service. When considering differences between telephone and online users, telephone users were more likely to report that they found the advice to be 'very helpful', even after adjusting for age, gender, ethnicity and long-term condition ($p < 0.001$). Three-quarters (75%) of online users felt that the advice given had been helpful.
Decision support tool: redirection		

Citation Country Study design Study aim/ research question Data collection period Model Service Hours	Model component description Note: Where applicable, only data meeting the inclusion criteria of this rapid review were included and are reported below.	Outcome Results
Morin 2018 (54) France Cross-sectional study To assess whether such a procedure (redirecting patients presenting to ED by triage nurse with complaints not requiring the level of care of an ED towards an OHGP) is effective, safe, and satisfactory for the patients. Feb to Mar 2016	**Redirection from ED to OHGP by triage nurse/ senior emergency physician.** A prospective observational study was conducted at the adult emergency department (ED) of Le Mans General Hospital, France, between 1 February and 31 March 2016. The ED averaged 155 admissions per day. All adult patients redirected from the ED to the out-of-hours general practice (OHGP) service during the study period were included. Patients were triaged shortly after arrival using a pragmatic, standardised triage scale. Those deemed suitable for redirection were referred to the OHGP, located within walking distance of the ED. The OHGP operated from 8 PM to midnight on weekdays, 12 PM to midnight on Saturdays, and 8 AM to midnight on Sundays and public holidays. A time-stamped administrative record was created for each redirected patient, capturing age, sex, contact details, and whether they had a declared primary care physician. Patient complaints were classified using the International Classification of Primary Care (ICPC).	**Efficiency: Adherence/compliance** Of the patients redirected from the emergency department (ED) to the out-of-hours general practice (OHGP), 199 attended, representing a 90% accessibility rate. The main reasons for non-attendance included excessive waiting times (9 patients), unsuitable opening hours (5 patients), and consultation costs (4 patients). Additionally, 29% of redirected patients reported they had never heard of the OHGP prior to their ED visit. **Effectiveness: Unplanned health service recontacts** Within 72 hours of being redirected to the out-of-hours general practice (OHGP), 4.1% (9 patients) were subsequently admitted to an emergency department (ED) for the same initial complaint. Of these, only one patient required hospitalisation, due to an anal abscess. This was the only case redirected from the OHGP back to the ED. **Patient experience: Satisfaction** Patient satisfaction was assessed by whether redirected patients felt the redirection aligned with their primary complaint. Of 221 patients, 176 (79.6%) considered the redirection justified. Reported reasons for dissatisfaction included lack of imaging or lab services (12 patients), absence of specialist consultation (8), severe pain (4), belief they should have been seen in ED (4), and long waiting times (4). **Efficiency: Service impact** Referral rates: Between 1 February and 31 March 2016, 9551 patients attended the ED, with 288 redirected to the OHGP (redirection rate: 3%). Rates were higher on weekends and holidays (5.7%) compared to weekdays (1.9%, $p < 0.001$). Among redirected patients, 86% reported having a primary care physician.

Citation Country Study design Study aim/ research question Data collection period Model Service Hours	Model component description Note: Where applicable, only data meeting the inclusion criteria of this rapid review were included and are reported below.	Outcome Results
Hospital Parallel Services Monday to Friday 8pm to 12am. Saturday 12pm to midnight. Sunday and public holidays: 8am to midnight.		
Introducing an UCC		
Barzin 2020 (21) USA Cross-sectional study To provide after-hours care to patients and to introduce new patients to the continuity	**Introduction of an urgent care centre within an existing Family Medicine Centre**. This report described the development, and one-year outcomes of a walk-in urgent care clinic (UCC) integrated into the Family Medicine Center (FMC) at the University of North Carolina at Chapel Hill - a Patient-Centered Medical Home serving approximately 19,000 patients. Prior to the UCC's launch in February 2018, the clinic operated with limited weekday and Saturday hours. The UCC expanded access to 7 AM to 9 PM on weekdays, 8 AM to 5 PM on Saturdays, and 12 PM to 5 PM on Sundays.	**Effectiveness: Costs** Financially, the revenue and costs were tracked on a quarterly basis. Including all initial staffing and supply costs, the researchers project a break-even point after 3 years. If quarterly balances are computed without carryover of upfront costs, the UCC was profitable by the fifth quarter of operations. Researchers project that the UCC saved the health care system between $568,000 and $1,136,000 based on the estimated savings of $200 to $400 saved per ED visit avoided. **Note:** the cost-effectiveness is projected. **Efficiency: Service impact** Reduction in ED visits: Cumulative data from provider notes indicated that over 33% of UCC patient encounters may have prevented an ED visit. This response was based on the provider's judgement and/or the patient voicing they would have gone to the ED when asked.

Citation Country Study design Study aim/ research question Data collection period Model Service Hours	Model component description Note: Where applicable, only data meeting the inclusion criteria of this rapid review were included and are reported below.	Outcome Results
practice, while decreasing ED utilisation. 2018 to 2019 Community Advanced Services Mon-Fri: 7 am to 9 pm. Sat: 8 am to 5 pm. Sun: 12 pm to 5 pm.	Weekday UCC staffing included one physician, one medical assistant (MA), and one licensed practical nurse (LPN) or registered nurse (RN) during early morning and evening hours, and two providers, two MAs, and one LPN/RN during core daytime hours. Weekend shifts were staffed similarly. The clinic collaborated with laboratory and radiology services to ensure access to diagnostics, including on-site lab draws and plain film radiology. UCC staffing was in addition to the existing continuity clinic team.	Change in demand of own or other service: An average of 115 new patients (largely patients who were not considering our practice prior to coming to the UCC for primary care) per quarter established care after coming to the UCC. Admission avoidance: Of all visits, fewer than 3% resulted in a direct admission to a hospital or transfer to the ED. Furthermore, 25% of patients seen (regardless of PCP) had preventive or chronic disease management needs addressed.
Bessert et al. 2023 (41) Germany Quasi-experimental study To what extent does the low-	**Urgent care walk-in centre within the immediate vicinity of the ED.** A prospective, monocentric pre–post comparative study was conducted at a university hospital in Hamburg, Germany, to evaluate the impact of a newly established walk-in clinic (WIC) located adjacent to the emergency department (ED). The ED, part of a maximum-care hospital, treated over 70,000 adult patients annually, with patients typically assigned to specialties.	**Efficiency: Service impact** The percentage of self-referring patients reduced from 78.6% to 61.2% ($p < 0.001$). The total number of daily patients fell by 37.3% (95% CI [30.9%; 43.8%]). We saw a decline in seven of 10 specialties in the ED. No specialty experienced an increase in ED-Ps (patients). A reduction in case numbers was observed in all diagnosis groups. Admission rate: The percentage of inpatient admissions rose from 21.9% to 28.3% ($p < 0.001$) following the opening of the WIC.

Citation Country Study design Study aim/ research question Data collection period Model Service Hours	Model component description Note: Where applicable, only data meeting the inclusion criteria of this rapid review were included and are reported below.	Outcome Results
threshold option to refer patients onwards to a WIC located in the hospital building result in changes to case numbers and treatment times in an ED? What are the patient flows between ED and WIC in this setting? Pre-intervention period: Aug to Sep 2019. Post-intervention period: Nov 2019 to Jan 2020 Hospital Parallel Services Mon-Fri: 10 am–	The study compared two periods: August–September 2019 (pre-WIC) and November 2019–January 2020 (post-WIC), excluding October 2019 as a run-in phase. Prior to the WIC, general practitioners (GPs) provided limited services within the ED. With the WIC's opening, GP coverage was extended to 6 PM–midnight on weekdays and 4 PM–midnight on weekends/public holidays. The WIC operated in unused outpatient clinic rooms 25 metres from the ED and was staffed by GPs and medical assistants. ED registration nurses referred low-urgency patients to the WIC during its opening hours. Available diagnostics included ECG, urine dipsticks, and point-of-care tests (troponin, D-dimer, CRP). Patients could be referred back to the ED if necessary.	

Citation Country Study design Study aim/ research question Data collection period Model Service Hours	Model component description Note: Where applicable, only data meeting the inclusion criteria of this rapid review were included and are reported below.	Outcome Results
midnight. Sat-Sun/ public holidays: 10 am–midnight.		
Payne 2017 (56) Australia Cross-sectional To assess clients' perceived urgency and satisfaction with their visit to the BAHGPC, GPs' views on the appropriateness of these presentations, and changes in non-urgent and semi-urgent ED visits at Bathurst Base Hospital	Afterhours GP clinic within the immediate vicinity of hospital. The Bathurst After Hours General Practice Clinic (BAHGPC), located adjacent to Bathurst Base Hospital in regional New South Wales, Australia, operated as a bulk-billing, walk-in service with no appointment system. It was open from 3 PM to 7 PM on weekends and public holidays (excluding Christmas Day and Good Friday), and staffed by a receptionist, registered nurse, and general practitioner. The clinic had been in operation since 1 December 2012 and was the only after-hours service in the local area. A survey study was conducted using a volunteer sample.	Efficiency: Service impact 205 patients participated in the Client presentation survey. Sixty per cent (60%; 125) indicated that they would have presented to the ED had the BAHGPC not been operating at the time of their visit, of which 86% (107) classified their visit as essential. A quarter of respondents (27%; 55) indicated they would have waited until the following week to see their own general practitioner rather than present to the ED (Table 1), however 58% (32) of these respondents still deemed their visit as essential. 452 general practitioner surveys were completed by treating doctors. From the perspective of the general practitioner, the majority of presentations to the BAHGPC were deemed appropriate (85%; 383) and an additional 2% (7) were considered appropriate and needed a referral to the local hospital or ED. For client satisfaction survey: Seventy-nine per cent (79%; 174) said their health issue was resolved as an outcome of their visit. Of the 45 (21%) issues that were not resolved, within one week of presenting the BAHGPC, 73% (33) saw another GP, 22% (10) went to ED and 9% (4) did not seek additional medical assistance. Patient experience: Satisfaction The follow-up satisfaction survey was completed by 219 clients. For the client satisfaction survey, the majority of clients (59%; 129) rated their visit as 10 (very satisfied), and a combined total of 190 (86%) rated their visit as 8, 9 or 10.

Citation Country Study design Study aim/ research question Data collection period Model Service Hours	Model component description Note: Where applicable, only data meeting the inclusion criteria of this rapid review were included and are reported below.	Outcome Results
since the BAHGPC opened. 1st February 2015 to 30th June 2015. 1st Dec 2014 to 30th June 2015. Community Restricted Services (due to limited opening hours and no information on resources/ staffing but could be Community Advanced Services) 3 pm to 7 pm on weekends and public holidays (excluding Christmas Day		Ninety-nine per cent (99%; 216) of respondents said that would use the clinic again and 99% (217) would recommend the clinic to someone else. Of the 219 participants that completed the follow-up survey, 162 (74%) provided additional comments about the service when asked. Almost all respondents gave positive comments about the BAHGPC (90%; 147). Only 5 (3%) respondents gave negative comments about the service which were due to: a lack of equipment, a lack of privacy at reception with personal details being relayed to the client, a long waiting time, and being turned away from the service at 6.45 pm (when the clinic closes at 7 pm). An additional two respondents provided a negative comment about the general practitioner on call, but also said that the BAHGPC was a good service.

Citation Country Study design Study aim/ research question Data collection period Model Service Hours	Model component description Note: Where applicable, only data meeting the inclusion criteria of this rapid review were included and are reported below.	Outcome Results
and Good Friday)		
Raidla 2020 (57) (57) Sweden Quasi-experimental study To investigate the outcome of treatment in the ED versus the UCC in terms of quality, LOS, time to physician (TTP), use of medical services, referrals, revisits, hospitalisation, mortality and costs. Unclear, probably	**Urgent care centre was established at an emergency department (ED)** within a university hospital in Gothenburg, Sweden. The hospital operated across three sites, each with its own ED, collectively receiving approximately 150,000 annual attendances. The included ED, which excluded orthopaedic and psychiatric cases, received 53,840 visits in 2018- a 4.8% increase from 2017- and served an area with high socioeconomic deprivation and a large immigrant population. The UCC, launched in spring 2018, was staffed by primary care physicians and registered nurses. It shared a triage line with the ED, with patients allocated post-triage to either the ED or UCC. The UCC aimed to optimise resource use and improve care for low-urgency cases.	**Effectiveness: Costs** Total cost of attendees at the UCC and the ED differed. The cost of UCC attendees was less than the cost of ED attendees. On average, an UCC attendee was 67–210 Euros cheaper. One reason for the difference was fewer medical services, i.e., radiology and laboratory than at the ED. The total cost of medical services at the UCC for the population studied was an average of 37.28 Euros less than at the ED (radiology = 16.62, laboratory = 20.66). **Effectiveness: Unplanned health service recontacts** A total of 4 people revisited within 72 hours. From the 100 people visiting the ED, 3 patients revisited within 72 hours, and from the 100 people who were referred to the UCC, 1 revisited within 72 hours. **Efficiency: Service impact** Laboratory analysis: Overall, UCC required statistically significant fewer lab analyses than ED [$Z = -6.723$, $p < 0.001$]. n = 63: UCC lab < ED lab (negative ranks) n = 5: UCC lab > ED lab (positive ranks) Ties: n = 32, no difference in lab analysis. **Efficiency: Waiting time** Difference of means results. Length of stay: ED versus treated by the UCC). From arrival to discharge, the UCC patients spent an average of 2.11 h less at the hospital than the ED patients. TTP was thus 1.57 h less at the UCC than at the ED.

Citation Country Study design Study aim/ research question Data collection period Model Service Hours	Model component description Note: Where applicable, only data meeting the inclusion criteria of this rapid review were included and are reported below.	Outcome Results
2018 Hospital Parallel Services Not reported		Wilcoxon signed-rank test (Table 3): overall, LOS [Z = -7.547, p < 0.001] and TTP [Z = -6.928, p < 0.001] were statistically significantly shorter for UCC than in ED. For LOS: 82 Cases (Negative Ranks) where UCC LOS < ED LOS. i.e., 82 participants had a shorter stay in UCC than in ED. 16 cases (Positive Ranks) where UCC LOS > ED LOS, i.e., 16 participants had a longer stay in UCC. and [Ties] for 2 patients LOS was the same in both settings. Z-score = −7.547 indicates a strong tendency for UCC LOS to be shorter. p < 0.001. For TTP: 80 cases with UCC TTP<ED TTP and 20 cases with UCC TTP> ED TTP. z-score= -6.928 indicates stronger tendency for UCC TTP to be shorter than ED TTP, p=0.001.
Schoenmakers 2021* (58)	This study utilised two model components: Digital triage and Introducing an UCC. Details of this study can be found under Co-location of Urgent and emergency care services.	
Urgent and emergency care survey 2024 (44) UK (England) Cross-sectional survey To ask people about their experiences of	**Urgent treatment centres (type 3)** in 70 trusts across England. Note: The survey lacked specific information on the included UTCs. Type 3 Urgent treatment centre are for the treatment of minor injuries and illnesses. They are doctor or nurse-led, operating at least 12 hours a day and can be accessed without appointment. These also offer appointments via NHS 111 service or a GP referral. They provide urgent medical help to people when their	**Effectiveness: Safety** Communication: 76% felt they had enough time to discuss their condition. 80% felt the health professional definitely listened to them. 73% said their condition/treatment was completely explained in an understandable way. Tests: 76% said the need for tests was completely explained. 72% said test results were definitely explained understandably. **Effectiveness: Unplanned health service recontacts** 20% had previously visited a UTC for the same condition. 5% within the past week

Citation Country Study design Study aim/ research question Data collection period Model Service Hours	Model component description Note: Where applicable, only data meeting the inclusion criteria of this rapid review were included and are reported below.	Outcome Results
care provided by NHS A&E departments (Type 1 services) or urgent treatment centres (Type 3 services) in England. February 2024 Hospital Parallel Services At least 12hrs/ day	condition is not life-threatening. And are expected to meet NHS England principles and standards.	6% within 1 week to 1 month 9% more than 30 days earlier **Efficiency: Waiting time** Duration of Visit: 82% stayed up to 4 hours (30% under 1 hour); 18% stayed 4+ hours. Initial Assessment: 19% had a pre-booked appointment. 34% of walk-ins were assessed within 15 minutes. 64% of those with appointments were assessed within 30 minutes. 19% of walk-ins and 18% of appointment holders waited over 60 minutes. **Patient experience** Overall Experience: UTC patients reported better experiences than A&E patients. Long waits (60+ minutes) linked to worse experiences on all 20 questions. Wait Time Communication: Only 39% were informed how long they would wait; 61% were not. Respect and Dignity: 81% felt treated with respect and dignity all the time. Involvement in Care: 71% were definitely involved in decisions; 20% to some extent. 66% said family/carers had enough opportunity to speak with staff. Emotional Support: 57% said anxieties/fears were completely discussed; 19% said not at all. Pain Management: 47% said staff definitely did everything to control pain; 26% said they did not. Feeling Safe: 77% always felt safe around other patients/visitors; 5% did not. Confidence and Trust: 75% definitely had confidence in the health professional. Discharge and follow-up: 88% were discharged home.

Citation Country Study design Study aim/ research question Data collection period Model Service Hours	Model component description Note: Where applicable, only data meeting the inclusion criteria of this rapid review were included and are reported below.	Outcome Results
		Medication: 37% were prescribed new medication. 75% had the purpose of medication explained; 7% received no information. Home Care Information: 82% received information on caring for their condition at home. 77% understood it very well; 2% not very well. 77% felt definitely able to care for their condition; 3% did not. Post-Discharge Contact Info: 82% were told who to contact if worried. Most common contacts were GP (45%), UTC (18%), NHS 111 (11%), A&E (11%). Health/Social Care Needs: 77% said staff discussed further care needs. 23% said they would have liked this discussion, but it didn't happen. Of those who sought services post-discharge: 50% said services were definitely available 21% said they were not available
Task shifting		
Collins 2019 (43) UK (England) Mixed methods To measure the effectiveness of advanced nurse practitioners (ANPs) against	**Advanced nurse practitioners (ANPs) performing urgent home visits** Between 1 September 2016 and 31 August 2017, an out-of-hours (OOH) service in a northern English county managed 120,590 patient contacts, including 34,654 home visits. Advanced Nurse Practitioners (ANPs) completed 1,539 home visits, while GPs completed 33,115. A random audit of documentation reviewed 162 ANP cases and 1,675 GP cases—over 10% of ANP visits.	**Effectiveness: Safety** Adverse events: The ANP home visit incidents accounted for only 1% of total adverse incidents. **Efficiency: Service impact** Referral rate: The refer-on rate consists of referral to accident and emergency (A&E), 999 ambulance requests, and hospital admission disposition codes. The ANPs doing home visits refer less than the GPs: ANP 12.87%, GP 16.26%. The patient disposition codes for both clinicians were very similar, with no adverse impact on daytime primary care. **Efficiency: Timely clinical assessment** Length of time for a home visit - ANP 33 min; GP 37 mins.

Citation Country Study design Study aim/ research question Data collection period Model Service Hours	Model component description Note: Where applicable, only data meeting the inclusion criteria of this rapid review were included and are reported below.	Outcome Results
national quality requirements (NQR) for out-of-hours (OOH) care. September 2016 and August 2017 Community Home Services Weekdays: 18.30–08.00 Weekend and Bank Holidays: 24hrs	The service operated from six treatment centres and one central hub, covering a rural area of over 2,613 square miles, with 51% of the population living rurally. It ran from 18:30–08:00 on weekdays and 24 hours on weekends. Since April 2013, ANPs had undertaken home visits during OOH periods, similar to GPs, except that GPs triaged patients by phone prior to visits. Six ANPs worked across three sites, covering all OOH shifts. They sometimes worked alongside GPs but often covered large areas independently, particularly at night, with telephone support available. ANPs were restricted from managing pregnant patients, in line with legal and organisational policy. Notes: – This was a mixed methods study; however, only quantitative outcomes met the inclusion criteria for this rapid review. – There was no clear definition of what constituted an 'urgent home visit'.	Responsiveness: Advanced nurse practitioners' home visit response times align with the GP response times, except for the immediate one-hour response time where the ANPs met this timescale only 33.85% of the time. However, this is only 65 cases (4%) of the total cases managed by the ANP compared to 674 cases in the six-hour response time. Routine and high-priority cases (four- and six-hour response) were completed within the required 95% target of the NQR by the ANPs and this accounts for 70% of their cases. The average length of time for ANP home visit was 33 min compared to an average of 37 min for the GPs, with a median time of 26 min for both clinicians. Both ANPs and GPs completed 72% of the home consultations in less than 40 min. The average number of homes visits (as a proportion of all cases received) over a night shift between ANPs and GPs was comparable, particularly in quieter localities. However, although home visit activity was found to be similar, there was more variation in base activity, with GPs seeing more patients. **Note:** The National Quality Requirements (NQRs) used in this study issued by the Department of Health in 2006, were superseded by the Integrated Urgent Care (IUC) Key Performance Indicators and Quality Standards, published by NHS England in June 2018.
McDonough 2021 (51)	Patient management by Advanced physiotherapy practitioners (APPs)	Effectiveness: Unplanned health service recontacts Thirty day re-attendance rates of patients returning to the emergency department

Citation Country Study design Study aim/ research question Data collection period Model Service Hours	Model component description Note: Where applicable, only data meeting the inclusion criteria of this rapid review were included and are reported below.	Outcome Results
UK (England) Cross-sectional study To quantify the proportional presentations of patients attending the emergency department who were suitable for management by advanced physiotherapy practitioners (APPs). And to analyse patient care delivered by APPs in comparison to other members of the multidisciplinary team.	A retrospective service evaluation was conducted over three months at an urgent treatment centre (UTC) located within the emergency department of a large NHS University teaching hospital and major trauma centre, with over 100,000 annual attendances. During the trial, 3,927 patients were triaged to the UTC between 08:00 and 20:00 using the Manchester Triage System, aiming to reduce pressure on majors and resuscitation areas. The multidisciplinary team included emergency nurse practitioners (22 hours/day in two 11-hour shifts), GPs (16 hours/day in two 8-hour shifts), and advanced practice physiotherapists (APPs) (7.5 hours/day from 11:00 to 19:00, aligned with peak attendance). ANPs and junior doctors were excluded from analysis due to limited data. APPs were experienced autonomous practitioners, primarily managing musculoskeletal and minor injuries. At Salford Royal NHS Foundation Trust, APPs had worked independently in minor injury units for over five years. Data were extracted from electronic patient records and analysed by professional group. Outcomes included	with the same condition were also recorded. Four per cent of patients seen by emergency nurse practitioners returned to the department within 30 days. This is compared to 6% of patients seen by APPs and 7% by GP. This is likely to reflect type of presentation of patients seen by each cohort. Further comparison has not been possible due to heterogeneity of condition seen. There were no hospital admissions as a result of any re-attendances. **Efficiency: Service impact** GPs admitted 11% of their caseload, compared to APPs at 9% and emergency nurse practitioners admitted 5% of their caseload. This reflects the type of patients primarily seen by GPs such as unwell adults or abdominal pain. APPs primarily admitted patients to either spinal or orthopaedic wards in keeping with the cohort of patients APPs commonly treat. Although an image was presented depicts the number of patients admitted by each member of the multidisciplinary cohort and their specific admission destination, exact numbers were not reported. HS: Also important to note with this one that as case loads were different this will affect the percentages of unplanned health service contacts, and adherence/compliance due to the differences in complexity of conditions seen by professions. **Efficiency: Waiting time** Compliance with the four-hour target of either discharging or admitting patients showed APPs to be 99.5% compliant, GPs 99.3% and emergency nurse practitioner's 97.5%.The use of investigations was broadly similar between GPs and APPs with 1.19 and 1.15 per patient respectively.

Citation Country Study design Study aim/ research question Data collection period Model Service Hours	Model component description Note: Where applicable, only data meeting the inclusion criteria of this rapid review were included and are reported below.	Outcome Results
Unclear Emergency Department Integrated Services Every day: 08:00 - 20:00	patient volume, condition types, re-attendance, discharge destination, time to treatment, and investigations.	
Smits 2020 (61) Netherlands Quasi-experimental study To provide insight into the safety, efficiency, and patient satisfaction of substituting general	Nurse practitioners performing home visits. Five male nurse practitioners (NPs), all former ambulance nurses with over 20 years of experience, were recruited after completing the two-year Master of Nurse Practitioner (MANP) programme in the Netherlands. The MANP followed a dual work-education model, with two-thirds of training delivered in practice settings. Each NP had 2–6 years of experience in clinic consultations at a general practitioner cooperative (GPC). Under GP supervision, NPs substituted for GPs during home visits on weekday evenings (5:00–11:30 PM) and weekends (10:00 AM–6:00 PM). They were authorised	Effectiveness: Safety Protocol adherence: Of the 639 visits: 358 nurse practitioner visits and 281 general practitioner visits. Nurse practitioners significantly more often adhered to the protocol than general practitioners (84.9% nurse practitioner versus 76.2% general practitioner). A reasoned deviation from the protocol was also seen as adequate care (2.0% nurse practitioner versus 5.7% general practitioners, not significant), but incorrect deviation of the protocol could be harmful to the patient (13.1% nurse practitioner versus 18.1% general practitioners, not significant). Prescription of medication was the most frequent incorrect de- viation from the protocol (51%), but did not significantly differ between professionals. Follow-up: N= 420. There were no significant differences between the groups in the frequency of missed diagnoses and complications reported by the patients' own general practitioners. Based on the descriptions of these cases the researchers assessed that in each group two complications were preventable. The severity of these preventable complications was somewhat higher for home visits by nurse

Citation Country Study design Study aim/ research question Data collection period Model Service Hours	Model component description Note: Where applicable, only data meeting the inclusion criteria of this rapid review were included and are reported below.	Outcome Results
practitioners with nurse practitioners for home visits by out-of-hours primary care general practitioner cooperatives. September 2016 to March 2017 Community Home Services Weekday evenings (5:00 PM–11:30 PM) and Weekends (10:00 AM–6:00 PM).	to manage 24 low-complexity health problems using protocol-based care, aligned with national GP guidelines (NHG, 2019). Triage professionals and supervising GPs allocated eligible patients to NPs following telephone triage. High-risk cases or resuscitation calls (U0) were handled by GPs or ambulance services. NPs received targeted training on the 24 protocols, delivered by the ambulance service and GPC. GPs, already familiar with the guidelines, received no additional training. NPs used ambulance vehicles equipped with ECG machines, while GPs used standard GPC cars with a medical assistant. Both vehicles carried similar emergency equipment but were not equipped for patient transport.	practitioners. Protocol adherence (99.5%) as rated by the patients' own gen- eral practitioner, was significantly higher for nurse practitioners (99.5%) than for general practitioners (92.3%). **Effectiveness: Unplanned health service recontacts** Follow-up: There were neither significant differences in the frequency of follow-up contacts within 72 h nor within one month after the home visit. There were also no significant differences in types of follow-up contacts < 72 h. **Efficiency: Service impact** Care characteristics: Nurse practitioners prescribed significantly less often medication than general practitioners (19.9% nurse practitioner versus 30.6% general practitioner), and significantly more often referred the patient to the hospital emergency department (24.1% nurse practitioner versus 15.9% general practitioner). In addition, the mean duration of the home visit was significantly longer for nurse practitioners (34.1 min) than for general practitioners (21.1 min) (Table 1). The nurse practitioners consulted the supervising general practitioner in 21.5% of all home visits. In one case this resulted in a visit of a general practitioner to the patient home. Follow-up: Appropriate referral and continuity of care as rated by the patients' own general practitioner was generally equal between both groups. Appropriate medication prescribing (93.7%) was rated significantly higher for nurse practitioners than for general practitioners (79.5%). **Patient experience: Satisfaction** On most items, the agreement percentages were higher for nurse practitioners than for general practitioners, with significant differences for confidence in expertise of care provider (nurse practitioner 95.8%; general practitioner 94.6%), usefulness of advice (nurse practitioner 95.3%; general practitioner 87.7%), information about

Citation Country Study design Study aim/ research question Data collection period Model Service Hours	Model component description Note: Where applicable, only data meeting the inclusion criteria of this rapid review were included and are reported below.	Outcome Results
		possibilities for the patient if complaints would change after the home visit (nurse practitioner 92.9%; general practitioner 85.2%), and interest in personal situation (nurse practitioner 95.7%; general practitioner 91.9%). The mean overall grade patients gave for the care provided by nurse practitioners was 8.6 (range 6–10). This was significantly higher than for general practitioners: 8.3 (range 1–10).
van der Biezen 2017 (63) Netherlands Quasi-experimental study To compare teams with different ratios of GPs and NPs in terms of the number of consultations, patient care and GPs' performance and provide insights into the	Patient management by Advanced Nurse Practitioners at an OOH primary care at a General Practitioner Cooperative (GPC) located within a hospital adjacent to the Emergency Department, operating on weekends from 10:00 to 18:00. Three team configurations were compared: Team 1 (four GPs), Team 2 (three GPs and one NP), and Team 3 (two GPs and two NPs). All acute care requests outside office hours were routed through a regional telephone number, with triage nurses assigning patients to appropriate care pathways based on the Netherlands Triage Standard. Eligible patients were scheduled for GPC consultations according to urgency. Each team was observed over a 35-week follow-up period, with systematic rotation between Saturdays and Sundays. GPs were randomly assigned to shifts without prior knowledge of NP involvement. Triage nurses, responsible for scheduling across multiple GPCs, were	Effectiveness: Cost The costs for personnel per consultation were €23.85 in team 1, €23.65 in team 2 and €23.41 in team 3. The inclusion of costs of other resources (X-rays, medication, referrals to the ED) led to total mean costs per consultation in the primary analysis of €59.22 (SD 86.63) in team 1, €62.23 (SD 90.49) in team 2 and €65.68 (SD 94.11) in team 3. After adjusting for age, gender, urgency and ICPC group, the costs per consultation in team 3 were significantly higher compared with those in team 1 (p=0.04). In the sensitivity analysis, which used the tariff of a GP employed by another GP, the costs for personnel per consultation were €29.89 for team 1, €28.36 for team 2 and €26.66 for team 3. There were no significant differences between teams in the sensitivity analyses using the tariff for a GP employed by another GP or in the sensitivity analyses using the maximum price for medications. Effectiveness: Safety Adverse events: No (near) incidents were reported during the study. Efficiency: Service impact Workload: Total number of consultations per provider for weekend cover between 10:00 and 18:00 hours: In total, 9503 patients had a consultation during the study period. Team 1 had contact with 3287 patients, team 2 with 3166 patients and team 3 with 3048 patients. The mean number of consultations per shift by the teams was 93.9 (SD 9.0) in team 1 vs 90.5 (SD 7.2) in team 2 (not significant) and 87.1 (SD 6.2) in

Citation Country Study design Study aim/ research question Data collection period Model Service Hours	Model component description Note: Where applicable, only data meeting the inclusion criteria of this rapid review were included and are reported below.	Outcome Results
number of patients outside the NPs' scope of practice in out-of-hours primary care. May 2014 to November 2015 Hospital Parallel Services 17:00 to 08:00 hours on weekdays, 24/7 over the entire weekend	unaware of team composition and only informed of total team size. Patients were not informed of NP presence. Note: In the Netherlands, NPs ar authorised to independently perform reserved procedures, including prescribing, within their scope of practice, following the same clinical guidelines as GPs.	team 3 (p<0.001). The mean number of consultations per hour per healthcare provider was 3.1 consultations in team 1, 3.0 consultations in team 2 (GP 3.2, NP 2.6) and 2.9 consultations in team 3 (GP 3.3, NP 2.5). note: the number of consultations per team and per healthcare provider. This was measured as the mean number of patients per team per day and per healthcare provider per hour. Resource use (x-rays, drug prescriptions, referrals to the ED): Across the overall sample, adjusted volumes of resource use did not change significantly for X-rays between teams 1, 2 and 3. Compared with team 1, after correction for case mix, team 2 more often prescribed drugs (41.3% vs 44.2%, respectively; p=0.033). In contrast, team 3 did not prescribe more drugs (39.5%; not significant). Referral rates: The number of patients referred to the ED was 12% in team 1, 13.2% in team 2 and 14.7% in team 3. After adjusting for case mix, the difference between team 3 and team 1 was significant (p=0.028). **Efficiency: Waiting time** The proportion of patients who did not receive a consultation within the targeted time period according to the NTS was 3.5% in team 1, 5.2% in team 2% and 8.3% in team 3. After adjusting for confounders, the proportion of patients who did not receive a consultation within the targeted time period was significantly higher in team 2 (p=0.001) and team 3 (p<0.001) compared with team 1.
Virtual urgent care		
McLeod 2023 Tarride 2024 McLeod 2023a Hall 2022 (50, 52,	**To address healthcare access challenges during the COVID-19 pandemic**, hospital organisations in Ontario submitted funding applications to Ontario Health to pilot **Virtual Urgent Care (VUC) services** tailored to local	**Effectiveness: Cost** Cohort 1 (those promptly referred to the ED and who presented to ED within 72 hours and matched in-person cohort n=2129): The 30-day health care expenditures were similar between the 2 cohorts. However, the 30-day MoH costs per patient

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53, 62) Canada Nested case-control study To address healthcare access challenges during the COVID-19 pandemic, hospital organisations in Ontario submitted funding applications to Ontario Health to pilot Virtual Urgent Care (VUC) services tailored to local needs. December 2020	needs. Each site was responsible for designing and implementing its program in line with overarching funding objectives. Models of care varied across sites. Several adopted collaborative approaches with primary care, long-term care, and community partners—enhancing service awareness, referral pathways, and access to technology. Key differences emerged in triage, staffing, technology, and physician remuneration. Triage models included self-screening (used by three sites), nurse-led triage (three sites, one with team-based decision-making), and one site led by a nurse practitioner. Staffing ranged from physician-only teams to mixed models involving nurses, physician assistants, or nurse practitioners. Technology platforms differed due to the absence of a provincial electronic health record or unified virtual access point. Physicians were paid on a fee-for-service basis. Note: Ontario Health and the Ministry of Health did not prescribe specific design requirements, resulting in variation in governance, staffing, technology, patient	were relatively greater for the VUC cohort (mean $2805, SD $7026, including mean $163, SD $99 of operational funds and mean $ 2642, SD $7017 of health care expenditures) compared to the matched in-person ED cohort (mean $2299, SD $6174), resulting in a difference of $506 (95% CI $139-$885) per patient. Cohort 2 - (VUC patients not referred to an in-person ED and matched in person ED controls n=14,179 each). The 30-day mean (SD) MoH health care expenditures per patient were lower with VUC (mean $758, SD $3129) than in-person ED care (mean $1270, SD $3846; P<.001), resulting in a difference of $511 (95% CI $434-$595) per patient in favour of VUC. More than 90% ($480/$511) of this cost difference was explained by a significant reduction in 30-day ED costs ($237/$511, 46% of total cost reduction) and physician visits ($243/$511, 47%). After adding the VUC operational funding (mean $149, SD $95 per VUC user), VUC remained less expensive than in-person ED care. At the cohort level, the absolute 30-day health care resource use cost associated with the cohort of VUC users who presented to an ED within 72 hours of VUC referral and matched in-person ED patients (n=2129 each) were $6.0 million and $4.9 million, respectively. For the cohort of VUC users not referred to the ED by their VUC provider and the matched cohort of individuals attending in-person to the ED and discharged home by their ED physician (n=14,179 each), the absolute 30-day costs were $12.9 million and $18.0 million, respectively. Overall, the absolute 30-day costs associated with the two VUC cohorts were $18.9 million (ie, $6.0 million + $12.9 million) versus $22.9 million ($4.9 million + $18.0 million) for the 2 in-person ED cohorts. Canadian dollars (a currency exchange rate of CAD $1=US $0.76 is applicable) were calculated for each cohort using standardized costing algorithms for Ontario administrative health care data in Ontario.

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to September 2021 Emergency Department Integrated Services Varied across sites	engagement, and services across sites.	**Efficiency: Service impact** Referral rates: Of the 17 034 patients with a known VUC disposition, 2931 (17.2%) were referred to the emergency department (Table 1). Increase or decrease in own or other service use: Of those, 669 (22.8%) did not present to the emergency department within 72 hours of their VUC visit, but their 30-day emergency department visits were lower (14.3% v. 21.5%) and hospital admissions were similar (3.3% v. 3.8%) than those of the overall cohort. Patients who initially sought VUC were more likely to have another VUC visit within 72 hours, 7 days and 30 days than patients who presented to the emergency department. They were also more likely to have a subsequent specialist visit within 7 days (24.0% v. 17.5%; Δ 6.5%, 95% CI 4.1% to 9.0%) and 30 days (48.6% v. 37.3%; Δ 11.3%, 95% CI 8.4% to 14.3%). We found that the overall impact of the provincial VUC pilot program on subsequent health care utilization was not significant. Patients referred promptly to the emergency department by a VUC provider had rates of health care utilization similar to those of patients who presented in person to the emergency department. **Patient experience: Satisfaction** In terms of overall satisfaction, 94% of respondents rated their overall experience with virtual urgent care as8/10 or greater, with an average score of 9.2 on a 10-point Likert scale. Patients reported being very satisfied with the ease of registration and scheduling a virtual care consult, with 90% rating their experience as 8/10 or greater. Patients were also satisfied with the software and logging into the virtual service, with 88% rating their experience as 8/10 or greater, and 93% were satisfied with the wait time with an average of 9.4 on a 10-point Likert scale. When patients were asked if they felt comfortable connecting with the health care provider virtually,

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		96% agreed, and 95% of respondents felt their privacy was respected. When patients were asked if their virtual healthcare provider spent sufficient time with them, 94% agreed, and 91% reported the virtual care visit was thorough. When asked if they would have preferred to meet the healthcare provider in person, half agreed they would want to receive healthcare in person, 35% said they preferred virtual care and 15% were unsure. The first patient-reported outcome measure related to the domain of patient understanding. The vast majority (over 80%) of respondents agreed they had answers to all the questions they had related to their health concern, understood their health concern as much as possible, had a clear picture or understanding of their health concern, and had as much information as they currently needed (Fig. 1). For the second patient-reported outcome measure of patient reassurance, over 80% of respondents felt at ease and reassured about their health concern after their virtual visit and had few lingering concerns (Fig. 2). For the third patient-reported outcome measures related to patient's having a plan, 80% of respondents believed they were able to manage the issue, had a plan they could follow, and knew what to do if the issue got worse or came back.
Nebsbjerg 2024 (55) Denmark Cohort study To investigate video use in	**Video use in telephone triage contacts** to OOH-PC in North Denmark Region, Central Denmark Region, Region of Southern Denmark, and Region Zealand. A register-based study was conducted to examine video use in telephone triage contacts to out-of-hours primary care (OOH-PC) services across four of the five Danish regions (North Denmark, Central Denmark, Southern Denmark, and Zealand). The Capital Region	**Efficiency: Service impact** Triage outcome (advice and self-care, referral to clinic consultation, home visit, or hospital admission). Patients receiving a video contact had a significantly higher frequency of ending the contact with advice and self-care compared to patients receiving a telephone contact (aIRR [adjusted incidence rate ratios] 1.21, 95% CI 1.21-1.21). Conversely, patients receiving a video contact had a significant lower frequency of being referred to a clinic consultation (aIRR 0.59, 95% CI 0.59-0.60) or a home visit compared to patients receiving a telephone contact (aIRR 0.31, 95% CI 0.29-0.32).

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telephone triage contacts to OOH-PC in Denmark by studying rate of use and potential associations between video use and patient- and contact-related characteristics and between video use and triage outcomes and follow-up contacts. March 2020 to Dec 2021 Community Advanced Services Weekdays 4 PM–8 AM, and 24/7 on	was excluded due to its distinct OOH-PC system. The study included all telephone contacts from 15 March 2020 to 1 December 2021, with Region Zealand included from 1 March 2021, when video triage was introduced there. Denmark's publicly funded healthcare system provides OOH-PC services staffed by GPs and final-year GP trainees (triage GPs), operating from 4 PM to 8 AM on weekdays and 24 hours on weekends and holidays. Triage GPs assessed whether video contact was appropriate and, with patient consent, initiated a one-way video link via text message. The GP could see the patient, but not vice versa. Triage outcomes included telephone or video consultation, clinic visit, home visit, or hospital admission. **Triage GPs were remunerated on a fee-for-service basis using specific codes.** Each patient was followed for seven days post-contact to assess outcomes.	The frequency of being admitted to a hospital was significantly higher after a video contact compared to a telephone contact (aIRR 1.20, 95% CI 1.17-1.23). **Effectiveness: Unplanned health service recontacts** In general, patients receiving a video contact had a significantly higher frequency of no follow-up contact compared to patients receiving a telephone contact (aIRR 1.09, 95% CI 1.08-1.09) (Table 3). For those who had a follow-up contact, the patients who received a video contact had a significantly higher frequency of having a follow-up contact with their regular GP compared to those receiving a telephone contact (aIRR 1.02, 95% CI 1.01-1.03). Conversely, patients receiving a video contact had a significant lower frequency of a follow-up contact in OOH-PC (aIRR 0.96, 95% CI 0.95-0.97) or at the hospital (aIRR 0.75, 95% CI 0.74-0.76) compared to patients receiving a telephone contact.

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weekends and holidays		

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