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# Improving antimicrobial prescribing practice for sore throat symptoms in a general practice setting

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## ABSTRACT

Acute sore throat is a common presentation in primary care settings. We aimed to improve our compliance with national antibiotic guidelines for sore throat symptoms to 90% in 3 months' time period. The national guidelines are based on Centor criteria. A retrospective audit of 102 patient records with sore throat symptoms presenting between 1 January to 30 December 2015 showed that over 50% were given antibiotics. Those who were prescribed antibiotics, 27% did not meet NICE criteria and 85% of patients were given immediate antibiotic prescription. Centor criteria was documented in just 2% of cases. Compliance with correct antibiotic course length was 15%. Antibiotic choice and dose was correct in 94% and 92% of cases respectively. Antibiotic frequency was correctly prescribed in 100% of patients.

We introduced interventions that included oral and poster presentations to multidisciplinary team, dissemination of guidelines through internal e-mail and systemic changes to GP electronic patient record system EMIS. This involved creating an automated sore throat template and information page. On re-auditing of 71 patients, after two PDSA cycles, compliance with NICE criteria was 87% with a significant reduction in immediate prescribing (66%). Centor criteria documentation was 42%. Correct antibiotic course length was prescribed in over 30% of cases. Other antibiotic regimen parameters (choice, dose and frequency) were correct in 100% of cases.

The initial results demonstrated that significant changes were needed. In particular, reducing the amount of antibiotics prescribed by increasing compliance with NICE criteria and ensuring all parameters of antibiotic prescription were correct. We showed that significant sustainable improvement is achievable through carefully devised automated systemic changes that provides critical information in readily accessible format, and does not solely rely on prescribers' knowledge and initiative. The outcome of these interventions are a decrease in immediate antibiotic prescription, significant increase in Centor criteria documentation and an increase in compliance with the correct course length of antibiotics. All these measures would contribute to reduction in antimicrobial resistance and improvement in patient care in the community. Future work must focus on improving compliance with correct antibiotic course length.

## PROBLEM

Sore throat is a common usually self-limiting upper respiratory tract infection. Ninety percent resolve in one week without antimicrobial therapy. However, antibiotic prescription for sore throat is common in general practice.<sup>1-10</sup> Inappropriate and overuse of antibiotics has led to increasing antibiotic resistance, which is a serious threat to public health, as well as increasing costs to healthcare services and growing antibiotic-related adverse side effects.<sup>3 4</sup>

There was a clear need to assess whether antibiotic prescription for sore throat symptoms complied with the national guidelines set out by National Institute for Health and Care Excellence (NICE) and Public Health England (PHE).<sup>11 12</sup> Although the guidance is not new, no quality improvement project to assess compliance had been undertaken for the local population and anecdotal reports suggested high levels of antibiotic prescription. This project aimed to improve compliance with NICE and PHE antibiotic guidelines for sore throat symptoms in a general practice setting to 90% within 3 month intervention time period.

## BACKGROUND

Antimicrobial resistance is a serious threat to health both at population and individual patient levels.<sup>1 2</sup> A key driver of increasing resistance to antibiotics is their overuse worldwide.<sup>3 4</sup>

The highest rates of antibiotic prescription in the UK takes place in general practice and most are for common respiratory tract infections (RTIs) such as sore throat.<sup>1</sup> General practice is also where most antibiotic treatment failures for RTIs, due to resistance and adverse side effects, increasingly occur.<sup>5</sup>

Sore throat symptoms is one of the most common presentations in general practice worldwide, ranging from 2-4 percent.<sup>7 8</sup> Most are due to viral infections and 90% resolve



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in 7 days without antibiotics. Antibiotic use has modest benefit in shortening the duration of illness with pain only reduced by 16 hours.<sup>9 10</sup> Although antibiotic therapy reduces the risk of very rare complications of Group A streptococcal pharyngitis such as rheumatic fever, otitis media, acute sinusitis and quinsy<sup>8</sup> the number needed to treat to prevent these complications is very high.<sup>9</sup> Furthermore, in clinical practice it is difficult to determine the bacterial aetiology of sore throat symptoms.<sup>11</sup> Therefore, the current guidelines from NICE and PHE in the UK recommend antibiotic use should be avoided for sore throat symptoms.<sup>12 13</sup> The guidelines further recommend that clinical assessment based on the four Centor criteria (Lymphadenopathy; No Cough; Fever; Tonsillar Exudate)<sup>14</sup> should be used to decide antibiotic prescription. For Centor score three or four, 2 or 3-day delayed or immediate antibiotic prescription could be considered.<sup>12</sup> Guidelines also state the parameters of antibiotic prescribing; antibiotic choice, dose, frequency and duration. The recommendation of the duration of antibiotic use is based on Randomised Control Trial (RCT) in <18 year olds, that shows 10 days phenoxymethylpenicillin course had lower relapse rates.<sup>15</sup> Furthermore, antibiotic resistance is more likely if patients received longer duration, incomplete courses and broad spectrum antibiotics such as clarithromycin.<sup>1 2 16</sup> Therefore, the guidelines recommend that phenoxymethylpenicillin should be used as treatment of choice and a short course of clarithromycin must be reserved for those with true penicillin allergy.<sup>16</sup>

Antibiotic guidelines have introduced evidence-based recommendations to reduce inappropriate antimicrobial prescription in general practice. Thus, improving compliance with national policies will reduce antibiotic resistance and healthcare costs, it will also contribute to better patient care by reducing antibiotic-associated adverse side effects.

## BASELINE MEASUREMENT

### Search tools and data collection

We collected retrospective data for 17 clinical conditions relating to sore throat symptoms from general practice electronic patient record system EMIS for the period 1 January to 30 December 2015 using the Royal College of General Practitioners' (RCGP) audit toolkit.<sup>17</sup> There was a total of 383 patients (154 males, 229 females). We processed the data and looked at EMIS consultation records of 102 patients who were selected randomly based on their EMIS numbers.

### Data analysis

Each consultation was reviewed and data on diagnosis, Centor criteria and score, antibiotic choice, dose, frequency and course length were entered manually by the lead investigator on Microsoft Excel Spread Sheet. The decision whether the NICE and PHE guidelines were met was determined based on the standards in the aforementioned guidelines.

Our results showed that out of 102 consultations reviewed overall compliance with NICE guidance (whether to prescribe antibiotics) was 73%. In total 51% of patients were prescribed antibiotics (85% immediate prescribing and 15% delayed prescribing). Overall Compliance with PHE Primary Care guidance (all parameters of antibiotic prescribing correct) was 15%. Antibiotic choice, dose and frequency were correct in over 90% of the cases. However, compliance with correct antibiotic course length was about 15%. Thus, reducing the overall compliance to just 15%. Centor scoring was used in just 2% of clinical consultations.

## DESIGN

This quality improvement project was undertaken between January and March 2016 in an ethnically diverse suburban general practice in London with a population size of about 12,000. The team undertaking this project included GP principal partners, GP trainees, practice nurses, practice manager and the IT department staff.

Results of the baseline measurements was presented at the multidisciplinary meeting that included all the key stakeholders in the practice. The issues of adherence to NICE and PHE guidelines were discussed following the presentation. It transpired that most prescribers were not aware of the guidelines and their significance. Furthermore, the steps involved in accessing relevant information was deemed too time-consuming during a 10-minute consultation. The following actions were agreed upon following an in depth discussion with multidisciplinary team.

All prescribers were asked to document clearly Centor criteria and scores for sore throat symptoms using the template on EMIS. All prescribers were asked to avoid prescribing antibiotics for Centor scores 0-2 with delayed prescription being an option in some cases. It was also agreed that prescribers should consider immediate or 2-3 days delayed antibiotic prescription for Centor scores 3-4. A table was included with the template to remind prescribers about the correct parameters of antibiotic prescribing including correct choice, dose, frequency and course length. The EMIS template included information on Centor criteria with a scoring system and a summary of recommendations in a table to ensure a consistent, reliable and sustainable access to information during each consultation. Once the template is triggered, by ticking the boxes next to each Centor criterion, a number would be generated. This would aide clinical decision-making and increase adherence to guidelines. Inclusion of this step was deemed important as the time spent accessing the relevant policy during the consultation was highlighted as a barrier to increasing compliance.

In addition, electronic copies of both guidelines were sent to all practice staff through internal e-mail system. A poster presentation of the action plan was also sent to practice staff.

**STRATEGY****PDSA cycle 1:**

Two months after the initial baseline result was presented and agreed action plan had been implemented, as stated above, we carried out the first data collection. A total of 33 patients had presented with sore throat symptoms between 11 February 2016 – 5 March 2016. Overall compliance with NICE Criteria was 76%. In total 51% (17 patients) were prescribed antibiotics (88% immediate prescribing and 12% delayed prescribing). Overall compliance with PHE Primary Care Guidance was 35%. Antibiotic choice, dose and frequency was correct in almost 100% of cases and correct antibiotic course length was prescribed in 35% of cases, increasing overall compliance to 35%. Centor scoring system was used in 39% of clinical consultations.

After the first PDSA cycle, although there was knowledge of the sore throat template on EMIS, it was not used sufficiently to make clinical decisions. In particular, information on prescribing standards and recommendations were underutilised. The template was amended to make information more prominent and a triggering system was introduced. The template would open automatically whenever any sore throat symptoms entries were made on clinical notes. We thought this systemic change would ensure that the template is made accessible with relevant easy to read information about the guidelines without relying on the knowledge of the prescriber to access the template and the relevant information.

**PDSA cycle 2:**

A re-audit of clinical notes for sore throat symptoms was carried out for the period 5 March -30 March following the changes that were introduced after the first PDSA cycle. A total of 38 patients were seen for sore throat symptoms. Overall compliance with NICE Criteria was 87%. A total of 55% of patients were prescribed antibiotics (66% immediate, 34% delayed prescribing). Overall compliance with PHE Primary Care Guidance was 29%. Antibiotic course length was correctly prescribed in 29% of cases. Other prescribing parameters (choice, dose, frequency) were correct in 100% of cases. Centor scoring was used in 42% of clinical consultations.

The focus of the next intervention would be to sustain and build on the improvement in compliance with NICE criteria and introduce systemic changes to improve compliance with antibiotic course length. This could be done through an automated message 'pop-up' whenever antibiotic is prescribed. Furthermore, the recommended course length should be one of the default choices for the two antibiotic used for sore throat symptoms phenoxymethylpenicillin and clarithromycin.

**RESULTS**

Post-intervention measurements were carried out through two PDSA cycles with seventy one patients in the same GP practice. Compliance with NICE guideline had increased to 87% from baseline measurement of 73%. This increase was largely due to reduction in immediate prescribing (from 88% to 66%) and increase in delayed prescribing (from 12% to 34%). Course length of antibiotic prescribing was correct in 29-35% of cases, demonstrating about 100% improvement. Other prescribing parameters – choice, dose, frequency – improved to 100%. Centor criteria documentation increased from 2% to 42%. Tables 1 and 2 summarise the changes over time through each of the cycles. There was minimal improvement in compliance after the first cycle where only educational interventions were implemented. There was significant improvement from baseline measurements after systemic changes were introduced on EMIS in cycle two as described above.

**LESSONS AND LIMITATIONS**

We learnt a number of lessons from this project. Introducing changes to the systems and the processes proved the most effective way in ensuring significant improvements. Although our interventions initially relied on educating the staff about the guidelines and focusing on individual prescriber's behaviour, we only noticed significant change in practice when we introduced an automated triggering system that ensured the template was accessed and used effectively. A succinct bullet point summary of the recommendations in tabular format, making important information readily accessible to prescribers, was also a useful strategy. However, we

**Table 1** Compliance with NICE Criteria

	Baseline (n=102)	Cycle I (n=33)	Cycle II (n=38)
<b>Immediate prescribing</b>	15	8	9
<b>Delayed prescribing</b>	6	1	7
<b>No prescribing</b>	54	16	17
<b>Percentage of patients with sore throat with prescribing compliant with NICE guidance*</b>	<b>73%</b>	<b>76%</b>	<b>87%</b>

\*Overall compliance with NICE guidance (whether to prescribe)=total NICE criteria met/ total number of patients (NICE criteria met+NICE criteria not met) x 100

**Table 2** Compliance with HPA Primary Care Guidance

	Baseline (n=102)	Cycle I (n=33)	Cycle II (n=38)
Total number of patients prescribed an antibiotic	52	17	21
Antibiotic Choice Correct	49	16	21
Dose Correct	48	17	21
Frequency Correct	52	17	21
Course Length Correct	8	6	6
<b>All Parameters of Antibiotic Prescribing Correct*</b>	<b>15%</b>	<b>35%</b>	<b>29%</b>
<b>Centor scoring documentation</b>	<b>2%</b>	<b>39%</b>	<b>42%</b>

\*Overall compliance to HPA Primary Care guidance=all parameters of antibiotic prescribing correct/total number of patients prescribed an antibiotic x 100

acknowledge that after the initial educational interventions we did not directly assess GP partners' knowledge before studying the effect of the interventions in the first PDSA cycle. We could have used a focus group to identify specific issues that affect antibiotic prescribing amongst GP partners and trainees and assess the effects of the educational intervention first.

Studies have shown that GPs' antibiotic prescribing behaviour once established is maintained.<sup>19</sup> This would make it more challenging to improve compliance and is perhaps one of the factors that recommended course length for antibiotics, after two interventions cycles, improved to only about 30%. The issue is further complicated by other factors that influence prescribing behaviour such as diagnostic uncertainty and patient pressures leading to overall reduced levels of compliance. To ensure sustainable improvements, future interventions must focus on changing the systems and processes that do not rely solely on prescribers' behavior. This is because prescribers usually work under very complex and often demanding circumstances. However, more data would be needed to assess the sustainability of the improvements through systemic changes.

We acknowledge several other limitations. There are obvious limits to the generalisability of this study, carried out in a medium sized suburban practice, to the wider population even with similar demographic profile. For example, not all practices use the same documentation software. Due to time limit of the study PDSA cycles were carried out on a smaller number of cases. More data would be needed to reduce the effects of natural prescribing variations over time. As discussed above there are many factors that influence prescribing behaviour, therefore we cannot exclude biases and confounding factors affecting the results.

## CONCLUSION

Our interventions to improve compliance with national antibiotic guidelines for sore throat symptoms appeared to have markedly changed prescribing practice over a short period of time. We used a mixture of systemic changes, multidisciplinary team involvement, oral and poster presentations and internal e-mail system to disseminate information about the guidelines and action plans.

The overall compliance with NICE criteria on whether to prescribe antibiotics increased from 73% to 87% in three months. Centor criteria documentation increased from 2% to 42% of cases. Correct antibiotic regimen was prescribed in about 30% of cases. Although this is a 100% increase from the baseline, it falls significantly short of the standard expected. We hope that subsequent strategies such as default antibiotic settings for course length, automated 'pop-up' reminders and better awareness of antibiotic policy amongst prescribers will improve this aspect of prescribing regimen. Future re-audits will evaluate the success of this approach.

This quality improvement work adds to an important and highly significant area of clinical practice. By increasing compliance with evidence-based guidelines we are reducing the harmful effects of antimicrobial overuse and improving the quality of care both for individual patients and the community.

Finally, the focus of our improvement project was on systemic sustainable changes through educational interventions and a widely used electronic patient record system EMIS. Therefore, we believe the improvement strategies and approach used in our study could be carried out in other practices. We have also identified a number of lessons and limitations that could provide additional resource for improving antimicrobial prescribing practice in primary care.

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**Declaration of interests** Nothing to declare.

**Ethical approval** This was a quality improvement project applicable to local service delivery not a study on human subjects. Therefore, it was exempt from ethical approval.

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