

Tackling antimicrobial resistance: educational priorities



Full report
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Foreword

Reducing and controlling infections in the NHS is a national priority. In 2017 Health Education England published the report [Combating antimicrobial resistance: educational approaches for the responsible prescribing of antimicrobials](#) where we identified gaps in the educational resources available to support responsible prescribing of antibiotics. As part of this review, Health Education England committed to work with stakeholders to explore the factors that help or hinder education about antimicrobial resistance and to identify good practice materials for promotion.

This report explores perspectives about educational interventions that may help address antimicrobial resistance in different healthcare settings and barriers for implementation. Through a series of discussion groups, individual interviews and an online survey, we asked those that train healthcare workers what works well in an educational environment, what the challenges are and how Health Education England might support the education of prudent, responsible use of antimicrobials.

The themes in this report will inform the future direction of Health Education England's antimicrobial resistance and sepsis programme, incorporating the work we do in infection prevention and control and the government's initiative to halve both healthcare acquired gram negative bacteraemia and the inappropriate prescribing of antibiotics by 2020.

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Key points

Antimicrobial resistance: a global challenge

More than 50,000 people die each year in Europe and the US because bacteria are becoming resistant to the medicines we use to fight infections. Within the next 50 years this is predicted to escalate to more than 10 million people dying worldwide every year. Addressing this crisis requires a system-wide approach. Supporting healthcare professionals to increase their knowledge and change their behaviour is a key part of this, and this is one of the top action areas in the UK's strategy against antimicrobial resistance. Health Education England wants to ensure that every healthcare worker has the knowledge and skills they need to improve infection control and support appropriate prescribing.

Health Education England wanted to hear from healthcare educators and frontline teams about what works well and not so well to educate health workers about this issue and the types of support that may be useful at a national level. 1,060 healthcare educators and professionals from England took part in discussion groups (27), interviews (105) and an online survey (928).

Helpful approaches

Approaches that participants thought were working well to raise awareness and support behaviour change to tackle antimicrobial resistance included:

- providing personalised feedback to prescribers via bedside teaching, ward rounds or benchmarked audit results, with visual prompts
- small group education sessions, including case scenarios and patient stories
- having role models demonstrating and talking about best practice
- targeting influential people such as educators, mentors and senior clinicians
- financial drivers such as Commissioning for Quality and Innovation (CQUIN) national goals and Quality Premiums
- embedding information about appropriate antibiotic use, stewardship and infection control procedures into the formal education curricula of a wide range of professionals
- showcasing how antimicrobial resistance is everybody's business, including the wider multi-professional team and members of the public
- simple smartphone apps and decision-support technologies to aid prescribers

Potential challenges

Perceived challenges in raising awareness and supporting behaviour change included:

- time pressures, making it difficult to take advantage of educational opportunities and to speak with patients about the reasons for not prescribing and alternatives
- patient demand for antibiotics
- fear of missing a serious infection and fear of complaints or litigation
- organisational and professional norms and hierarchies which may make it difficult to challenge or help change what others do
- inaccessibility of prescribing guidance and culture testing at the point of care
- lack of understanding of the scale of the issue and what individuals, including non-prescribers, can practically do to support change
- lack of adequate and appropriate mandatory training and continuing professional development opportunities

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Priorities for national support

Areas where healthcare educators and health professionals thought that national or regional- level support may be useful to help tackle antimicrobial resistance included:

Working at a strategic level: Participants urged Health Education England to work with partners at a strategic level to embed tackling antimicrobial resistance as a national priority, aligned with financial drivers and policy. Without such a mandate, it was suggested that there was a danger that antimicrobial resistance could be overshadowed by a multitude of other priorities.

Integrating national approaches: Participants felt that Health Education England could work in a more integrated manner with NHS England, Public Health England and other national partners to implement a structured approach, including increasing consistency, reducing duplication and targeting appropriate messages to both health and care workers and members of the public. Awareness raising amongst the public was a central priority in tackling antimicrobial resistance.

Educating the future workforce: Health Education England could increase efforts to ensure that competencies related to antimicrobial resistance are embedded and mandatory within the formal education of health professionals, including those who are not prescribers. Participants felt that there was room for improvement in current levels of education of the future and emerging workforce.

Educating the current workforce: Participants provided many useful suggestions about educational approaches that worked well and less well to raise awareness and support behaviour change. Health Education England may wish to set a requirement that training hubs ensure that interactive educational opportunities about addressing antimicrobial resistance are available within protected learning time sessions or other sessions coordinated by the hubs on an annual basis. This could be one of the key performance indicators of training hubs. Evaluating the impact on practice should be built in.

Sharing good practice: Many felt that Health Education England or other national bodies could be instrumental in helping organisations and professionals to share good practice. This may include refining and making available online a mechanism to signpost to existing quality assessed free educational resources and courses from around the world. Some thought that any such website should include a forum to post examples of good practice and that a quarterly electronic newsletter could compile research and ideas. Participants generally did not think there was a need to generate more educational resources or e-learning, though some felt a simple smartphone app or decision-support tool would allow standardisation of messages and guidelines across the country.

Testing approaches for culture change: Participants suggested a number of novel approaches to help change the culture of organisations and professions, including having an 'antibiotic aware' kite mark programme for organisations (similar to 'dementia friendly' type programmes) and shifting to a default position of ceasing antibiotics after two days. Health Education England and partner organisations could work with Academic Health Science Partnerships or others to test the feasibility of some of these approaches.

Health Education England and partner organisations will consider these suggestions when planning ongoing work.

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Acknowledgements

This report describes feedback from professionals who educate healthcare workers in England and other frontline team members. Health Education England thanks everyone who attended discussion groups, took part in interviews and completed surveys.

An independent team from The Evidence Centre collected and compiled the feedback.

Tackling antimicrobial resistance: educational priorities

1.0 Overview

This document summarises feedback from more than 1,000 health professionals and healthcare educators in England about what helps and hinders awareness raising and behaviour change to address antimicrobial resistance. This section describes why antimicrobial resistance is a priority for Health Education England and how feedback was sought from educators and practitioners.

1.1 Antimicrobial resistance

Antimicrobial medications such as antibiotics destroy or slow down the growth of bacteria. They help our bodies fight infections and, when used properly, can save lives. However, bacteria are becoming resistant to antimicrobial medications and this will have a major impact on our health and lives.¹ England's Chief Medical Officer, Dame Sally Davis has highlighted that in future there may be no suitable antibiotics available to treat infections, meaning that even minor surgery or routine operations could become high risk procedures.²

It is estimated that by 2050, worldwide, more than ten million people per year will die as a result of bacteria becoming resistant to these medications – far more than will die from cancer. Already, antimicrobial resistance is claiming at least 50,000 lives each year across Europe and the US.³

Antimicrobial resistance cannot be eliminated but health professionals, educators, policy makers and the public can work together to reduce the risks and minimise the impact. Reducing infections is a national priority for the NHS. The government has set targets to halve healthcare associated gram-negative bloodstream infections and halve inappropriate antibiotic prescribing in England by 2020.⁴

System-wide awareness and action is needed so the healthcare workforce must be equipped to help tackle this threat. Antimicrobial medications are prescribed for a variety of infections by both medical and non-medical prescribers. It is vital that prescribers have the right knowledge and skills to ensure that antimicrobials are being prescribed safely and effectively and that other staff have the knowledge and confidence to support and challenge prescribers where needed, with all maintaining good hygiene and infection control practices. A number of antibiotic stewardship programmes and infection control practices are championed nationally and locally.

1 *Global action plan on antimicrobial resistance*. Geneva: World Health Organization, 2015

2 *Chief Medical Officer Annual Report: Volume Two: Infections and the rise of antimicrobial resistance*. London: Department of Health, 2013.

3 *Antimicrobial Resistance: Tackling a crisis for the health and wealth of nations*. The Review on Antimicrobial Resistance, 2014.

4 *Antimicrobial resistance review: government response*. London: Department of Health, 2016.

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1.2 Health Education England's role

Health Education England supports the delivery of excellent healthcare by ensuring that the current and future workforce has appropriate skills, values and behaviours.

The government's [five year antimicrobial resistance strategy](#) identified seven priority areas for action:

1. improving infection prevention and control practices through enhanced dissemination and implementation of best practice and better use of data and diagnostics
2. optimising prescribing practice through antimicrobial stewardship programmes that promote rational prescribing and better use of existing and new rapid diagnostics
3. improving professional education, training and public engagement to enhance clinical practice and promote wider understanding of the need for more sustainable use of antibiotics
4. developing new drugs, treatments and diagnostics through better collaboration
5. better access to and use of surveillance data in human and animal sectors
6. better identification and prioritisation of research
7. strengthened international collaboration, working with a wide range of governmental and non-governmental organisations, international regulatory bodies and others

Health Education England has a key role to play in the first three priority areas, supporting good education, raising awareness and sharing best practice about infection prevention and control, prescribing and stewardship programmes.

We are working to promote awareness of antimicrobial resistance, encourage those prescribing, dispensing and administering medications to do so responsibly and ensure that education about preventing and managing infections is included in the curricula and continuing education of medicine, nursing, pharmacy, dentistry and other professionals.

1.3 Examples of work to date

Over the past two years, Health Education England has contributed to tackling antimicrobial resistance in the following ways:

- All health education institutions were [surveyed](#) about the extent to which antimicrobial prescribing and stewardship [competencies](#) developed by Public Health England and the government's Advisory Committee on Antimicrobial Resistance and Healthcare Associated Infection (ARHAI) were embedded into the curricula for health professionals. The survey found that progress had been made but there was work to do to continue embedding the competencies and assuring that adequate time was allocated to cover them.
- [The Health and Social Care Act \(2008\)](#) requires employers to ensure that all staff prescribing medicines are given induction and training in responsible antimicrobial use and are familiar with the antimicrobial resistance and stewardship competencies. Health Education England [surveyed employers](#) and found that there remains work to do to ensure that this requirement is fulfilled, particularly with regards to refresher training for prescribers.
- We have produced a [guide to learning resources](#) on management of infective states, infection prevention and control, antimicrobial resistance and antimicrobial stewardship. In this guide, we

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signpost prescribers and other staff to available educational sessions that will help support their learning has been published.

- An introductory free e-learning module, [Reducing Antimicrobial Resistance](#), was developed to help health and social care staff understand the dangers of antimicrobial resistance and ways to tackle it. A [report](#) that measuring the impact was published in August 2017.
- Health Education England worked with Public Health England to develop two short introductory videos about the risks associated with overusing antibiotics. One video is a [guide for GPs on antimicrobial resistance](#). This signposts to the [TARGET toolkit](#) which includes a range of educational materials for GPs and other primary care prescribers. Another video is a short animation that can be used by health professionals when speaking with [patients](#) about the risks of antibiotic resistance and misuse.

Before proceeding further with steps to improve professional education and training about antimicrobial resistance, Health Education England wanted to understand potential priority areas from the perspective of healthcare professionals and educators. HEE's [antimicrobial resistance prescriber training report](#) recommended undertaking a series of discussion groups with healthcare educators to this end. The feedback from healthcare educators and practitioners will be used by Health Education England and other national and regional bodies to consider priorities for 2018/19 and beyond.



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1.4 Collating feedback from health educators and teams

Health Education England asked healthcare educators and practitioners from primary, community and secondary care to identify the key issues facing them in the field of antimicrobial resistance and effective learning and behaviour change strategies to address these issues. The focus was on understanding what frontline teams and educators felt was working well in terms of education to tackle antimicrobial resistance, what the gaps might be and what support may be needed at a national or regional level.

To collate feedback, the following methods were used:

- four discussion sessions in the North, Midlands, South East and South West of England
- a short online survey
- telephone interviews with key stakeholders

To recruit participants for each approach, information was sent via Health Education England networks. Invitations were sent to:

- the deans and senior teams of medical, nursing, dental and pharmacy schools
- community education provider networks and training hubs
- the Hospital Infection Society
- the British Infection Association
- the British Society for Antimicrobial Chemotherapy
- the UK Clinical Pharmacy Association Pharmacy Infection Network
- the College of Pharmacy Postgraduate Education

All groups were asked to cascade invitations throughout their networks.

In addition, an independent team contacted clinical commissioning groups, hospital trusts, general practice federations and care homes.

Notes from discussion groups and interviews were combined with survey feedback using a narrative approach to draw out key themes. The aim was not to be able to generalise to health professional trainers and practitioners throughout the country but rather to draw together a wide range of opinions to help shape priorities for the future.

The themes described in this report reflect opinions. They are not ‘factual’, but rather perceptions of stakeholders about what works well and the challenges that exist in tackling antimicrobial resistance from an educational perspective. Participants will not all agree with every listed helpful and hindering factor as there were mixed views about some issues. In reporting the feedback, no judgement has been made about the feasibility or accuracy of the statements made.

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1.5 Participants

Feedback was provided by more than 1,000 people. Table 1 and Figures 1 and 2 list the main sectors and roles of those who took part. 66% indicated they were healthcare educators in addition to other roles. About 33% of participants were based in Northern England, 12% in the Midlands, 33% in the South East, 22% in the South West and <1% had a national role.

Figure 1: Proportion of participants from different sectors that provided feedback.

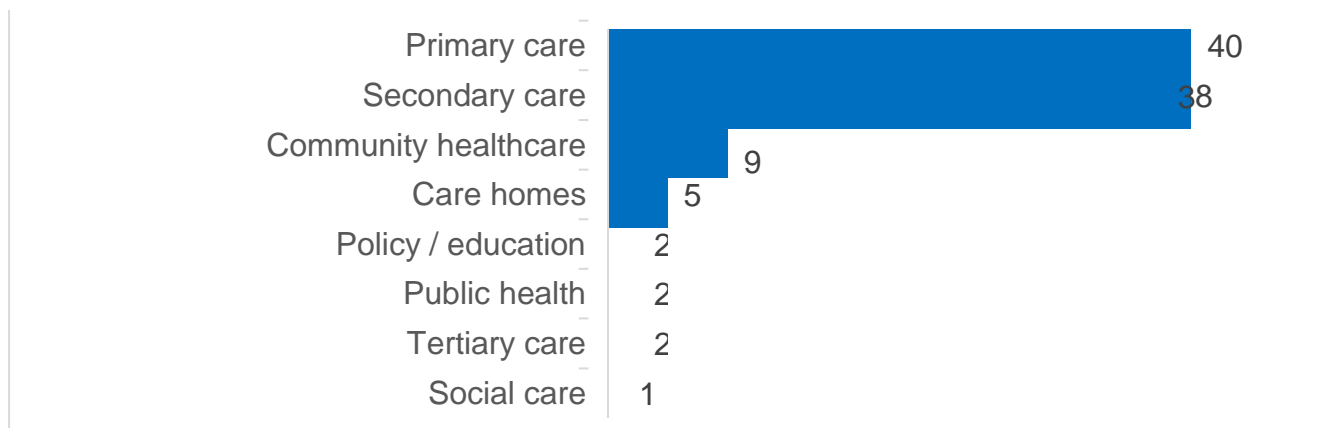
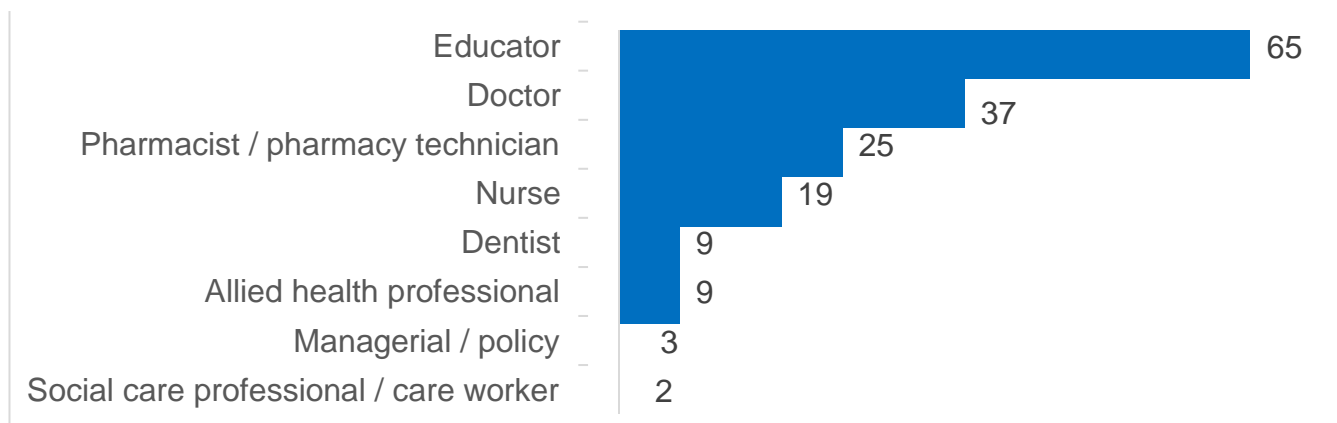


Table 1: Number of people from various sectors that provided feedback.

Sector	Discussion groups	Interviews	Survey	Total
Care homes	0	25	31	56
Public health	1	12	9	22
Community healthcare	2	14	83	99
Primary care	14	15	399	428
Secondary care	8	18	375	401
Tertiary care	1	3	16	20
Social care	0	6	5	11
Policy / education	1	12	10	23
Total	27	105	928	1,060

Figure 2: Proportion of participants with various roles



Note: Percentages add to more than 100% because participants could have more than one role.

2.0 Approaches working well

This section describes approaches that healthcare educators and practitioners thought worked well to raise awareness or support behaviour change to tackle antimicrobial resistance.

2.1 Key themes

Participants in discussion groups, interviews and the online survey were asked what they had found works well to educate healthcare workers about antimicrobial resistance. Educational approaches were defined in the broadest terms, relating to any approach to raise awareness or change behaviour to tackle antimicrobial resistance. Many people focused on approaches to improve antibiotic prescribing rather than infection control or other antimicrobial medications. Not all participants will agree with the opinions summarised here, as there were mixed views about the effectiveness of some strategies.

In general, the educational approaches perceived to be working well locally included:

Approaches targeting prescribers

- taking a personalised approach so information is targeted towards an individual (31%)⁵
- bedside teaching or ward rounds in hospital with microbiologists, pharmacists or other specialists so that advice and feedback can be given in a helpful, non-confrontational manner (34%)
- having role models demonstrating best practice (22%)
- auditing the practice of individual prescribers and providing feedback comparing prescribers with one another (43%)
- simple graphs and usage maps to track prescribing (13%)
- real time feedback about inappropriate prescribing (12%)
- wide communication of the results of prescribing audits (<10%)
- a newsletter distributed to all prescribers in the organisation (<10%)
- placing antibiotics on a restricted list in hospital, so clinicians are not able to prescribe them without gaining a special code from an authorised source (<10%)
- embedding education about appropriate antibiotic use into the formal curricula (17%)

Approaches targeting multidisciplinary teams

- emphasising that antimicrobial resistance is an issue for the entire multiprofessional team, including nurses, pharmacists, doctors and support workers, so that everyone has a role (12%)
- having pharmacists or similar professionals working across community, primary and secondary care to provide more integrated feedback and services (<10%)
- lunchtime learning events for the wider team (<10%)
- huddles focused on key issues (<10%)
- antimicrobial stewardship groups in every hospital (<10%)

Throughout this document, percentages refer to the total proportion of participants in interviews, discussion groups or surveys who mentioned a particular point.

The percentages indicate how many people mentioned an issue without prompting, not the proportion of people who may agree with this point if explicitly asked about it.

Educational resources

- small group education sessions, particularly with role models, sharing examples of good practice and using audit results (47%)

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- using case scenarios that relate directly to the workplace. It was suggested that having patient stories personalised the issue and made it seem relevant in practice (37%)
- specific e-learning programmes and toolkits (14%)
- smartphone apps to support prescribing (<10%)
- using national or regional campaigns to highlight issues annually (11%)
- posters for professionals placed in staff rooms, bathrooms or wards (<10%)
- using Facebook and Twitter to share messages with staff teams and the public (<10%)
- guidelines including alternatives to antibiotic prescriptions (<10%)
- guidelines tailored to a specific sector (for example, general practice or hospital) (<10%)
- having short (one page) handouts or guideline summaries as an aide memoire on desks or lanyards (<10%)
- template presentations and other resources prepared nationally / by experts (<10%)
- workplace-based assessments for prescribers (<10%)
- rewarding course or e-learning attendees with certificates as evidence of continuing professional development (<10%)
- easy access to online resources, without the need to register with a website (<10%)

Infrastructure

- having an electronic prescribing system or computer database that tracks medication and issues alerts (21%)
having specific staff members assigned, such as an antimicrobial nurse, antibiotic pharmacist or medicines management team, to support audits, awareness raising and promotion (16%)
- changing drug charts so there is a space to document a review of medication after a set period (e.g. 72 hours) and requiring that any scripts are rewritten after five days (<10%)
- legislation that requires education or specific behaviours (<10%)

Messaging

- discussing antimicrobial resistance in sepsis training, so messages are linked (<10%)
- focusing on infection control and hand hygiene, not solely prescribing (11%)

Finances

- having a CQUIN or Quality Premium linking financial reimbursement to appropriate antibiotic use (39%)

Other approaches

- asking patients to complete self-assessment forms about their symptoms to see whether antibiotics may be indicated. This serves an educational purpose too (<10%)
- point-of-care C-reactive protein (CRP) testing devices (<10%)
- deferred antibiotic prescriptions with personalised handouts (delayed prescribing) (<10%)
- rapid access to specialist support, such as a dedicated telephone line to reach a microbiologist during consultations (<10%)
- requiring teams to undertake audits every three or six months (<10%)
- asking workers to pledge to change their behaviour and reviewing progress (<10%)
- having badges or stickers to signpost workers as champions of good practice (<10%)
- antibiotic guardian programme (<10%)
- public information sessions run in general practices, care homes and schools (<10%)

2.2 Role models

Across primary, community and secondary care, those who provided feedback emphasised the importance of having someone that people respect modelling good practice and providing information. This focus on 'respected individuals' was repeated whether participants were speaking about ward rounds, educational mentors, protected learning time sessions or conference speakers.

“Doctors learn about antibiotics from their role models and teachers such as the teams they are working with in hospital. Therefore, what works well is to have those role models demonstrating good practice. If we want to get at the future workforce, we should target improving the prescribing of role models as that will rub off on others.”

Hospital consultant

Some suggested that it was important to change educational and awareness raising approaches regularly, so people do not get fatigued with repeated messages or the same educational styles.

2.3 Audits and benchmarking

One of the most effective strategies to alter prescribing behaviour was reported to be audits of individual and organisational prescribing practice that allowed comparisons with others and mobilising of peer pressure. Although this was said to be time-consuming to implement, it had reportedly been found to work well to prompt behaviour change. Similar comments were made about audits of infection control practices. Some suggested that there should be a national audit programme focused on antibiotic prescribing and infection control.

“[What works well is] showing them real examples from Microbiological Results of Antibiogram which has been detected in the hospital. This reality brings home to them the visible and current status in their own hospital about incidents alongside poor adherence to antimicrobial stewardship from their own clinical setting.”

Hospital infection prevention and control nurse

One hospital team described how they had used the results of an audit of the amount of nursing time spent administering antibiotics as part of a business case for medicines management or microbiology staff. Others also emphasised that it was important to use the results of audits directly to support practical change.

2.4 Targeted education

A small number of participants felt that educational initiatives should target doctors as key prescribers.

“Considering only doctors prescribe antibiotics, the education should primarily focus on educating doctors. In my view educating doctors to clinically differentiate viral infections from bacterial infections works well.”

Tertiary care doctor

However most argued that education should not only be directed towards doctors and other prescribers, but also the wider multidisciplinary team and patients. In this view it was important to promote educational messages about antimicrobial resistance being everybody’s business.

Using case studies and patient stories to humanise the issues was repeatedly reported to be an effective educational approach.

“[What works well is] patient stories about resistance in their setting, not theoretical or distant examples. Right here right now impact needed.”

Hospital doctor

Some areas provided examples of good practice such as hosting educational sessions for groups that may not otherwise have ready access to training, such as general practice locums. Others noted the value of specific toolkits or e-learning programmes.

“The TARGET programme is an excellent educational resource - it has supplementary resources that prescribers can use such as non-prescription pads, back up prescribing leaflets specific to each infection. However, it is a very lengthy programme and not all staff may have the time to utilise it.”

Hospital nurse

Others, however, suggested that there was room to improve seminars to ensure that these were more interactive and hosted by people who were educators and specialists in the topic, using activities and processes suitable for adult learning.

2.5 Educating patients

Some participants described how simple explanations from prescribers to patients could have an educational impact.

“When I saw the doctor with my little girl last year, she had a viral chest infection and the doctor prescribed antibiotics but he specified it was because of her sore on her nose, not her chest infection. I think that approach is helpful.”

Community education provider network representative

A small number of people mentioned the potential of delayed prescriptions, whereby patients are given a script and instructed only to fill it if their symptoms persist or weaken, however some were uncertain about the effectiveness of this approach.

2.6 Technological support

Some participants described technological resources to support improved prescribing. These included smartphone apps with ready access to guidelines and clinical decision support / electronic prescribing systems that automatically prompted a review of antibiotics 48 hours after initiation. Most of these technologies were described in a hospital context.



3.0 Potential challenges

This section describes gaps or challenges identified by healthcare educators and practitioners in efforts to raise awareness or support behaviour change to tackle antimicrobial resistance.

3.1 What works less well

Participants in discussion groups, interviews and the online survey were asked what they had found works less well to educate workers about antimicrobial resistance. The most commonly recurring comments included:

Styles of education

- reliance on e-learning rather than face to face approaches (35%)
- passive information circulation such as bulk email, newsletters and posters (24%)
- long reports with large amounts of unnecessary detail and no summaries (11%)
- letters or missives from national organisations (11%)
- trying to fit a great deal of information into induction training (<10%)
- use of 'buzzwords' such as 'stewardship', which may be alienating and not clearly defined (<10%)
- approaches that challenge professional integrity or individual clinical judgements (<10%)
- relying on professionals to look up websites (<10%)
- offsite education sessions, as it is difficult for some to find time to attend (<10%)
- 'old style' education that humiliates people (<10%)

Guidelines and targets

- guidelines that offer unclear or somewhat conflicting advice, or that are long and difficult to navigate (41%)
- different guidelines used by varying organisations or professions within the same region (27%)
- guidelines or targets that focus on reducing prescribing by a set proportion or shifting prescribing from one medication to another (13%)
- guidelines that suggest blanket reductions in prescribing without accounting for the specifics of individual cases (<10%)

Other approaches

- not making the scale of the problem clear (<10%)
- lack of evidence or inappropriate use of evidence, such as quoting international cost studies or those undertaken outside usual practice (<10%)
- not providing alternatives to antibiotic prescribing (<10%)
- unhelpful media stories (<10%)

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Some participants welcomed the focus on issues that happened around national campaigns such as World Sepsis Day or Antibiotic Awareness Week. However, they felt that this was too important an issue to focus on for such a short period per year.

The potential pros and cons of e-learning were noted.

“We have tried to apply e-learning to staff groups to teach them about antimicrobial resistance. It has the advantage that we have been able to reach a wider audience with some form of education, but the package may have been less than ideal and not so well received by some staff. Pitching the education at the right level for all staff is difficult, as is producing a stimulating package.”

Hospital pharmacist

“I think e-learning is ok as a blanket approach to disseminating an awareness but I think for prescribers and for healthcare professionals administering antibiotics (eg nurses on drug round) there should be pertinent and relevant face to face learning.”

Hospital doctor and educator

“Generic stuff is not helpful - people need specific information on what changes they need to make at work i.e. not diagnosing a urinary tract infection just based on a dipstick test. Staff also need information on what to do instead i.e. what to stop doing and what to start doing instead.”

Primary care nurse

Others stated that it was unhelpful to circulate long documents and guidelines without practical summaries, to provide generic information not tied to clinical practice or to overuse email and newsletters.

Some emphasised the importance of wording educational messages sensitively so that it did not appear that blanket reductions were needed without accounting for individual circumstances. These participants said that feeling ‘told off’ had a negative impact and that alternatives to antibiotics or a focus on shortening the duration of cycles needed to be provided within educational initiatives.

Emphasis on reducing the use of antibiotics does not work. Appropriate use should be recommended. Most harm has been done by asking doctors to reduce use of antibiotics. The rebound increase in use of higher dose and second and third generation antibiotics, often secondary to not using antibiotics early enough, is a significant problem.”

Tertiary care doctor

3.2 Potential barriers

When asked about any barriers to raising awareness or changing behaviours regarding antimicrobial resistance, the most frequently mentioned issues were:

Timing issues

- time pressures, making it difficult for people to take time to increase skills and knowledge, particularly given many competing priorities (59%)
- perceived lack of time to speak with patients about why antibiotics may not be appropriate, particularly within general practice consultations (47%)
- inaccessibility of prescribing guidance at the point of care (31%)

Cultural issues

- prescribers not feeling empowered not to prescribe (21%)
- perception that patients want prescriptions, even if this is not the case (51%)
- hierarchies between disciplines which may make questioning prescribing decisions more difficult (47%)
- prescribers not wanting to 'interfere' in decisions made by another person (37%)
- fear of making a mistake if antibiotics were not prescribed but later found to be needed (37%)
- fear of complaints or litigation (12%)
- entrenched views from some senior personnel, who influence the views of others (11%)

Infrastructure issues

- lack of investment in rapid diagnostics, meaning it takes time to receive test results to support appropriate diagnosis (19%)
- insufficient electronic prescribing systems, with prompts and alerts about appropriate prescribing behaviours (14%)
- use of antibiotics internationally, including over the counter, and in veterinary medicine (11%)

Communication issues

- not being clear about best practice messages, such as the appropriate duration of antibiotics or whether a full course of antibiotics should always be completed (61%)
- difficulties communicating the urgency and importance of the issue to various audiences (12%)
- people feeling that they are already aware of the issue, as though this solves the crisis (<10%)
- focusing on reducing prescribing rather than emphasising that resistance is also related to preventing the spread of infections (<10%)
- inadequate discharge summaries which do not list what type of antibiotic people were prescribed, why and for what duration (<10%)

Personnel issues

- locums, out of hours' services and online consultations where professionals may be more likely to prescribe antibiotics without full examinations or tests (12%)
- lack of supervision of junior doctors at urgent care centres and out of hours' services (<10%)

Consistency issues

- balancing the desire to avoid sepsis with the desire to reduce antibiotic use (25%)
- perception that health workers in another service will provide antibiotics if someone asks, so it would serve limited purpose to deny a prescription from the outset (21%)
- many teams within an organisation, leading to a lack of continuity (25%)
- the prescriber who started antibiotics may not be the person that reviews continuation (11%)
- lack of joint working across primary, community and secondary care (<10%)

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- perception that there are too many organisations involved at a national level, thus diluting messages and making it difficult to know who is responsible (12%)
- inconsistent messages and guidelines from various Royal Colleges and national bodies about when to use antibiotics (<10%)
- varying definitions of 'inappropriate' prescribing (<10%)
- rapid staff turnover in some organisations and sectors, making it difficult to sustain and embed educational messages (<10%)
- senior leaders and ministers reportedly not being aware of antibiotic guardians and other key campaigns (<10%)

Educational issues

- lack of confidence amongst junior doctors, who err on the side of caution (21%)
- lack of mandatory training about ways to address antimicrobial resistance for all workers, particularly junior doctors and nurses (19%)
- insufficient time and resources for educators who may want to offer more personalised role modelling or instruction at the point of care (18%)
- insufficient knowledge amongst prescribers, particularly junior doctors, about bacteria and how antibiotics of different types work (15%)
- reported issues reaching some sectors or groups with educational messages, such as care homes, community nurses and mature single-handed general practices (13%)
- lack of accessible information about when to appropriately prescribe antibiotics (15%)
- lack of evidence about the best way to use antibiotics, such as whether to stop before completing a course (15%)
- insufficient knowledge that antibiotics need to be given at certain times to be most effective (<10%)
- insufficient knowledge amongst professionals and members of the public about alternatives to antibiotic use, including self-care and home remedies (<10%)
- insufficient recognition of the scale of the problem or what individuals can do about it (<10%)
- too few charismatic, knowledgeable and motivated individuals to deliver training locally (<10%)
- lack of education for care homes, such as about how to manage urinary tract infections (<10%)

Other issues

- not having sufficient information in notes about why antibiotics were started, making it difficult for another team member to make a change (<10%)
- perception that guidelines may not be based on appropriate evidence, which may affect the extent to which practitioners follow guidelines (<10%)
- employers more readily accepting sickness requiring leave from work if employees have a prescription and some nurseries and schools not accepting children who have been ill unless they have an antibiotic prescription (<10%)

3.3 Linking education to other drivers

Participants described a wide range of factors that may affect good practice, many of which were couched in terms of systems or infrastructure issues rather than directly related to knowledge and skills. Many of the factors mentioned, however, such as the need for more consistency between team members and organisations, improved documentation, and greater acceptability of making changes to initial prescribing decisions, could be affected by appropriate education and reinforcement.

Some suggested that there was a need for increased knowledge and confidence about prescribing and clear messages, particularly for doctors in training.

“Professionals are bombarded with conflicting information. For instance, the focus on sepsis may increase possible heavy handed antibiotic prescribing. We need more evidence about the best way to use antibiotics such as whether to stop before a course ends or not. Junior doctors are most worried about making a mistake so they give antibiotics. There is also a fear of litigation. There are definitely challenges in terms of our knowledge and skills.”

Hospital consultant

“Junior medics generally follow what a senior medic suggests without questioning the need for an antimicrobial. Awareness and behaviour change needs to happen during undergraduate training for ALL healthcare professionals but antimicrobial stewardship and awareness needs to be embedded in some sort of annual mandatory training for all staff, in particular prescribers.”

Hospital pharmacist



3.4 Patient demand

A commonly cited issue was perceived patient demand for antibiotics and patient behaviours.

“The key issues facing us involve patients. There is patient expectation for an antibiotic prescription. It doesn't help that patients can go abroad and purchase them over the counter. Patients may complain and then book another appointment with an alternative healthcare professional or consult out of hours' services if they have been refused a prescription and sometimes they are then offered one... There is a lack of time to discuss the pros and cons sufficiently within the appointment and the pressure of appointments in general practice makes this worse. We also have to practice defensively as patients are more likely to take legal action.”

Primary care nurse

“We did a survey of doctors at our hospital. Public perception was very important in the decision to prescribe. If they feel that a patient will be difficult if they send them away without antibiotics and will go to another doctor for it, and they will prescribe. Doctors know why not to prescribe, but they feel pressured by public opinions and also needing to try to convince people why antibiotics are not needed.”

Hospital educator

“If a patient wants antibiotics, they threaten us with a complaint. If they do not get them and they want them (despite long discussion about risks) they issue us with a complaint. Even if we are completely right in the decision we make not to give, we still have to deal with the complaint, analyse it, reflect on it, discuss it in appraisal....and even then, the patient can pursue it if they wish. This has massive implications on a healthcare professional's time and career. We only have 10 minutes to manage these expectations.”

General practitioner

Several participants described research locally or internationally about why clinicians prescribe antibiotics. There was reportedly a perception amongst clinicians that patients want antibiotics when they visit a general practitioner for example, but in reality, this may not be the case. Instead, they may want reassurance and information about how to manage their symptoms and how to identify signs of deterioration. There may be particular insecurities about caring for children. In this view, informing health professionals about the types of reassurance that people want for themselves or their children may help to reduce perceived pressure to prescribe.

3.5 Time pressures

Another of the most frequently mentioned challenges in tackling antimicrobial resistance was time pressures.

“Time is one of the biggest issues we face. It can be quicker for people to prescribe than to look for other options or explain why prescribing would not be the right thing to do. It is even hard to find the time to access the latest guidance to look up what to do. Audit can help but that is time intensive too.”

Consultant microbiologist

Whilst time was often discussed in the context of clinical consultations, some noted that it was difficult to ring fence time to bring professionals together to raise awareness of the issue and how it could be addressed in day to day practice.

“A barrier is time to engage with education. There is a lack of opportunity to bring together relevant groups to work together to change behaviour.”

Dentist

“Time commitments in terms of people delivering and developing learning opportunities but also in releasing healthcare professionals to attend educational forums. People need to have more insight to understand global concerns but also people need to be respectfully challenged on prescribing habits if they are not within acceptable practice. Non-medical healthcare professionals should feel empowered to raise concerns about use of antimicrobials but this all takes time.”

Hospital doctor



3.6 Organisational and professional culture

Interpersonal relationships, cultural or hierarchical norms and not wanting to be seen to challenge the clinical decisions of others were thought to have an important influence on prescribing behaviours.

“Lots of cultural stuff needs to be unpicked about prescribing behaviours. People don’t want to step on other people’s toes, especially when transferring patients between teams on admission then to wards.”

Community pharmacist

Some practitioners noted that clinical judgement was essential in prescribing decisions and that unilateral recommendations for change may act as a barrier or appear to challenge professional judgement.

“It is easy to challenge physicians to reduce usage when you are not the one taking clinical responsibility for the patient. All too often it is managers doing the challenge or people who do not prescribe actively. This leads to integrity issues which can become barriers to change.”

General practitioner

Others highlighted that prescribers may prescribe antibiotics to ‘be on the safe side’ due to wanting to support individual patients, fear of serious infection and fear of litigation.

“People are terrified of missing a treatable infection resulting in severe sepsis or death of a patient. This is why antibiotics are prescribed sometimes as they believe it is best to err on side of caution. The here and now for a sick patient is the urgent issue - microbial resistance in the future is not something you can trace directly to any one decision made for an individual patient but them dying of sepsis might be.”

Hospital pharmacist

“There is always the fear that there will be the one patient who does have end up having the life threatening bacterial sepsis down the line, and you know may have benefited and had an improved outcome from antibiotics if given earlier. They are not straightforward decisions to make always.”

General practitioner

3.7 Similarities and differences across sectors

The barriers and challenges in tackling antimicrobial resistance reported across primary, community and secondary care were broadly similar, with a significant focus on organisational and professional culture, awareness and resourcing.

“Day to day stewardship is about pharmacists, doctors, nurses, paramedics and others working together. This needs to be developed more so a culture is developed within and across organisations to recognise that antibiotics are important drugs and need to be considered carefully.”

Ambulance service representative

Some working in secondary care thought that a great deal of educational resource and input had targeted primary care and that more was now needed in the context of secondary care. Others from primary care felt the opposite.

Some said that it was particularly difficult to target educational messages towards nursing homes. Mature single-handed general practices were identified as another area of concern in some areas.

Participants working in primary care were most likely to say that patient expectations and the fear of complaints influenced the prescribing of antibiotics. Those working in a hospital context were most likely to raise the issue of balancing the desire to avoid sepsis with trying to reduce antibiotic prescriptions.

Some felt that it may be more difficult for nurse prescribers in primary care to deflect patient demand for antibiotics. A number of community and hospital pharmacists said that it was difficult for them to raise concerns about prescriptions as they did not have access to patient records or know the history or individual circumstances.

Some participants felt that, particularly in a hospital context, it was often appropriate to prescribe antibiotics, but that much more emphasis should be placed on ceasing antibiotic use promptly.

“In hospital you want to avoid sepsis, so this triggers a lot of antibiotic prescribing. This is largely appropriate. We need to try to stop sooner and focus on having a shorter duration of antibiotics, such as within 48 to 72 hours. There is a culture change needed as you feel you need to prescribe so we need to move to a default position of stopping after two days instead of the default being to continue.”

Hospital consultant and educator

4.0 National and regional support

This section describes areas that healthcare educators and practitioners thought might benefit from national or regional support from Health Education England or other bodies to help tackle antimicrobial resistance.

4.1 Key themes

In discussion groups, interviews and the online survey, participants were asked about any areas that may benefit from national or regional support from Health Education England or other stakeholders in the field of antimicrobial resistance. The overarching message was that education needed to be part of an overall strategy to change the culture within health economies, organisations and teams.

It was proposed that some initiatives were better developed and implemented locally, to account for contextual features. Some felt it was difficult to implement meaningful change from a national perspective. Others felt that national teams had a role to play in setting and enforcing priority areas, in providing consistent messaging and in sourcing and sharing good practice.

The most common suggestions about where national support would be beneficial included:

Awareness raising for the public

- having a standardised toolkit of resources that all sectors and areas could use or adapt, including simple video and written resources for waiting rooms encouraging patients to wash their hands or highlighting that antibiotics may not be needed. Health Education England and Public Health England have such resources, but some participants said that these were not widely known about or distributed for use in every waiting room, and that there should be one consistent message rather than resources from multiple sources (49%)
- having a nationally produced information leaflet that professionals could give to patients with minor illnesses, so professionals feel that they have something to give to patients instead of medications (21%)
- visual tools such as infographics and colourful leaflets, posters and short videos to help articulate messages to the public, including short films for use in waiting rooms (21%)
- working with media organisations and celebrity endorsements to provide simple and consistent messages for the public (20%)
- having a storyline in a popular soap opera to raise public awareness (12%)
- more information to support self-care such as information about infections in the elderly, how to care for a catheter and when to escalate to a health professional (<10%)
- running education sessions for school children or embedding in the school curriculum (<10%)
- targeting employers with education that it is acceptable for workers to be off work sick if they do not have a prescription (<10%)

Awareness raising for professionals

- focusing on bite sized pieces of information, rather than long documents (31%)
- providing case studies of successes from local areas (27%)
- providing links to quality assessed resources and courses, with star ratings so professionals can easily review whether a resource is good quality and relevant for them (16%)
- training a wider range of workers so that champions are built at various levels and across sectors. This may include non-medical personnel and leaders at different levels (15%)

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- having a national competition for the best improvement ideas to spark interest (<10%)
- providing audit templates to help local organisations and professionals review their own practice (<10%)
- having best practice examples and tips on the websites of Royal Colleges, professional websites and in trade publications (<10%)

Targeting specific personnel

- making it a priority to educate the trainers of health professionals about why this issue is important and how to teach about it. For example, programme directors in educational deaneries could be trained as champions to promote the topic to others (15%)
- making it mandatory for medical students to undertake an e-learning package with a test at the end of years one, three and five, so this is embedded into the curriculum and assessed (11%)
- making it mandatory for student nurses to undertake training about antimicrobial resistance (11%)
- running sessions for nurses, bearing in mind that junior doctors (prescribers) take a lot of advice from senior nurses (<10%)
- providing accessible training for care homes and social care personnel (<10%)
- training emerging roles such as physician associates and medical assistants (<10%)

Education about specific topics

- having a national campaign about when to stop courses of antibiotics so the message is clear and consistent (24%)
- developing a short video about the default position being to stop antibiotics after a set period such as two days (21%)
- educating prescribers about how to have conversations with patients about why they may not need antibiotics (11%)
- educating prescribers about whether there is an ideal duration or dosage to mitigate antimicrobial resistance (<10%)
- guidelines and best practice about what to document on notes when people make a prescribing decision (<10%)
- simple factsheets about the risks associated with antimicrobial resistance (<10%)
- empowering non-prescribers to request reviews of antibiotics (24%)
- providing more information about how to help older people who appear disorientated.
- Sometimes it is assumed that these people have a urinary tract infection and need antibiotics when disorientation could be related to emerging dementia (<10%)
- providing information about the effectiveness and cost-effectiveness of various infection prevention, control and prescribing interventions (<10%)
- having more campaigns about preventative approaches such as hydration to reduce urinary tract infections (<10%)
- supporting teams with information about what to do with prescribing or infection control audit results, so there are actions associated with various levels of performance (<10%)

Community of practice

- developing a website where practitioners can share examples of good practice (32%)
- circulating a national electronic newsletter with tips and examples of good practice from local areas, along with contact details so people could learn more (19%)
- running events to share good practice with key opinion leaders speaking (14%)

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- setting up opportunities for the chairs of organisational antimicrobial stewardship groups to meet regionally to discuss good practice (11%)
- encouraging every clinical commissioning group and training hub to have an antimicrobial resistance and sepsis champion, with these leads meeting regionally to share good practice (<10%)
- having an electronic portal where educators could make contact with one another with a view to working together to provide education (<10%)

Targets and regulation

- refining CQUINs, Quality Premiums, prescribing incentives and contract requirements to tackle antimicrobial resistance (51%)
- making the provision of antimicrobial resistance training mandatory for community education provider networks or training hubs. The form this takes would be decided locally, but Health Education England would set this as a priority topic to be covered every year (21%)
- providing dashboards with targets and progress to help people appreciate the scale of the problem and how organisations and regions compare to one another (14%)
- circulating basic data to teams and antimicrobial stewardship groups, such as cases of sepsis and targets for antibiotic use (<10%)
- undertaking a national audit of prescribing practice (<10%)
- including antimicrobial resistance mitigation in the factors assessed by the Care Quality Commission (<10%)
- basing targets in primary care, such as those in Quality Premiums, on the total volume of antibiotics, not reducing the use of specific named antibiotics (<10%)
- ensuring that antibiotics are not given under patient group directives as prescribers need to make such decisions (<10%)

Other approaches

- linking campaigns about sepsis and antimicrobial resistance so there are clear and consistent national messages (27%)
- campaigning for the availability of near patient testing so clinicians can quickly assess whether the cause of symptoms is bacterial or viral (19%)
- setting up a national 'antibiotic aware' kite mark programme similar to dementia friendly or baby friendly initiatives, where organisations need to achieve certain standards to be accredited (<10%)
- having regional or national antibiotic prescribing fellows to lead and coordinate work with the Department of Health, Royal Colleges, Sustainability and Transformation Partnerships, training hubs and similar (<10%)
- providing national templates for forms such as prescribing medication charts (<10%)
- developing a simple app or decision support tool that plugs in to clinical systems about when to prescribe antibiotics, similar to NEWS (<10%)
- identifying potential cost savings from making appropriate choices in urinary tract infections, surgery and so on, so good clinical practice is linked to financial sustainability (<10%)

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4.2 Promotion and resources

While some felt that existing campaigns and messages were reaching health and care workers, others suggested that there remained a lack of recognition about the scale of the issue and practical steps to mitigate it. In this view, nationally coordinated and consistent messages would be useful across all health and care sectors.

“At the moment it is seen locally as a quaint problem from the future and not many people seem to have made a link to how it impacts them or their children's future.”

Care home support worker

It was suggested that a detailed strategy could be developed listing various stakeholders and the most appropriate messages and mechanisms to reach each group. Some noted that messages may be differently targeted towards individuals, organisations and wider bodies.

“Communicating the risk consistently and regularly is important to challenge lack of or misunderstanding. Knowing what level and how to tackle - at individual prescribers or trust level? Both have challenges as well as advantages.”

Public health practitioner

“There's too much targeting of certain professions at the expense of others who get no targeting whatsoever.”

Community pharmacy technician

Some said that there was a need for more regular and consistent information sharing, as they did not always receive information relevant to practice.

“As a GP I very rarely receive information about local resistance patterns. The antibiotic guidance I receive is usually several years old, mainly based on cost and usually by disease. There needs to be a considerably higher priority given to this area by commissioners, with effective support for general practices in changing prescribing behaviour.”

General practitioner and educator

Participants also noted the importance of prompt guidance and messaging, particularly where there was a desire to promote changes in the use of specific medications or the duration of use.

Others said that even those who had received messages or training in the past may need refreshers.

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Some participants said it would be useful to have nationally prepared training courses, assessment forms and educational board games or other resources that could be implemented locally. Professionals felt that this would reduce duplication and promote consistent and good quality messages.

“If Health Education England was able to provide centralised teaching packs / Powerpoints ... with evaluation forms / assessments, perhaps even a stewardship and resistance board game or fun element, this would be helpful.”

Hospital doctor

The e-Learning for Healthcare website was felt to be out of date and difficult to navigate, and there were requests to remedy this.

One engagement strategy suggested was having a kite mark or ‘antibiotic aware’ accreditation, whereby organisations needed to fulfil certain criteria in order to display the kite mark on their premises, websites or correspondence. In this approach, a standardised quality improvement programme may be completed by a general practice surgery, dental surgery, hospital team or other group over a set period in order to achieve accreditation signaling that the team had achieved certain standards.

4.3 Enforcement

Participants repeatedly noted that it would be useful to ensure that undergraduate medical, nursing, pharmacy, dentistry and other curricula engaged students appropriately and encouraged stewardship roles. Whilst the expertise to offer training exists in local areas, it was felt that the policing of such curricula should be undertaken at national level.

“Embed antimicrobial stewardship into doctors / nursing / pharmacy/ physiotherapist / podiatrist etc undergraduate training - making sure that it is applied in a practical way through case studies / workshops and not just delivered as theory. Make it mandatory for junior doctors / nurses to spend time with antimicrobial stewardship teams to pick up good habits and good antibiotic prescribing principles.”

Hospital pharmacist

Another type of national enforcement mentioned focused on stewardship programmes. Some participants said that whilst NICE guidelines highlight the importance of antibiotic stewardship programmes, many organisations do not allow ring fenced time to maintain such programmes. In this view there was a need for national enforcement of such guidelines.

Others said that HEE should set antimicrobial resistance as a priority area that all training hubs and community education provider networks needed to include in their annual offerings, with a key performance indicator associated with this. This is something that is within the control of HEE, if this focus is deemed a priority.

4.4 Good practice

In addition to enforcement, participants felt that national support would be useful to source and share examples of good practice.

“Health Education England should collect short case studies about what is working well and circulate regularly to spark ideas. It would also be good to have an online forum where people can post what they are doing so we can all share. There is lots of good practice but we are working in silos.”

General practitioner

Participants described approaches that had been found to work well locally and that could be shared more broadly.

“We’re using whiteboards on wheels ... to travel around the wards and deliver on the spot multidisciplinary team teaching in 10 minute chunks to small groups. Feedback has been fantastic and we are reaching larger numbers than we would with a lecture or e-learning and it is more interactive. People feel more able to ask questions in a smaller group with people they know.”

Hospital doctor

Many emphasised that there was already a great deal of information and resources available online and in paper form and that what was needed was coordination and quality assessment of those resources rather than duplication or further production.

It was suggested that Health Education England could support training hubs and community education provider networks to run multiprofessional learning events to bring together workers from a range of disciplines and sectors, perhaps including patient representatives and the voluntary sector.

“The key priority is dissemination of learning and co-ordination of events multiprofessionally in the community. Working with non-clinical staff is also important as this is about changing a belief system of disease management in the area of minor illness and also promoting the right messages and new thinking widely in communities through everyone everywhere.”

Community education provider network representative

Another way of sharing good practice proposed was a quality improvement collaborative of organisations working together to improve infection prevention and control or appropriate prescribing. Whilst various potential solutions were put forward, the underpinning principle was to promote working in a more joined up manner and sharing good practice across organisations and sectors.

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4.5 Investment

Participants noted that some of the challenges in addressing antimicrobial resistance may require investment. Three areas that were commonly mentioned in this regard were:

- increased access to prompt diagnostics to differentiate bacterial versus viral illnesses
- increased staffing of microbiologist or medicines management teams to lead on education and promotion locally
- investment in apps, clinical decision-making software and technology to support training so that there is a more standardised and ‘slick’ approach than in-house efforts

Some of these decisions may be outside the remit of national agencies, but participants felt strongly that investment in staffing and technology was a key factor in prompting change.

“If we could have faster tests to establish whether illnesses were viral or bacterial and if we could have faster results with antibiotic sensitivities it would help greatly.”

General practitioner

“Resource Consultant Microbiologists for identified education around antimicrobial stewardship for all healthcare professionals. There are many qualified and committed to education but cannot provide this within current clinical service demands. Also support for developing IT prompts especially apps / handbooks and communications would be useful.”

Microbiologist



5.0 Summary

This section summarises factors thought to help and hinder efforts to improve education about antimicrobial resistance and areas that may be prioritised for further national support.

5.1 Key learning

Feedback from 1,060 healthcare educators and frontline workers suggests that in order to tackle antimicrobial resistance in England a more **system-wide and joined up approach** to thinking and working may be required. There was a perceived lack of coordinated working and promotion across various national and regional agencies. It was felt that NHS England, Health Education England and Public Health England should be working in an integrated manner with Royal Colleges, the British Society for Antimicrobial Chemotherapy and others to avoid duplication and ensure clear messaging.

Some felt that there was a sense of ‘message fatigue’ amongst professionals or a degree of defensiveness if messages suggesting behaviour change appeared to question clinical judgement or autonomy. Others believed that awareness had been raised about the issue but that there remained significant gaps in knowledge about practical steps to take or tools to use that would make a difference in routine practice.

There were reportedly many educational resources available to raise awareness about antimicrobial resistance amongst health workers. However, these were not necessarily well known or used. A lack of time to use the resources, in amongst many competing priorities, was a core reason for limited use. In other words, it was largely a lack of promotion and external pressures contributing to limited use, rather than characteristics of the resources themselves. An exception was e-learning resources and guidelines, many of which were thought to be too long, simplistic and not appropriately targeted. Participants suggested that there should be less emphasis on developing and promoting e-learning resources. There was a call for a simple **directory of quality assured educational and promotional resources** from the UK and internationally, perhaps broken down by learning style or cadre as well as an online community of practice to share evidence and good practice in an interactive manner.

Another recurring message was the importance of viewing members of the public and people using services as key influencers and members of the wider care team. Engaging and **empowering the public** may reduce inappropriate demand for antibiotic prescriptions or help professionals feel less pressured to prescribe. Box 1 summarises other key themes.

A learning point from this process was that even short discussion groups or interviews can encourage educators to take further action. Some who participated in interviews and discussion groups said that as a result they had learnt more about the seriousness of the issue. A small number said that this would influence their prescribing practice and how they speak with patients about the need for antibiotics. Some representatives from community education provider networks set up multi-professional educational sessions to discuss antimicrobial resistance or featured articles in their newsletters after taking part in this programme of work. Some discussion group participants kept in contact with one another and ran joint education sessions within their localities.

Tackling antimicrobial resistance: educational priorities

Box 1: Key themes raised about tackling antimicrobial resistance via education

Personnel

- Education of a wide range of health and care personnel is important, including prescribers and non-prescribers
- Targeting educators and senior personnel may be useful, as these people affect the practice of more junior team members
- Include sectors that may traditionally be difficult to reach such as care homes, community nursing and mature single-handed general practices
- Engage with and educate the public to reduce demand for antibiotics and fear of complaints amongst practitioners

Education type

- Auditing and benchmarking against others is reported to work well to change practice
- In person seminars help professionals hear impassioned speakers
- There are already many resources and e-learning programmes available so the production of new resources may be a low priority unless there is an agreed need
- Some educators report the value of specific e-learning, guidelines or educational programmes. In general, concise approaches are preferred
- Communities of practice may help to share examples of what is working in local areas and spark new ideas

Educational approach

- Developing a strategy listing stakeholders, messages and appropriate educational approaches to target different audiences may inform a more structured approach
- Joint learning across professions and sectors could improve consistency
- Champions at education deaneries and in senior positions in organisations may act as role models to spread messages and good practice
- Peer pressure can be an important tool for changing infection control and prescribing behaviour
- In-person seminars such as protected learning time workshops may best be facilitated by those with educational skills to ensure active learning
- Build in messages about antimicrobial resistance to existing education, such as training prescribers how to speak with patients about antibiotics as part of routine consultation skills training
- Quality improvement collaboratives or kite mark programmes may support change

Educational content / messages

- Include messages about the scale of the problem and practical impacts locally
- Include content about both infection prevention and control and appropriate prescribing
- Link messages about antimicrobial resistance and sepsis so these are not seen as competing issues
- Include content about how to address patient demand
- Include content about ways to address the key challenges that professionals face to provide practical strategies to address antimicrobial resistance
- Include information to support decision making about when to prescribe antibiotics and for how long
- Empower non-prescribers to support and challenge prescribing decisions sensitively

5.2 Priority Areas

Based on the feedback received, key priority areas may be summarised as follows:

Working at a strategic national policy level: Participants believed that HEE and partners needed to work strategically to embed tackling antimicrobial resistance as a national priority, aligned with financial drivers and policy. Without such a mandate, there was a perceived danger that this issue could be overshadowed by the multitude of other priorities juggled by organisations and educators.

Integrating national and local approaches: A number of participants felt that HEE could work in a more integrated manner with NHS England and Public Health England, including increasing consistency, reducing duplication and targeting appropriate messages to both health and care workers and members of the public. Awareness raising amongst the public was seen as a central priority in tackling antimicrobial resistance, as was educating professionals about how to speak effectively with patients about risks and self-help strategies.

Improving education of the future workforce: HEE could increase efforts to ensure that competencies related to antimicrobial resistance are embedded and mandatory within the formal education of health professionals, including those who are not prescribers. HEE's survey of higher educational institutions noted that there was room for improvement here. In addition to ensuring that 100% of courses include this content, further work may be needed to assure the quality and quantity of material being covered.

Improving education of the current workforce: There was a call for more engaging education about practical things that both prescribers and non-prescribers could do to tackle antimicrobial resistance. If this is a national priority, HEE could require community education provider networks and training hubs to make interactive educational opportunities about this available within their localities on an annual basis. This could be one of the key performance indicators of training hubs.

Sharing resources and good practice: Participants generally did not feel that it was a priority to develop new educational resources or e-learning packages, though some standardised promotional materials were welcomed. Instead, educators and practitioners suggested that HEE could support organisations and professionals to share good practice. This may include making available online a mechanism to signpost to quality assessed free educational resources and courses from around the world. Some thought that any such website should include a forum to post examples of good practice and gain the details of other educators.

Testing approaches for culture change: Participants suggested a variety of approaches that may support behaviour change. These included having an 'antibiotic aware' kite mark programme for organisations, shifting to a default position of ceasing antibiotics after two days and having smartphone apps to provide accessible prescribing guidance. HEE could work with partners to test the feasibility of some of these approaches.

HEE will consider this feedback and work with partners to prioritise next steps.