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## **An evaluation of antimicrobial stewardship in community pharmacy**

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### **Abstract**

This study investigated several aspects of antimicrobial stewardship by gathering information from community pharmacists and members of the public. The aim was to identify how community pharmacists implement antimicrobial stewardship guidelines and influence patients on the use of antibiotics.

This study required and received approval from the University of Huddersfield Ethics Committee. Information and opinions of community pharmacists in the Kirklees and Calderdale areas, and surrounding local areas, and of members of the public in Huddersfield town centre, were gathered using two different questionnaires. These focused on initiatives regarding antibiotic resistance, development of the competencies required for medicines optimisation and antimicrobial stewardship, patient education by pharmacists, monitoring of antibiotic prescribing and pharmacy access to records. The results obtained were then analysed. The study consisted of 50 participating pharmacists and 100 participating members of the public. It was identified that eight pharmacists had undertaken recent professional development regarding antimicrobial stewardship, 11 had made an Antibiotic Guardian pledge and eight monitored antibiotic prescribing. It was also discovered that, when handing out a prescription for antibiotics, five pharmacists (all of whom work in an independent pharmacy) always questioned the indication and seven always provided extra self-care information. Finally, 92 members of the public selected that they would be comfortable allowing their indication (the condition that the antibiotic is being used to treat) to be provided on prescriptions for antibiotics, and 83 selected that they would be comfortable with pharmacies having access to medical records.

This study suggests that increased awareness is necessary of the resources that are available to pharmacists regarding antibiotic resistance initiatives and monitoring of antimicrobial prescribing. In addition, an improvement is required concerning patient education by community pharmacists. Finally, the public should be appropriately educated regarding patient confidentiality and the benefits of pharmacies having access to patient information.

**Keywords:** Antibiotics; resistance; prescribing; monitoring; stewardship.

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## **Introduction**

### *Purpose*

Antibiotics are an extremely valuable resource. An increase in antimicrobial resistance, combined with a lack of development of new antimicrobial drugs, has, therefore, caused antimicrobial stewardship to be a very important global priority (World Alliance Against Antibiotic Resistance (WAAAR), 2014). According to WAAAR (2014): 'It is estimated that at a minimum 25,000 patients in Europe and 23,000 in the USA die each year from infections caused by resistant bacteria.' Antibiotic resistance occurs as bacteria gain resistance mechanisms. Antibiotic resistance has become such a global issue because of the amount of antibiotics used. Antibiotics are used extensively in healthcare, as well as agriculture, leading to the development of antimicrobial resistance (WAAAR, 2014). Antimicrobial stewardship involves ensuring that antibiotics are prescribed appropriately and used effectively by patients (Centre for Pharmacy Postgraduate Education (CPPE), 2013).

The importance of antimicrobial stewardship is currently being highlighted in many ways. These include *The UK Five Year Antimicrobial Resistance Strategy 2013 to 2018* (Department of Health & Department for Environment, Food and Rural Affairs, 2013), which discusses different areas for action, such as optimising prescribing and using surveillance data. The overall aim is to reduce the spread of antimicrobial resistance (CPPE, 2013). There has also been a CPPE campaign named 'Use antibacterials wisely'. The campaign involved various challenges for pharmacy professionals, including developing knowledge regarding antimicrobial resistance, putting learning into practice and becoming an Antibiotic Guardian. It aimed to encourage pharmacists to interact with other healthcare professionals and the public to highlight how they can work together to protect the valuable resource that is antibiotics (CPPE, 2014b). Therefore, it is essential that prescribers, pharmacists and the public understand the impact of antimicrobial resistance, and how antibiotics can be preserved through antimicrobial stewardship. As this is currently a global priority, this study aimed to gain information and opinions from pharmacists and the public regarding antimicrobial stewardship.

### *Aim*

The aim of this project was to investigate the strategies used by community pharmacists to implement guidelines on antimicrobial stewardship and to influence patients with respect to the use of antibiotics.

### *Objectives*

These were as follows:

- to determine the skills and knowledge of community pharmacists about the national and international initiatives regarding the prevention of antibiotic resistance;
- to determine the methods used by community pharmacists to develop the competencies required for medicines optimisation and antimicrobial stewardship;
- to determine the degree of patient education by pharmacists directed at minimising the use of antibiotics;
- to determine how patient information is used by community pharmacists to monitor the increased prescribing of antibiotics by GPs for coughs and colds, despite guidance aimed at changing the culture of inappropriate prescribing;

- to determine the views of the public regarding pharmacies having access to patient records.

## **Literature review**

### *The rise of antimicrobial resistance*

Failure in treatment with antibiotics rose 12% in primary care between 1991 and 2012, correlating with increases in antimicrobial prescribing (Currie et al., 2014). This rise has been noted in reports by Public Health England (2014b), which have recorded a 4% increase in the number of antibiotics prescribed on NHS prescriptions in primary care between 2010 and 2013.

The circumstantial evidence suggesting that the use of antimicrobials causes increased resistance now seems clear, and this idea is accepted in healthcare worldwide (Department of Health, 1998). Overuse and overprescribing are not the only factors, as inappropriate use by patients can cause resistance by not fully killing the pathogen and producing selective pressures on both the pathogens and body flora (McNulty, Boyle, Nichols, Clappison, & Davey, 2007). Although genetic resistance mechanisms in our own bacterial flora would not in themselves be problematic, their spread to virulent bacteria could be.

### *Problems within prescribing in primary care*

GPs were 40% more likely to prescribe antibiotics for coughs and colds, sore throats and otitis media in 2011 than they were in 1999 (Hawker et al., 2014), going against guidance from the Department of Health stating that antibiotics should not be used for these conditions (*Pharmacy Magazine*, 2014). In a recent survey, over a quarter of GPs said that they prescribe antibiotics when they are unsure whether they are appropriate, with 90% stating that they felt pressured to do so by the patient (Doctor.net.uk, 2014, cited by Nesta, 2014).

Although patient demand for prescription items is said by GPs to be a problem, GPs often misjudge patient expectations, according to Stimson (1975, cited by Britten, 1995). This misjudgement was also identified by Himmle, Lippert-Urbanke, and Kochen (1997), with GPs correctly identifying only 41% of patients who expected prescription items. Although this research was done in Germany, and may not be representative of British GPs, it does highlight a possible issue.

### *The UK's actions against antimicrobial resistance*

The UK has been at the forefront of much of the movement internationally surrounding the fight against antimicrobial resistance (Harvey, 2014). In an effort to raise awareness of problems caused by antimicrobial resistance, the UK has developed its own national campaigns, such as the Antibiotic Guardian campaign (ABGC) pledge in 2014. This centred around European Antibiotic Awareness Day (EAAD) and tried to raise awareness of the threat of antimicrobial resistance, encouraging healthcare professionals and the public to pledge actions to help to prevent it (Public Health England, 2014a).

The optimisation of prescribing has also been a key issue within the UK and, focusing on primary care, the 'TARGET' antibiotic toolkit (McNulty, 2012) was developed. The toolkit is aimed primarily at GPs, community pharmacists and nurses, and aims to raise awareness of antimicrobial resistance and the appropriate

use of antimicrobials, while also providing educational tools on these subjects for healthcare professionals to share with patients (McNulty, 2012).

#### *The UK Five Year Antimicrobial Resistance Strategy*

As well as the above actions, the Department of Health and the Department for Environment, Food and Rural Affairs have put together *The UK Five Year Antimicrobial Resistance Strategy 2013 to 2018*, providing an action plan to address the issue. This plan, as the title suggests, runs over five years and seeks to tackle the problem of antimicrobial resistance through three aims (Department of Health and Department for Environment, Food and Rural Affairs, 2013):

- to improve the knowledge and understanding of antimicrobial resistance;
- to conserve and steward the effectiveness of existing treatments;
- to stimulate the development of new antimicrobials, diagnostics and other novel therapies.

More detail is given within the paper, with infection prevention and control, optimisation of antimicrobial prescribing, and professional and public education being key topics of interest for community pharmacists (Department of Health and Department for Environment, Food and Rural Affairs, 2013).

#### *Community pharmacy*

The role of the community pharmacy team in antimicrobial stewardship can be simplified into two main objectives (CPPE, 2014a):

- ensuring antimicrobials are prescribed appropriately when needed;
- ensuring they educate patients to improve the chances of them using their antimicrobial properly.

These broad aims encompass several opportunities for community pharmacists, but require pharmacists to ensure that they keep up to date with professional development in this area, as advised by Howard et al. (2013).

#### *Monitoring prescribing*

Pharmacists have access to PACT (prescribing analysis and cost) data and this information could be used to identify local prescribers who are prescribing high levels of antimicrobials. With this information, community pharmacists could approach such prescribers and develop strategies with them to reduce these levels (CPPE, 2014a). This advice has been echoed by NICE (2015b), who also suggested that multidisciplinary teams should monitor antimicrobial prescribing rates within local areas, providing guidance to prescribers who have abnormally high rates (NICE, 2015a).

#### *Educating patients*

Basic information regarding the appropriate use of antibiotics should be given to all patients receiving them by community pharmacists, emphasising the need to finish the course and not to save antimicrobials for another infection or to share them with others. A survey by Pharmacy Voice (2014, cited by Goldman, 2014) found that many patients used their antimicrobials inappropriately in these ways, increasing the risks of resistance, and showing a need for community pharmacists to tackle the inappropriate use.

### *Possible resources*

There are already a number of resources available to complement pharmacists in their role as antimicrobial stewards, such as the ones in the TARGET antibiotic toolkit (Ashiru-Oredope, 2014). Campaigns such as the ABGC (Public Health England, 2014a) are available and were highlighted in the CPPE booklet (2014a) *Antibacterial resistance – a global threat to public health: the role of the pharmacy team*, part of the 'Use antibacterials wisely' campaign. This was sent to 62,000 GPhC pharmacy professionals (Pharmaceutical Services Negotiating Committee (PSNC), 2014), and covered topics including roles and resources for community pharmacists as antimicrobial stewards. The campaign also involved six online challenges, one for each week of the campaign (PSNC, 2014), and these were emphasised within the CPPE booklet (CPPE, 2014a).

The minor ailments scheme allows patients who are exempt from paying prescription charges to receive free over-the-counter medicines from a community pharmacy for certain minor ailments. This allows patients who are deterred by the price of over-the-counter medicines to seek advice from a pharmacist first, rather than visiting a GP for free prescription items. Therefore, this could possibly lead to fewer GP appointments (Ashiru-Oredope, 2014), and possibly lower antimicrobial prescribing rates, with patients treating their ailments with over-the-counter medicines instead.

### *Access to patient medical records*

Within antimicrobial stewardship lies another issue, namely community pharmacies' access to patient medical records. Although patient concerns about confidentiality and consent to the sharing of these records have been expressed (Lawrence, 2014), there are major advantages to patient care. The Royal Pharmaceutical Society (2014) believes that it is a progression in patient care, and that SCR (Summary Care Records) allow more informed decisions surrounding pharmaceutical care, possible improved adherence, and maximised value from pharmacy.

## **Design/methodology/approach**

### *Study design*

This was a prospective and investigational study that examined the strategies used by community pharmacists to implement guidelines on antimicrobial stewardship, and to influence patients with respect to the use of antibiotics. There were two aspects to the study, one involving pharmacists and the other involving members of the public. Data were collected using two questionnaires, which were validated with pilot questionnaires. The questionnaires contained a variety of open and closed questions, allowing both quantitative and qualitative data to be collected. Pharmacists are often limited for time, and questionnaires take less time to complete than other data collection methods, such as interviews and focus groups. This method is appropriate for members of the public, as they are also often limited for time and may not be willing to participate in projects that require more effort on their part. Paper forms of the questionnaires were used, as the technology available to each of the consenting pharmacists is unknown. This is also true for the various parts of Huddersfield town centre, where members of the public were asked to complete questionnaires.

### *Study population, subject recruitment and research site*

The population for the study was decided based on locations. The study population was community pharmacists in the Kirklees and Calderdale areas, and surrounding local areas, and members of the public in Huddersfield town centre. A consent letter was sent to pharmacies in the Kirklees and Calderdale areas. It contained an attached permission slip for the pharmacy owner, pharmacy area manager, pharmacy superintendent or pharmacy manager to sign and return in the envelope provided if they wished to take part in the study. Participant information sheets and questionnaires were then posted directly to the consenting participating pharmacies. Pharmacists completed the questionnaire after reading the participant information sheet and, hence, giving informed consent. Initially, 68 letters were posted; however, the response rate was low, so pharmacists in community pharmacies in the local surrounding areas were approached in person and asked to participate in the study. Members of the public were approached in Huddersfield town centre and were provided with a participant information sheet. If they provided informed consent, they were asked to complete a questionnaire.

### *Ethics*

Ethics Committee approval was gained from the University of Huddersfield for the consent letters, the participant information sheets and the questionnaires. The participant information sheets informed participants that any information received from the questionnaires would be kept in strict confidence. NHS approval was not required.

### *Subject definition*

There were additional inclusion and exclusion criteria for the study. For the section of the study involving pharmacists, the inclusion criteria were consenting pharmacies and pharmacists in the Kirklees and Calderdale areas, and other local surrounding areas. For the section involving members of the public, the inclusion criteria were consenting members of the public in Huddersfield town centre who were over the age of 18. The exclusion criteria were non-consenting pharmacies and pharmacists, non-consenting members of the public, and members of the public who were under the age of 18.

### *Study procedures*

Consenting pharmacies and members of the public were provided with the appropriate participant information sheet and questionnaire, which they completed. Completed questionnaires provided a range of information.

### *Withdrawal or early termination*

The pharmacists and members of the public were free to withdraw from the study at any time and the participant information sheets provided this information. It was also at the discretion of the investigators to withdraw anyone that did not follow the protocol procedure (for example, in the case of an incomplete questionnaire). If a response to the consent letter was not received, those pharmacies were contacted by telephone. Questionnaires could be returned either completed or not completed, or destroyed by the pharmacy. If any questionnaires were not returned the investigators contacted these pharmacies by telephone. The questionnaire could then be sent again, completed over the telephone, or not completed at the request of the pharmacy.

### *Number of subjects*

There was no preliminary data, as this was a pilot study. Numbers were determined by consent provided. A minimum of 100 subjects were required, 50 pharmacists and 50 members of the public. The actual study had 50 participating pharmacies in the Kirklees and Calderdale areas, and other local surrounding areas, and 100 participating members of the public in Huddersfield town centre.

### *Data collection*

Data was collected from the pharmacists and members of the public who consented to take part. The outcomes measured were:

- the role that pharmacists feel they have as antimicrobial stewards in community pharmacy;
- the knowledge of community pharmacists regarding antimicrobial stewardship, and how they further and apply their knowledge and skills;
- the degree of patient education by pharmacists regarding antimicrobial resistance;
- the extent of public knowledge surrounding antimicrobial stewardship;
- the opinions of the public regarding the presence of the indication on a prescription for antibiotics and pharmacies having access to medical records.

### *Confidentiality of subject identity and data*

Data collected and generated by this research study were presented anonymously. All of the data are regarded as confidential by the investigators. Names, initials and dates of birth were not recorded.

### *Data analysis*

Microsoft Excel and IBM SPSS Statistics 22 were used in order to produce figures and tables to display the data collected. Parts of the collected data were statistically analysed using the chi-squared test (a non-parametric procedure), using the IBM SPSS Statistics 22 software. This allowed any significance or correlations with the results to be identified. On the original questionnaire for the pharmacists there were five age groups. After data collection, the participants who selected '50–59' and '60+' were grouped into one age range, '50+'. This was because only two participants selected '60+' and five participants were necessary in order to carry out chi-squared analysis. In addition, this also created the necessary four categories (see research limitations below).

## **Findings**

### *Knowledge of campaigns, initiative and guidelines*

It was found that 46% (23) of the pharmacists had received and read the CPPE *Antibacterial resistance – a global threat to public health: the role of the pharmacy team* booklet, while 40% (20) had received the booklet, but not read it. Of the pharmacist questioned, 12% (6) completed the six 'Use antibacterials wisely' campaign online activities, all of these respondents having read the CPPE booklet.

As well as the 'Use antibacterials wisely' campaign, community pharmacists were questioned on the EAAD ABGC, run by Public Health England. Here, only 22% (11) of the pharmacists questioned had made a pledge to the campaign, with 18% (9) of the community pharmacists encouraging patients to make a pledge themselves.



As the CPPE booklet provided information regarding the ABGC, the 46% of pharmacists who had read it should have had a good understanding and knowledge of the campaign. There was a significant increase in the number of pharmacists who made a pledge ( $p = 0.003$ , Cramer's  $V = 0.310$ ) among those who had read the CPPE booklet, with 43% (10) making a pledge after reading the booklet, compared with 22% overall. This could suggest that the booklet gave pharmacists the knowledge that enabled them to participate in the ABGC. This cannot be claimed as a direct link, as other causes have not been tested for. For example, it could simply be that the pharmacists who read the booklet are more proactive in antimicrobial resistance and, therefore, show more initiative in taking part. Furthermore, some community pharmacists made a pledge without having read the booklet, and some who read it did not. Therefore, with no record taken of which pharmacists knew of the guardian pledge, and how they discovered it, the booklet cannot be seen as a major source of this information.

Although it is imperative to keep up to date with relevant information regarding antimicrobial resistance (Howard et al., 2013), the results show that many community pharmacists are not participating in extra development activities and campaigns on this subject, even when they have the required knowledge to do so. This can be seen in the fact that so few completed the online 'Use antibacterial wisely' development activities and made a pledge, even after reading the CPPE booklet advising them to do so. This information was also well publicised during 2014 in *The Pharmaceutical Journal* (2014a) and in earlier years through other journals, some of which specifically targeted pharmacy (McNulty, Cookson, & Lewis, 2012).

#### *Community pharmacists' participation in development activities*

There was an unsurprising significant relationship ( $p = 0.018$ ) between the number of pharmacists who had read the CPPE booklet and those who completed the CPPE activities relating to the 'Use antibacterials wisely' campaign, with all six pharmacists who undertook the activities having read the booklet. This does not prove a direct cause, but is strongly linked as the activities were part of the same campaign that was highlighted in the booklet, and was only completed by its readers. Still, 17 of 23 readers ignored this opportunity to further their learning, showing either that it was not emphasised strongly enough, or that pharmacists are lacking initiative within their role as stewards. This statement is also supported by the fact that only 16% (8) of the pharmacists questioned had completed any professional development on antimicrobial resistance in the past 12 months. In contrast to this, the West Yorkshire Local Practice Forum recently hosted an antibiotic development training event (Howard, 2014), with a good response and uptake, yet no pharmacist mentioned this as an example of their further development. This possibly suggests that the question was misunderstood, or that the high attendance rate was mostly down to hospital and pre-registration pharmacists who did not undertake this questionnaire.

The need for further professional development is clear, as only 20% (10) of the pharmacists knew their local antibiotic prescribing guidelines. NICE (2015a) suggests that healthcare organisations should help to monitor and evaluate antimicrobial prescribing. With pharmacists obviously needing knowledge of prescribing guidelines to do this effectively, there is a clear need for pharmacists to improve their knowledge.

### *General pharmacy advice*

In the ABGC, Public Health England (2014a) suggested information that should be given and checked with patients by a community pharmacist about antimicrobials when dispensing them to patients, such as the correct way to take the medicines, that they have no allergies to the drug and that they are given self-care advice to aid their recovery. With regard to the advice and information exchanged with a patient receiving antimicrobials, the results showed a lack of consistency in the pharmacists' answers. Advice on dose, the need to complete the course and checking for allergies were given most frequently, while other pieces of advice and questioning were seen to be answered poorly or incoherently in comparison. Advice on not sharing with friends and relatives was the most poorly answered question of the group, with the majority (46%, 23 pharmacists) saying they never gave this information to patients, while a survey by Pharmacy Voice (2014, cited by Goldman, 2014) suggested that this is a current issue. These results are poor, given that evidence suggests that patient knowledge on antimicrobial use increases when simple advice such as this is given over the counter by community pharmacists (Northey, McGuren, & Stupans, 2014).

A significant result ( $p = 0.002$ ) was seen in pharmacists' responses to the question of whether they asked the patient what infection the antimicrobial was intended to treat, and the pharmacy chain size they worked in. The results suggest that independent pharmacies show more variation within their answers, with more selecting either 'never' or 'always', as opposed to 'sometimes' in the larger chains. Although there is no clear reason as to why there is such a spread, it could possibly be due to less consistent practices. Large pharmacy multiples may have procedures that are rolled out nationwide, whereas independents' procedures may be determined internally, although this reasoning is untested.

Results from the public found that only 31% would return leftover antibiotics for safe disposal at their community pharmacy as advised, with many opting to throw leftovers in the general waste (46%). Unfortunately, the number of community pharmacists who gave advice on correct disposal of antimicrobials was not recorded, but owing to the poor response from members of the public, a lack of effectiveness generally can be seen in educating patients on how to dispose of antimicrobials properly.

### *Advice on campaigns*

Only 8% (8 individuals) of the members of the public questioned had heard of the ABGC, with 25% (2) of those making a pledge. Although the members of the public questioned had not necessarily recently visited a community pharmacy, it is unlikely that further encouragement would have been given, with only 18% of the pharmacists questioned giving any encouragement to patients to participate. A certificate that was sent via email to pharmacists who had made a pledge gave pharmacists strategies to encourage patients to take part (Ashiru, personal communication, November 11, 2014), yet still only around 67% of pharmacists who received a certificate encouraged patient participation, compared to 44% when certificates were not received.

### *Public opinion*

The public questionnaire emphasised issues raised by Ashiru-Oredope (2014), namely that patients may not know of the information and actions a pharmacist can provide. Results showed that although 92% (92) of the public would treat themselves for 5 days before going to see a doctor – a message given by Public Health England (2014a) in the ABGC – only approximately 57% (52) of those would go to the pharmacist before visiting their GP. The main reasons for this included patients feeling that they knew how to treat their own symptoms (14 people), that they had not thought to ask a pharmacist (6 people), or that they favoured visiting their GP (3 people). These findings possibly show a lack of knowledge among the public of how pharmacists can help, and suggest again the need to raise awareness of what community pharmacists can do.

### *Monitoring prescribing of antimicrobials*

Pharmacists showed poor results when asked whether they checked prescriptions against their local area antimicrobial prescribing guidelines, with only 6 (12%) doing so. This goes against advice by the CPPE (2014a) and suggests that pharmacists are not clinically checking prescriptions as completely as they should be. Furthermore, none of the pharmacists 'always' confirmed a patient's infection, showing that they were not always checking that antimicrobials were clinically appropriate and in line with local guidance. There were two discrepancies in these results, with one of the pharmacists checking prescriptions against local guidelines when they did not know them, and one pharmacist who checked prescriptions against local guidelines but never checked a patient's infection. These answers show obvious misunderstandings of the questions by these pharmacists.

Further monitoring of prescribing was also poor, going against guidelines from NICE (2015b), with only 16% of pharmacists monitoring antimicrobial prescribing levels, although 46% had read the CPPE booklet advising them to do so. Those who did monitor prescribing highlighted the use of patient medicine records and the use of PACT data, although no further information was given on how this was completed. The major reasons given for not monitoring included that the pharmacist did not know how to do so, that they did not have enough time, and that GPs would be unappreciative of this interference.

Although there is a view that pharmacists' advice would be unwelcome by GPs, Clare Gerada, the chair of the Royal College of General Practitioners, states that this is untrue, suggesting that GPs welcome advice on switching and changing medicines to a patient's needs (Sukkar, 2015). There is also evidence that making prescribers aware of their levels of antimicrobial prescribing compared to their colleagues, and offering feedback and advice on how to bring this down, can help to lower antimicrobial prescribing levels (Roberts, Dawoud, Hughes, & Cefai, 2015).

On the other hand, Parkes (2013) does recognise that there are problems in communication between the two professions, and has suggested breaking down the barriers through joint local practice forum meetings so that both prescribers and pharmacists understand each other's roles, and can work together. Another proposal by Burton and Mack (2014) is that the minor ailment scheme should be combined with the minor illness management scheme, so that advice given to patients from both professions is synchronised.

### *Pharmacists' own opinions*

When questioned about their own feelings towards their level of antimicrobial stewardship, pharmacists' answers were once again mixed, ranging between 'very good', 'good', 'acceptable' and 'poor', although only 47 of the 50 pharmacists answered this question. 'Acceptable' was the most common answer, with 48% (24) of the pharmacists choosing this.

Although the pharmacist's role as an antimicrobial steward is defined by the CPPE (2014a), as described in the literature review, previous results have already highlighted that this is not being fulfilled as effectively as it could be. With many pharmacists believing that they are delivering an acceptable level of stewardship or better, results may suggest that pharmacists do not feel that all of the activities they were asked about are encompassed in their role as antimicrobial stewards, and, therefore, there is a lack of awareness of the role.

Although the pharmacists may be completing campaigns and activities about which they were not questioned, leading them to feel that they are at least an 'acceptable' antimicrobial steward, 22% (11) of pharmacists still never gave any self-care advice when advising patients with infections. This shows clearly that some of the most basic help that a pharmacist can give is not being provided, even when pharmacists have been advised to do so (Fleming, Barber, & Ashiru-Oredope, 2011).

### *The public's opinion on community pharmacy access to records*

Answers from the public showed that 92% (92) of participants would be happy for the condition for which they are being treated to be printed on their prescriptions for antimicrobials, while 83% (83) would be happy to share their medical records with their community pharmacy. The major reason that was highlighted for answering 'no' to these questions was a concern over privacy. Some of the participants specified privacy concerns surrounding pharmacy team members other than the pharmacist themselves, while the nature of the condition treated, or the extent of the records that would be shared, were also singled out as possible issues.

Pharmacists have to follow a code of ethics laid down by the Royal Pharmaceutical Society (2014), and dealing with or sharing this information inappropriately would go against this. Records that would be shared with pharmacists would only allow them to see what was needed to complete their role, with the pharmacist having to ask for permission from a patient to check these records, and requiring the NHS card to do so (NHS, 2015). In addition, pharmacists would be unable to alter records, and would have to take measures to ensure their appropriate use (Lawrence, 2014).

## **Research limitations/implications**

### *Limitations*

Certain of the results obtained indicated that specific questions in the questionnaire for the pharmacists were not completely understood. For example, one participant stated 'yes' in answer to the question 'How do you use this data in your role as an antimicrobial steward?', demonstrating that this question was misunderstood. Therefore, perhaps the questionnaire could have been improved by phrasing certain questions more clearly. In addition, the chi-squared test was used to statistically analyse many of the collected results from the questionnaire for the pharmacists. This requires a maximum of four categories for each question and a minimum of five

participants in each category. This was not considered during the design of the questionnaire, and the questions regarding age groups and ratings did not meet these criteria, as they contained five categories each. Fortunately, none of the participants selected 'excellent' (one of the categories) as the rating, so the conditions for the chi-squared test were met. However, the data collected regarding age groups was altered, as explained in the data analysis section above. Therefore, the questionnaire design could have been improved by consideration of the possible statistical tests needed.

Finally, there was no question regarding whether the pharmacists answering the questionnaire had any hospital pharmacy experience. In such pharmacies, pharmacists have a greater clinical role directly advising doctors on prescribing. These pharmacists may have been more familiar with local antibiotic prescribing guidelines, and, therefore, more comfortable with checking prescriptions against these guidelines and monitoring local antibiotic prescribing. As a result, the lack of such a question is a limitation.

#### *Future research*

Future studies could compare the levels of antimicrobial stewardship in different practice settings, such as community pharmacies, hospital pharmacies and GP surgeries. They could identify how pharmacists from each setting monitor antimicrobial prescribing, and determine how they rate themselves as antibiotic stewards. Investigating pharmacists within GP surgeries could be particularly interesting, as one participating pharmacist commented that working in a GP surgery would aid with antimicrobial stewardship. In addition, there have been recent news articles suggesting that pharmacists should work within GP surgeries and have scheduled appointments with patients, to reduce the pressure that GPs are under (Mundasad, 2015), and therefore, this issue is currently very relevant. Another research point could be the possibility of antimicrobial prescribing audits in community pharmacies. Research has been carried out in hospitals regarding this, and the designed programme received acceptance from the hospital consultants (*The Pharmaceutical Journal*, 2015). Further investigation regarding public perceptions of pharmacy access to medical records could be useful, for example to find out whether members of the public would be more comfortable with the idea of pharmacy access if only the pharmacist would have access to the medical records. This would be an interesting topic for future development, as pharmacy access to the medical records of patients would be very beneficial in relation to antimicrobial stewardship.

### **Practical implications**

#### *Pharmacists' participation*

From the results, it can be seen that not all pharmacists are taking full advantage of all activities available to them as antimicrobial stewards. This includes not participating in campaigns; failing to question and advise patients both on campaigns and on the use of antimicrobials; and poor levels of professional development activities and monitoring of local antimicrobial prescribing. These issues are seen even when it is clear that the pharmacists in question have the required knowledge to complete these activities. Therefore, pharmacists possibly need to take more action in aiding patient education on antibiotic guidelines, such as in the work of

Northey, McGuren, and Stupans (2014), where over-the-counter advice on antimicrobials from a pharmacist improved patient knowledge.

#### *Understanding the role*

Many of the pharmacists who were questioned believed themselves to be an 'acceptable' antimicrobial steward or better, yet answers relating to activities of the pharmacists as antimicrobial stewards were less consistent. This suggests that many pharmacists do not believe that their role encompasses many of the points on which they were questioned, showing that there is a lack of clarity as to the exact role they have as antimicrobial stewards.

Although guidance has been published, such as the CPPE (2014a) booklet mentioned above, this has not significantly changed pharmacists' attitudes to giving advice and guidance to patients, or monitoring prescribing. Monitoring antibiotic prescribing could certainly be more effective. It was identified that a low percentage of participating pharmacists monitor local antibiotic prescribing levels, are aware of the local antibiotic guidelines, and check that prescriptions for antibiotics comply with these guidelines. The main reasons stated for this were a belief that monitoring prescribing is not part of the role of a pharmacist, time constraints, and a lack of information concerning how to carry this out. Therefore, this is another instance where it may be necessary to increase the awareness of the available resources, placing emphasis on the role of community pharmacists in antimicrobial stewardship.

#### *Pharmacist recognition*

The study has suggested a lack of recognition for community pharmacists on the part of both GPs and the public, with some pharmacists stating that they are uncomfortable with the idea of monitoring prescribing because this feels intrusive and is unappreciated by GPs. When members of the public were questioned, many still felt more comfortable visiting their GP, or treating their minor ailments without pharmacy intervention.

While there is clearly a need to improve the awareness of community pharmacies as the first port of call for minor ailments for the public, more effective antimicrobial stewardship requires a change in the practice of healthcare professionals. Closer ties should be established between community pharmacists and primary care prescribers, so that they are working together, not against each other, in the fight against antimicrobial resistance.

### **Social implications**

#### *Patient education*

This research project generated a range of results. It was discovered that patient education by pharmacists to minimise the use of unnecessary antibiotics is an area that requires improvement. Further research is required to determine whether, if this area improved with the use of available resources by pharmacists, the impact on society regarding inappropriate use of antibiotics would be positive, and whether there would be an improvement in public attitudes regarding the knowledge of pharmacists.

### *Antibiotic prescribing*

As stated above, monitoring antibiotic prescribing could certainly be more effective, and it may be necessary to increase the awareness of the resources that are available, placing emphasis on the role of community pharmacists in antimicrobial stewardship. Again, further research is required to determine if this would help to ensure appropriate antibiotic use, and again improve public attitudes regarding pharmacists and their level of knowledge, leading to a positive impact on society.

### *Access to records*

Finally, an important point is that the majority of participating members of the public were comfortable with the idea of indications being stated on prescriptions for antibiotics, and of pharmacies having access to medical records. For the few participants who were not comfortable, this was mainly due to confidentiality and privacy concerns. Many of these concerns could be resolved with appropriate education of the public regarding confidentiality in pharmacies and the benefits of pharmacy access to patient information. This could positively influence public attitudes towards pharmacy. Allowing indications to be present on prescriptions for antibiotics would allow pharmacists to ensure appropriate prescribing and, therefore, reduce the development of antimicrobial resistance (*The Pharmaceutical Journal*, 2014b). In addition, if pharmacists were allowed access to the medical records of patients, this would have several benefits, such as ensuring the correct prescribing of medicines (including antibiotics), being aware of the allergies of patients and overall improving patient care (*Pharmacy Business*, 2013).

Therefore, further research is necessary to determine whether, if specific findings from this research project were used to influence community practice, this could lead to a positive impact on quality of life.

### **Originality/value**

This paper has allowed the actions and, to some extent, the knowledge of community pharmacists regarding their role as antimicrobial stewards to be assessed. Questioning the public has also allowed for a brief insight into their opinions of and thoughts about community pharmacies, with regard to treating minor ailments and the sharing of medical records.

This paper has shown clear issues within community pharmacy practice that need to be addressed to ensure that the UK receives maximum benefit from pharmacy as a profession in its fight against antimicrobial resistance. Although not all of this can be completed by pharmacists, this issue and some possible solutions have been highlighted, as well as the need for further research. An especially interesting and positive aspect of the study has been the results regarding the opinion of the public about sharing their medical records with community pharmacists, and also printing their medical condition on their prescription.

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