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KNOWLEDGE AND PRACTICE OF COMMUNITY PHARMACISTS REGARDING ANTIBIOTIC DISPENSING WITHOUT PRESCRIPTION

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1. INTRODUCTION

Antibiotics changed medicine, and they are now losing some of their power. Bacterial infections that once yielded to a short course of a cheap drug increasingly need second- or third-line treatment, longer hospital stays and higher costs. A cost analysis in a large teaching hospital found that resistant infections added substantially to treatment costs and to length of stay [1]. Consumption is part of the cause. Between 2000 and 2015 global antibiotic use rose by about two-thirds, mostly in low- and middle-income countries [2], and every unnecessary course adds a little to the selection pressure on bacteria [3, 4, 5].

Abstract

Dispensing antibiotics without a prescription remains common in community pharmacies in many countries and adds to antimicrobial resistance. This review summarises published surveys, simulated-client studies, qualitative work and intervention trials on what community pharmacists know about antibiotics, how they behave when asked for them without a prescription, and why. It covers the extent of the practice, knowledge and attitude findings, commercial, regulatory and patient-related drivers, consequences, and interventions that have been tried. The review reports no new survey or data. Published work shows frequent dispensing despite reasonable knowledge, so knowledge alone does not explain behaviour, and rigorous evaluations of interventions remain few.

The problem is therefore not confined to any one health system. It appears in rich and poor settings, and it involves ordinary clinical decisions made many times a day by pharmacy staff who are often busy, under commercial pressure and seldom audited.

Prescription-only status is meant to put a clinical judgement between the patient and the drug. Where antibiotics can be bought over the counter, that check disappears, and the person at the counter, usually a pharmacist or a pharmacy assistant, becomes the only gatekeeper. Early accounts of resistance in developing countries already described antibiotics being sold over the counter with little control [6], and later observational work in Egyptian community pharmacies found antibiotics dispensed without prescription in a large share of encounters [7]. The law on paper and the practice at the counter are often quite different things. Pharmacists are also among the most accessible health professionals in many communities, open long hours and needing no appointment. That accessibility is a strength when they give sound advice, and a liability when the same convenience is used to obtain medicines that need a diagnosis first [8, 9].

This review looks at the evidence on community pharmacists in particular. It asks how often antibiotics are supplied without prescription, what pharmacists know about appropriate use, what practice studies and qualitative interviews say about the reasons they dispense, and which interventions have been tested. It is a narrative synthesis of published surveys, simulated-client studies, qualitative work and trials, and it reports no new survey. Where survey figures are given they are those of the original authors and they are rounded, as methods and settings vary too much for precise comparison. The sections that follow take the evidence in turn, beginning with how common the practice is, and end with the limits of the literature itself, since the strength of any conclusion depends on how the studies were done and who took part in them.

2. EXTENT OF DISPENSING WITHOUT PRESCRIPTION

Two kinds of study measure how often it happens. Surveys ask pharmacists what they do, and simulated-client (mystery shopper) studies send trained people to ask for an antibiotic or to describe a standard infection and record the response. The second design avoids the social desirability bias that makes

self-reports optimistic. A systematic review of studies from developing countries found that non-prescription supply of antibiotics was frequent across much of the world, though with wide variation between studies and settings [10]. Even so, simulated-client studies have limitations of their own. They record a single transaction, the scenarios are chosen by researchers, and ethical review has sometimes been waived or modified because the pharmacists are not told they are being studied, which is itself debated in the literature [11, 12].

National figures show how uneven the picture is. Studies in Catalonia and in Greece, both European settings where prescription rules apply, documented dispensing of antibiotics for scenarios such as sore throat or urinary symptoms in a substantial share of pharmacy visits [11, 13]. A multicentre study in urban China found that around half of the pharmacies approached supplied antibiotics without a prescription [14]. Studies from Sri Lanka, Zambia and Ethiopia reported that such sales were routine or at least common [12, 15, 16]. The rule against it exists nearly everywhere, but enforcement is another matter. Self-medication surveys in Europe and elsewhere confirm that the community demand is real [17, 18]. Differences in method complicate comparison across countries. A study that presents a request for a specific named antibiotic will find more supply than one that describes symptoms and asks for advice, and sale to a person who appears confident is more common than to one who seems unsure. Still, the overall direction is not in doubt [7, 10].

Which antibiotics are involved matters too. The commonest requests are for broad-spectrum penicillins, macrolides, fluoroquinolones and cephalosporins, which are also the classes most closely linked to resistance problems, and the indications are usually self-limiting respiratory and gastrointestinal complaints that do not need antibiotics at all [6, 8, 10]. Dispensing is more likely for simple, uncomplicated requests and less likely for children or for medicines perceived as strong. Some studies find that pharmacists fall back on partial courses, supplying a few tablets sufficient for a day or

two, which is almost certainly worse than either a full course or none [10, 15]. The size of the courses and the dosing instructions given at the counter are reported only rarely, which is a pity, since accurate advice on dose, duration and adverse effects would at least reduce some of the harm from a sale that should not have happened [6, 8, 15].

3. KNOWLEDGE AND ATTITUDES OF PHARMACISTS

Knowledge-attitude-practice surveys are the commonest way to study this subject. Taken as a body, they find that pharmacists generally score well on basic questions, such as the fact that antibiotics do not work on viruses or that resistance follows overuse, and that a notable minority hold mistaken beliefs about specific points, including which conditions need antibiotics and which classes are appropriate [19, 20, 21]. A Hungarian survey, for instance, found good overall understanding but some uncertainty about how to handle customers who insist on a particular drug [20]. Mixed results of this kind recur in many countries. Differences in questionnaire design make cross-country comparison difficult, and the passing score on a knowledge item is rarely defined in advance. Even so, the broad pattern stands, and it has been reproduced in studies from Europe, the Middle East and Asia [19, 20, 21].

A survey of pharmacists in Makkah Province reported that most acknowledged dispensing antibiotics without prescription at least sometimes, even though many agreed that doing so contributes to resistance [19]. A Saudi study of community pharmacy found a similar gap between recognition of the problem and behaviour at the counter [22]. In Albania, researchers questioned the assumption that pharmacists' knowledge can be taken for granted, finding gaps in understanding of indications and in distinguishing bacterial from viral illness [21]. Knowing the right answer on a questionnaire is clearly not the same as acting on it with a customer waiting. The point is made repeatedly in the literature. Education gives a pharmacist the means to decide correctly, but it does not remove the pressure to decide otherwise, and surveys that only

measure the first are likely to understate the problem. That explains why some authors urge observation of real transactions in preference to questionnaires alone [19, 22].

Attitudes seem to carry more weight than knowledge. Pharmacists who believe that refusing a sale will send the customer to a competitor, or who see antibiotic supply as a legitimate part of the pharmacy's role in primary care, are more likely to dispense [23, 24, 25]. Others see the problem as primarily a doctor's issue, believing that prescribers overuse antibiotics, so a pharmacist's own contribution is small. Findings on age, gender and years of experience are not consistent across studies [22, 25]. Beliefs about patient safety also play a part. Some respondents state that a single course of an antibiotic is unlikely to cause harm and that the real danger is hospital use or agricultural use, a view that is understandable but not supported by the resistance data discussed later in this review [4, 5, 26].

The main published findings are collected in table 1, and their distribution by theme is shown in fig. 1. The striking feature is the imbalance: there are many descriptive surveys and relatively few controlled evaluations, and surveys of knowledge outnumber studies that observe real behaviour. Readers should keep in mind that most data come from self-selected respondents. Pharmacists who agree to answer a questionnaire about antibiotic stewardship may well be the more conscientious ones, which tends to flatter the results. Better reporting would help. Authors could state the response rate, how the sample was drawn, and how many respondents were pharmacy owners as opposed to employees, because those details change how far a result applies to the profession as a whole [20, 21].

4. PRACTICE DRIVERS

Commercial pressure comes up in nearly every qualitative study. Pharmacies in competitive markets depend on sales, and antibiotics are a high-turnover product. A qualitative study from New Delhi described pharmacists who dispensed because customers would otherwise go elsewhere, because the clinic was costly or distant, and because enforcement was weak [23]. A

Tanzanian study of accredited drug outlets reported similar motivations, including a sense that customers expected a medicine and that refusing would damage trust [24]. Profit is seldom stated outright, but it is clearly present in the background. Business structure seems to matter too. Pharmacists who own their premises describe stronger personal pressure to keep customers, while employed pharmacists and those in chain stores sometimes report that company policy or fear of inspection discourages sales without prescription [23, 25].

Patient demand and access to doctors form a second cluster. Where consultation fees are high, waiting times are long or clinics are far away, the pharmacist is the first and sometimes only health professional a person meets [10, 27, 28]. Patients arrive with expectations shaped by previous prescriptions, by advice from relatives and by marketing, and many ask for a named antibiotic. Some pharmacists regard supply as a public service in these circumstances, and they say so. Seen from this angle, refusal feels like denying care and not like stewardship. Cultural expectations are not trivial. In some communities, buying medicines directly from a pharmacy or drug shop is an ordinary first step in managing illness, and a visit to a doctor is kept for severe disease or failed home treatment [27, 28]. Pharmacists who work within that custom are acting in line with what their customers consider normal.

Table 1: Published studies on antibiotic dispensing without prescription by community pharmacists

Study type / setting	Reported finding	Ref.
Review resistance in developing countries	Over-the-counter antibiotic sales described in many low- and middle-income settings.	[6]
Meta-analysis simulated-client studies	Antibiotics dispensed without prescription in most visits.	[7]
Simulated clients Catalonia, Spain	Antibiotics supplied for common respiratory and urinary scenarios in a notable share of visits.	[11]
Pharmacy visits Greece, 2008	Dispensing without prescription frequent despite legal ban.	[13]

Study type / setting	Reported finding	Ref.
Multicentre survey urban China	Around half of pharmacies sold antibiotics without prescription.	[14]
Knowledge survey Makkah, Saudi Arabia	Many admitted occasional dispensing despite recognising resistance risk.	[19, 22]
Knowledge survey Hungary	Good overall knowledge; some uncertainty over insistent customers.	[20]
Knowledge survey Albania	Gaps in indications and in bacterial versus viral illness.	[21]
Qualitative studies New Delhi, Tanzania	Competition, customer demand, cost of consultation and weak enforcement.	[23, 24]
Randomised trial Vietnam and Thailand	Multi-component intervention improved dispensing for respiratory infection and diarrhoea.	[29]
Systematic review pharmacist interventions	Modest benefit on general practitioners' prescribing.	[30]

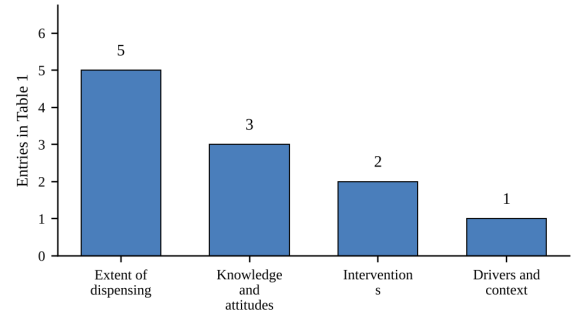


Fig. 1: Number of entries in table 1 by theme

Regulatory weakness is the third cluster. Pharmacist surveys in several countries mention that inspections are rare, penalties are small or never applied, and competitors dispense freely, so one compliant pharmacy loses trade without improving public health [9, 16, 23]. A Spanish study found that dispensing without prescription was associated with features of the pharmacy and its location, which suggests that context and not individual character explains a good part of the variation [25]. Where rules are enforced consistently, behaviour has been observed to change quite quickly. Policy analysts also point out that the effects of legal change depend on supply of alternatives. Where a prescription requirement was

introduced without improvement in access to primary care, some reports describe a rise in informal sales through unlicensed outlets and street vendors, which are harder to monitor than registered pharmacies [9, 16].

Clinical uncertainty plays a smaller but real part. Without diagnostic information, a pharmacist asked to help with a sore throat or diarrhoea cannot tell whether it is viral, and some prefer to err on the side of treatment, especially when the customer is a child or looks unwell [8, 10, 12]. Point-of-care tests such as C-reactive protein have been shown to cut antibiotic use in clinical settings, and training in communication helps clinicians explain why antibiotics are not needed [31]. Whether similar tools would work in pharmacies is a fair question that few studies have addressed. Studies of this question remain sparse. Pharmacists' decisions about who to refer and when are poorly documented, and most evidence comes from interviews, which are good for reasons and poor for measuring how frequent each reason is [23, 24].

5. CONSEQUENCES FOR PATIENTS AND PUBLIC HEALTH

The link between community antibiotic use and resistance is well supported. Across European countries, areas with higher outpatient consumption showed higher resistance rates [26], and a meta-analysis of primary care studies found that individuals prescribed an antibiotic carried resistant bacteria for up to a year afterwards, with the strongest effect in the first month [4]. A second meta-analysis found a consistent association between consumption and resistance at both individual and population levels [5]. Evidence specific to pharmacy sales is less direct, because sales are rarely recorded, but there is no reason to think these courses behave differently. Surveillance is a persistent difficulty. Resistance data usually come from hospital laboratories and reflect the sickest patients, while the community picture is far less clear, which makes it hard to attribute any change in resistance to changes in over-the-counter sales [1, 4]. Ecological studies, in particular, cannot show cause with confidence.

Individual patients can be harmed as well. Antibiotics taken for a viral illness bring side effects such as diarrhoea, rashes and allergic reactions, with no benefit, and a wrongly chosen drug or dose may let a bacterial infection progress while masking its signs [8, 32]. Delayed diagnosis of conditions such as pneumonia or tuberculosis is a recognised risk when partial courses are taken before seeing a doctor. Unsupervised use also bypasses checks for allergy, pregnancy, renal function and interactions, which are the ordinary parts of a prescribing decision. Evidence on harm from non-prescription courses is mostly indirect and relies on case reports and on the known adverse effect profiles of the drugs involved [8, 32].

6. INTERVENTIONS

Multi-component interventions have the best evidence. A randomised trial in private pharmacies in Vietnam and Thailand combined education, peer feedback, and the involvement of authorities, and reported improved dispensing for acute respiratory infection and diarrhoea compared with controls [29]. Few comparable controlled studies exist. Most other reports describe uncontrolled before-and-after training programmes, which cannot separate the effect of the intervention from background change or from heightened awareness among participants who know they are observed. The intervention bundled several parts, with pharmacy staff receiving training and feedback while local authorities were engaged, and the effect appeared across both countries. Whether results transfer to settings with different regulation or pharmacy ownership is unknown, and long-term follow-up was limited [29].

Education on its own gives mixed results. Knowledge scores usually rise after training, but there is little evidence that behaviour at the counter changes unless training is linked with other measures [29, 30]. A systematic review of pharmacist-based interventions to influence doctors' prescribing found modest benefit [30], which shows that the profession can have an effect on stewardship from other positions. Decision aids, such as simple algorithms for common complaints and scripts for explaining why an antibiotic is not

needed, are cheap and have face validity, though trial evidence is limited. Targeted training of non-pharmacist staff deserves attention in this context, since they handle much of the counter work in many countries. Programmes that reach them directly, in the language they use, may achieve more than courses limited to registered pharmacists [9, 16].

Regulation and enforcement are the other pillars. The countries with the lowest rates of non-prescription supply tend to be those with strict rules, regular inspection and reimbursement systems that link payment to prescriptions [6, 9, 33]. Changing law without ensuring access to prompt, affordable care risks leaving patients with no way to treat a genuine infection, so reform needs to widen access at the same time as it narrows the loophole. Public awareness campaigns can support such changes by reducing demand at the counter [8, 33]. Evidence on the effect of public campaigns is mostly from prescribing, not from pharmacy sales, and some campaigns raised awareness without changing behaviour. Combining messages with a visible change at the pharmacy counter, such as a poster stating the policy, may help staff say no [18, 33].

7. LIMITATIONS AND FUTURE DIRECTIONS

The evidence has several recurrent weaknesses. Surveys depend on self-report and on convenience samples, response rates are often modest, and questionnaires differ between studies, which limits comparison [19, 20, 22]. Simulated-client studies are closer to behaviour but cover a few scenarios and small samples, and they are hard to repeat. Study populations are concentrated in a few countries, so evidence on large parts of Africa, Latin America and Central Asia is thin [7, 10]. Reports often fail to distinguish pharmacists from assistants, which blurs the interpretation of knowledge results. Publication bias is an additional concern. Studies that find high rates of non-compliance get attention, while those that find good practice may be less likely to be written up, and the reverse may happen in settings where pharmacists wish to appear compliant [7, 10, 17].

Better studies are possible. Standardised simulated-client protocols with several scenarios, pharmacist and non-pharmacist staff identified separately, and sales data from pharmacy systems would give a more reliable picture of what is dispensed. Randomised or stepped trials of combined training, regulation and decision support, with antibiotic sales as the outcome, would show what works [29, 30]. Qualitative work should include customers and prescribers as well as pharmacists, since the problem is made by all three together [23, 24, 27]. The wider research agenda includes evaluation of pharmacist-led services that offer something in place of a sale, such as minor ailment advice, rapid testing and structured referral, as well as study of how patients themselves respond when a pharmacist declines [18, 31]. This review has similar limits, since it is a narrative synthesis and may have missed relevant reports.

8. CONCLUSION

Published studies show that dispensing antibiotics without prescription by community pharmacists is common in many settings, including some with clear legal prohibitions, and that it takes place alongside reasonable knowledge of resistance [6, 7, 19, 20]. The reasons reported are mainly commercial pressure, patient demand, limited access to doctors and weak enforcement, which means that education directed at pharmacists, however useful, addresses only part of the problem [23, 24, 25]. Resistance-related deaths and costs, though hard to attribute to any single practice, make the issue one of general concern [1, 34].

Progress will probably need several measures at once: consistent regulation, accessible primary care, practical decision support and training for all staff who serve customers, evaluated in controlled studies that measure what is really dispensed [29, 30, 33]. Until such evidence accumulates, descriptions of pharmacist behaviour should be read as signs of a system-level problem, not as simple evidence of individual failings. Pharmacists will carry much of this work, and they will do it better if the rules and incentives around them point the same way.

9. ABBREVIATIONS

AMR-Antimicrobial resistance, KAP-Knowledge, attitudes and practice, WHO-World Health Organization, CRP-C-reactive protein

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11. AUTHORS CONTRIBUTIONS

All the authors have contributed equally.

12. CONFLICT OF INTERESTS

Declared none

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