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TITLE

Antibiotic prescribing in UK out-of-hours primary care services: a realist-informed scoping review of training and guidelines for health care professionals

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Antibiotic prescribing in UK out-of-hours primary care services: a realist-informed scoping review of training and guidelines for health care professionals

Abstract

Background: Antibiotic overuse has contributed to antimicrobial resistance, a global public health problem. In the UK, despite the fall in rates of antibiotic prescription since 2013, prescribing levels remain high in comparison with other European countries. Prescribing in out of hours care (OOH) provides unique challenges for prudent prescribing, for which professionals may not be prepared.

Aim: To explore the guidance available to professionals on prescribing antibiotics for common infections in OOH primary care within the UK, with a focus on training resources, guidelines, and clinical recommendations.

Design and method: We carried out a realist-informed scoping review of peer-reviewed papers and grey literature focusing on antibiotic prescribing OOH (e.g. clinical guidelines, training videos). General prescribing guidance was searched whenever OOH-focused resources were unavailable. Electronic databases and websites of national agencies and professional societies were searched following PRISMA standards. Findings were organised according to realist review components i.e. mechanisms, contexts, and outcomes.

Results: 46 clinical guidelines and eight training resources were identified. Clinical guidelines targeted adults and children and included recommendations on prescription strategy, spectrum of the antibiotic prescribed, communication with patients, treatment duration, and decision-making processes.

Conclusion: No clinical guidelines or training resources focusing specifically on OOH were found. Our results highlight a lack of knowledge about whether existing resources address the challenges faced by OOH antibiotic prescribers. Further research is needed to explore the training needs of OOH health professionals, and whether further OOH-focused resources need to be developed given the rates of antibiotic prescribing in this setting.

How this fit in:

- A higher proportion of antibiotics are prescribed in out-of-hours primary care services, which may contribute to antibiotic resistance.
- Prescribing out-of-hours has additional challenges for health professionals, including managing patient anxiety and professionals being unfamiliar with patients' prior medical history and social circumstances.
- There is a lack of specific guidance for health professionals prescribing antibiotics in out-of-hours primary care services.
- Providing evidence-based training targeting health professionals working out-of-hours may increase prudent antibiotic prescribing

Introduction

Overuse and inappropriate prescribing of antibiotics is a worldwide public health concern as a major driver of antibiotic resistance (1). In the UK, 81% of all antibiotic prescriptions in 2017 were in primary care (2), including general practice and other community settings such as out-of-hours (OOH) services. Although antibiotic prescribing rates in general practice in the UK have fallen since 2013, rates of prescribing in OOH settings are increasing (3). Approximately 15% of OOH consultations result in an antibiotic prescription, with suggestions this could represent a partial shift of antibiotic prescribing from in-hours to OOH primary care (4). Prescribing of antibiotics OOH in the UK is high in relation to other European countries such as the Netherlands (5). Moreover, a substantial proportion of UK prescriptions have been reported as not clinically warranted (6-7), with research indicating that if the level of prescribing in the UK decreased there would not be an increase in complications (8).

Providing training in healthcare is key to improving quality of care and reducing prescription rates (9). In 2013, a multinational European study (which included the UK), showed that internet-based communication training plus C reactive protein testing in general practice could reduce antibiotic prescribing for respiratory tract infections (RTIs) by 15% (10). In another study, communication skills training reduced antibiotic prescribing in 27% of cases (11). More recently, in a study conducted in Belgium, antibiotic prescriptions for RTIs dropped by 12% following online training on prudent antibiotic use/prescribing (12); and in the USA, a clinical trial demonstrated that providing professionals with training on communication strategies and individualised

prescribing feedback decreased antibiotic prescribing for RTIs by 11% and a sustained reduction of 7% at follow-up (13).

However, little is known about how existing clinical guidelines and training materials account for the unique challenges of prescribing OOH, which include professionals being unfamiliar with the patient's medical history; the urgency of complaints and patient anxiety/expectations (14). Our goal was to explore the guidance available to health professionals on prescribing antibiotics for common infections in OOH primary care within the UK. We aimed to identify research evidence, training resources, guidelines and clinical recommendations relating to antibiotic prescribing in OOH in the UK. General antibiotic prescribing guidance was searched whenever OOH-focused guidance was unavailable.

Method

The scoping review followed PRISMA guidelines (15). The review was part of a larger mixed-methods observational study exploring how professionals and patients (and/or caregivers) communicate about common infections and their treatment OOH (the OPEN Project; <https://www.spcr.nihr.ac.uk/projects/414-understanding-antibiotic-prescribing-patterns-in-out-of-hours-ooh-primary-care>).

For this review, we wanted to go beyond a traditional systematic review which focuses on whether an intervention works or not to instead explore the mechanisms underlying antibiotic prescribing in OOH and how antibiotics are prescribed in this setting. To understand these mechanisms, we employed a realist review framework. Realist reviews are exploratory by nature and aim to develop theories about the process that make interventions work by identifying “mechanisms, contexts and outcomes” of complex scenarios (16). Although theory generating was beyond the scope of this paper, this framework guided our data synthesis towards the identification of the mechanisms underlying antibiotic prescribing.

Eligibility criteria

We were interested in peer-reviewed papers and grey literature concerned with how primary care professionals are trained and guided on how to prescribe antibiotics OOH in the UK. We included training materials, clinical guidelines, reports/audits, and research papers. To be eligible for the review, these materials had to: be developed for

the UK context or used in the UK; contain information relevant to patients of all ages / general population; and refer to common conditions treated in primary care (see Table 1 for full inclusion/exclusion criteria). Preliminary searches (as described in the next section) identified peer-reviewed papers about antibiotic prescribing OOH, but no guidelines and training materials designed specifically for OOH. For this reason, we expanded the search to include any guidelines for antibiotic prescribing in primary care (either in hours or OOH). Table 1 summarises the final eligibility criteria applied.

Information sources

We searched websites of major health care agencies (e.g. Public Health England), websites of relevant professional associations (e.g. Royal College of General Practitioners) and electronic databases (e.g. Medline) (see full list of sources used in the supplementary material). Sources were identified based on an exploratory search of the literature and research team and collaborators' experience.

Search strategy

The terminology used to perform the searches was informed by preliminary readings of key studies about antibiotic prescribing, as well as consultation with experts and local provider organisations (Table 2).

The search process was conducted iteratively as follows: an initial search strategy using a preliminary list of key words was devised with librarians at the Royal Free NHS Hospital (London); a trial search was conducted to pilot the accuracy and relevance of those key words; the list of key words was adjusted until a final list was obtained. Finally, a second search was run where all the key words were used in all sources/databases. The searches were conducted in two stages: between July-October 2018 and then updated in March 2020, using the same sources and keywords.

Selection of sources of evidence

The search results were saved and managed using EndNote (version 9). Documents were initially screened for inclusion based on title and abstract (if any) and table of contents/index. Whenever necessary the full text was consulted. All documents which met the inclusion criteria were selected. PA led the selection process with FS and GH leading an independent 10% reference review for quality assurance.

The preliminary list of selected documents was circulated to the full research team and collaborators to ensure all key references were included, which resulted in the identification of additional documents. We also shared this list with two OOH service providers (OPEN Project partners) so that local guidelines and training materials could be identified and included in our search. The search ended in April 2020.

The heterogeneity of document formats included for review hindered the use of standardised and structured quality appraisal checklists. However, the relevance and quality of the documents considered for inclusion was discussed and agreed within the research team, which included health care researchers and primary health care practitioners.

Data extraction and synthesis

We began by reading the full text of selected documents. Descriptive data, such as target population and year of publication, were compiled in a data extraction form, which served as a “template to interrogate the papers” (17). Data extraction was done iteratively, with new categories being included whenever required.

Our data synthesis aimed to consolidate our understanding of what is known about training and clinical recommendations for antibiotic prescribing in OOH primary care services. Data were synthesised as follows:

(i) Contexts

Research papers and clinical guidelines provided us with information about where healthcare professionals can find training and clinical guidelines for antibiotic prescribing. For this we summarised the information regarding the year of publication, country, setting, study design, clinical condition, and clinical population for each document and conducted a descriptive analysis of these data, based on counts and frequencies.

(ii) Mechanisms

Clinical guidelines provided us with information about the type of recommendations (mechanisms) healthcare professionals are provided with to prescribe antibiotics OOH. For this, we extracted verbatim quotations from guidelines and synthesised these data using a qualitative meta synthesis approach (18):

- 1) gaining familiarity with data by actively reading each document, which meant appraising and extracting the relevant information;
- 2) coding the information, which represented key principles for antibiotic prescribing and:
- 3) grouping the final codes into themes and organisation of themes into a hierarchical structure.

(iii) Outcomes

Research papers provided us with information about the outcomes of studies in which health professionals were provided with training or clinical guidelines about how to prescribe antibiotics OOH. We summarised the results of each study and synthesised the key findings.

Results

Search results

Our searches yielded a combined total of 2649 documents potentially eligible for review. After removing duplicates and preliminary screenings, 657 (24%) were included in the full-text screening. Of these, 59 (2% of initial yield) were included for review (see Figure 1). This comprised: 5 peer-reviewed papers, 46 clinical guidelines and 8 sets of training materials (webinars and eLearning modules). The research team agreed that all selected documents were relevant and of sufficient quality to inform the topic under review.

What is addressed in guidance for antibiotic prescribing?

After screening, five peer-reviewed papers were identified, of which two targeted only children and three targeted both adult and child patients. All five papers focused on in-hours care and general practitioners, but one also included pharmacists and further one nurses. Two of the papers focused on fever and one on respiratory tract infections. Two papers did not specify any health condition (Supplementary Table 1).

Guidelines and training materials were not specific to OOH, but instead included guidance available to all prescribers in general practices and hospitals (Supplementary Table 2). Guidelines fell into three categories: adults, children and generic. Most guidelines were either non-specific or about respiratory tract infections, urinary tract infections or sepsis. Most guidance targeted the UK only, with the remainders being international but used in the UK.

Which clinical recommendations for antibiotic prescribing are being provided to primary care professionals?

Although not specific to OOH, clinical guidelines and training materials included a wide range of general recommendations for antibiotic prescribing (see Supplementary Table 2). We grouped the themes covered in these documents as follows: 1) spectrum of the antibiotic prescribed, i.e. range of bacterial types that the antibiotic affects, including broad and narrow spectrum; 2) strategy to prescribe antibiotics, (i.e. immediate, no antibiotic and delayed or 'just in case'); 3) communication with patients, i.e. information and advice about antibiotics; 4) treatment duration, i.e. length of prescribed antibiotic course; 5) clinical benchmarking, i.e. comparisons using clinical data to support and implement best practice; and 6) decision-making process, i.e. steps involved in the process leading to antibiotic prescribing, including a no antibiotic decision.

The recommendations found across the literature were consensual, and no conflicting principles were identified. Moreover, half of the clinical recommendations synthesised (see Supplementary Table 2) were endorsed by more than one organisation. Approximately a third of the recommendations were published both in UK-only guidance and international documents. Just over 60% of recommendations were either revised/published in the last two years.

How do training and guidelines impact on antibiotic prescribing OOH?

There was limited mention in the literature about the outcomes of training interventions on antibiotic prescribing in OOH. The papers identified indicated that prescribers working OOH may face uncertainties about diagnosis (19) and that guidelines specifically related to working in OOH would be helpful in relation to the decision-making process (20). The literature also suggested that general practitioners and prescribing nurses may be prescribing antibiotics in OOH settings according to different standards and guidelines, and would appreciate supervision, discussion with peers or clinical audits (21). Prescribing is likely to be reduced when family physicians have access to interactive booklets to facilitate communication with patients (22) and peer education programmes promote greater adherence to clinical guidelines (23). See Supplementary Table 1 for further details concerning the findings of the studies.

Discussion

Summary

Our goal was to explore the existing clinical recommendations for primary care professionals working OOH, regarding how and when to prescribe antibiotics. We conducted a realist-informed review to provide an overview of the contexts, mechanisms and outcomes of these recommendations, described both in guidelines available to primary care professionals and research in the field.

Our key finding is that there is a paucity of information about how professionals are being trained to prescribe antibiotics specifically in OOH and whether further, specific training is required. For instance, the guidelines we reviewed highlight that professionals should discuss treatment plans, manage expectations and inform patients about the consequences of antibiotics and self-limiting conditions. However, there is a dearth of evidence regarding the basis for these recommendations, how they are being implemented in OOH settings or indeed how appropriate they are for this context, where health care professionals often have to diagnose infection without access to laboratory results. Additionally, it is also clear that further empirical research is needed in this field, particularly in relation to whether training professionals in OOH contributes to lower prescribing rates.

Strengths and limitations

The primary limitation of this review was the lack of information about training materials and guidelines focusing on OOH contexts. Our search results were shared with two OOH service providers in the hopes of identifying further resources, however no additional materials were identified. This made it difficult to produce definitive conclusions, aside from that professionals in OOH may not have access to specific training related to working in this context. Future studies should aim to engage with further OOH providers to ensure that local guidance is also considered. Nevertheless, our realist-informed review allowed us to consider the mechanisms underlying antibiotic prescribing in OOH which may provide a platform on which to build future theoretical work. Another limitation is that due to the heterogeneity of sources, quality assurance review was dependent on the expertise and judgment of the research team as opposed to traditional standardised quality appraisal procedures.

Comparison with existing literature

The limited research on prescribing antibiotics in OOH settings makes it difficult to compare our findings with previous literature. Previous studies have shown that educational interventions and training are likely to optimise prescribing competency (24) and reduce inappropriate prescribing (25). The literature also indicates that general training for GPs and other clinicians working OOH could be expanded and standardised at national level. For instance, in a survey with over 1000 GP trainees in England, Hayward et al. (26) found that only half of GP trainees received formal education sessions on OOH care, and a no more than a third were offered formal training in OOH home visits. Training in OOH care is generally perceived as a positive experience for GPs and trainees, suggesting that further training could be well received (27).

Implications for research and practice

This review highlights the need for further thought and discussion as to whether general clinical guidelines on antibiotic prescribing are adequately addressing the particularities and challenges of OOH care. This includes (i) the management of patients by health professionals unfamiliar with their medical history, (ii) limited access to medical records and testing, (iii) higher levels of patient (and caregiver) pressure and patient anxiety, (iv) perceived/actual urgency of complaints / acuity of infections on point, (v) patients who may have experienced difficulties accessing care and prescriptions in-hours and (vi) little opportunity for patient follow-up (14, 21, 28). It is important to explore the needs of healthcare professionals working OOH and their preferences regarding the format and type of resources needed to support this work to ensure that the success of future interventions is optimised.

In terms of prescribing strategies, our review identified various recommendations for UK healthcare professionals when prescribing antibiotics. However, since none of these were tailored specifically to OOH care, it is uncertain whether the recommendations are relevant and feasible in this setting. For instance, research shows that delayed prescribing has been associated with a decrease in antibiotic use (29-33). Further research is needed to explore the benefits and barriers to offering delayed antibiotic prescriptions OOH where there may be particular patient expectations regarding the immediacy of the need for a prescription.

Moreover, as Colliers et al. (20) suggest, based on primary care in Belgium, GPs working OOH do not always feel confident in their decision-making regarding antibiotics

and feel less responsible for these decisions due to patients being “unknown”. Similar findings were reported in UK studies which highlighted the lack of prior relationship with patients as a factor hindering clinical decision-making (21). On this basis we believe that evidence-based training may help strengthen antibiotic stewardship practices in OOH contexts. Evidence-based targeted training may result in modifying OOH consulting behaviour and optimising prescribing practices in line with generalised antibiotic stewardship programmes which have been shown to be effective in improving patient outcomes, producing savings for health services and reducing antibiotic resistance (34).

This review identified no current clinical guidelines or training resources focusing on antibiotic prescribing targeting professionals working in OOH primary care settings in the UK and only limited research evidence about the use of educational interventions in this field. Our review also suggests that even though they have been separated from in-hours GP services since 2004, it is unclear which guidelines are being used by medical and non-medical prescribers working OOH in the UK.

Further research is needed to ascertain whether the existing guidance is fit for the challenges faced in OOH settings, and whether and what other resources targeting antibiotic prescribing OOH need to be developed. Observational and exploratory research could be a first step towards understanding the context and training needs of professionals working OOH, and how training and updated guidelines could best support prescribing practices.

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Declaration of interests

All authors declare that no competing financial, professional, or personal interests that might have influenced the performance or presentation of the work described in this manuscript.

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Figure 1: Selection flowchart and reasons for exclusion

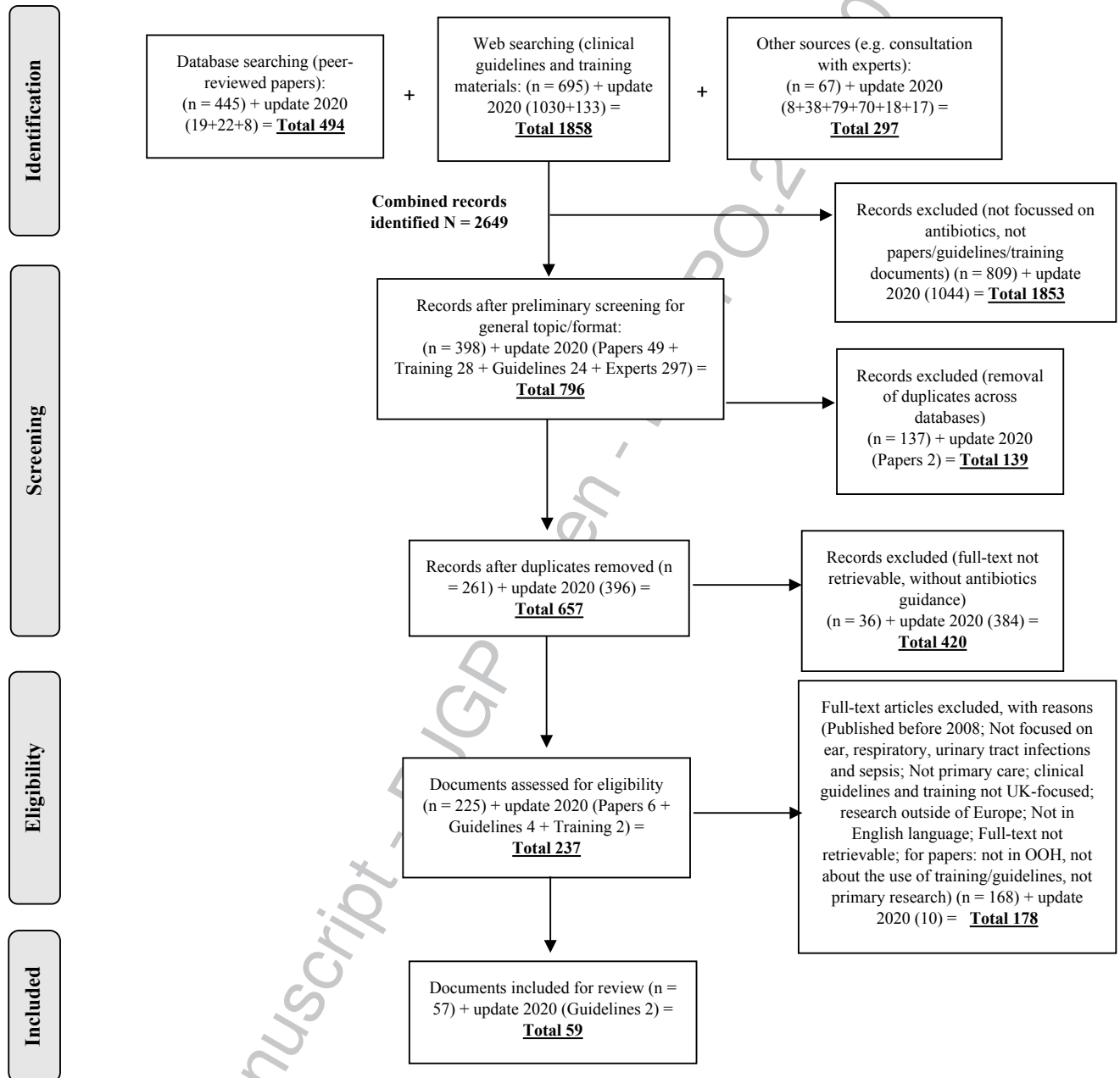


Table 1: Inclusion and exclusion criteria

| Inclusion | Exclusion |
|---|---|
| Antibiotic prescribing in primary care | Antibiotic prescribing in secondary, tertiary care services and dentistry |
| Child, adolescent and adult health | Languages other than English |
| Male/female patients | Published before 2008 (last 10 years) |
| Respiratory, ear, skin, urinary tract infections and sepsis | All other infections |
| Developed and/or used in UK relevant | |

Table 2: Key search terms

| Type of document | Search term | Alternative search terms | Associated subjective headings (MeSH terms, exploded) |
|---|---------------------------|--|---|
| - Peer-reviewed papers only | - Out-of-hours | - Urgent and emergency care - After-hours - Accident and emergency service | - After-hours care - Emergency medicine |
| - Peer-reviewed papers - Other documents (Clinical guidelines, training materials) | - Antibiotic | - Antibacterial - Antimicrobial | - Anti-Bacterial Agents |
| | - Prescription guidelines | - Guidance on prescribing - Guidance for dispensing - Good practice in prescribing | - Drug Prescriptions - Practice Guidelines as Topic - Drug Utilization - Practice Patterns, Physicians' - Guideline Adherence |
| | - Professional training | - Professional development - Professional skills - Continuing professional development | - Education, Medical - Education, Nursing |