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Wendy Thompson

Spread Awareness. Stop Resistance.

It's Friday and it's quarter to five. An emergency patient has been squeezed in. Reception has wedged them into the rammed list of the dentist least likely to complain. Despite being exceptionally busy, the associate, Dr Gracy Curette, keeps her counsel and agrees to see the patient. How often does this scenario happen in practices across the UK? Does it happen in yours? What follows is a series of stories about patients who were harmed by taking antibiotics. The aim is to spread awareness about the risks of antibiotics to keep patients safe. But aren't antibiotics one of the safest drugs we can prescribe? Well, increasingly the answer is 'No'. And it's about more than just resistance.

World Antimicrobial Awareness Week takes place 18–24 November each year. In 2021, the theme is 'Spread Awareness. Stop Resistance.'¹ As you read this editorial, I hope that you find something new. From readers who are experienced at delivering antimicrobial stewardship to those relatively new to it, I trust you'll find something different and interesting.

Let's return to that Friday afternoon. The patient walks in with a fat-face roughly the size of a honeydew melon. He is in 'agony', but appears to be neither pyrexial nor generally unwell. Introrally, there's a brawny buccal swelling in the upper molar sulcus area. A quick look at the notes shows Gracy that a radiograph, taken by her colleague just before the patient went on holiday a few months ago, captured a large radiolucency associated with the mesio-buccal root of the upper right first molar.

The patient is going on holiday again tomorrow and will be staying for 2 months at his Malaga apartment. He flashes his COVID vaccination passport at Gracy and the envious dental nurse just to prove it.

The notes show that the last time the patient was in for an emergency, the practice boss diagnosed an abscess. As the patient was going on holiday, he gave a prescription for two broad-spectrum antibiotics. The notes were clear: the patient had been instructed to take the second course of antibiotics only if the first course didn't work. An additional note recorded that the patient had refused metronidazole because he 'wanted to enjoy his holiday.'

The patient had been rebooked for an examination after his holiday with a view to discussing treatment for the tooth. However, when the patient had returned with the tooth symptomless and with no sign of 'active' infection, the patient and dentist agreed to 'See how it goes' rather than plunge in with root canal treatment or extraction. Do you see the rotating door of urgent dental conditions starting to turn?

Back to Friday afternoon again. While taking the history of his condition from the patient, it became clear to Gracy that, during the last holiday, neither course of antibiotics had worked fully. So, a Spanish doctor had given the patient 'some really strong ones that I could drink with.' Now the patient was asking her: 'Can you give me two lots of those?'

Gracy knows that penicillin penetrates pus poorly and on examining the old radiograph closely, she feels that she would stand a chance of draining the infection through the tooth with a high speed (no local anaesthetic required for this non-vital tooth) or with a blade through the pointing abscess. That eruption of pus could be both entertaining for the team and a quick solution for the patient! If only Gracy could get consent from the patient. But the patient isn't that enthusiastic and

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the dental nurse has a hot date and is looking edgy. And it's now five to five – on a Friday.

So, the dentist decides against attempting to talk the patient into a procedure. The holidaymaker, already in shorts and garish Hawaiian shirt, is packed off to the local pharmacy with a prescription for 10 days' of 500-mg amoxicillin and a 'just in case' back-up of 500 mg of erythromycin for 14 days (because the 'The big white tablets gave me gut rot the last time.'). The patient is advised to see the boss on his return for a definitive treatment plan.

End of story? Well – not quite.

Within 5 weeks of arriving at his holiday apartment, the patient was rushed into hospital after experiencing severe abdominal pain. The doctors diagnosed *Clostridium difficile* (aka C. diff or more recently, *Clostridoides difficile* infection (CDI)) and the patient spent 3 weeks hospitalized on a vancomycin drip, with the possibility of needing segmental resection of the colon. The symptoms continued for around 6 months and required extensive tests on his return to the UK, with the continued possibility of resection of his colon.

When Gracy found out about this, her mind went into panic mode. What if the patient made a claim for compensation? She had just been reading about a case in the US where a stockbroker's widow was claiming for loss of earnings after her husband died following prophylactic clindamycin associated with routine endodontic treatment.² In that case, the lawyers had wanted BIG money.

Now you may be thinking that's all a bit far-fetched, but this story and the two which follow are all absolutely true and happened to friends of mine. Of course, my friend who shared this story embellished it with a COVID passport and Hawaiian shirt to brighten up what was otherwise a most traumatic memory. While the patient didn't die, he DID have a long hospital stay being pumped with two lots of IV antibiotics and he DID have persistent bowel problems for many years afterwards.

Antibiotics have a profound effect on the whole of the body, not just the mouth

In recent years, sepsis has quite rightly received widespread media coverage, raising the public's awareness of its dangers. Some ambulances are even displaying NHS warnings on the side of the vehicles emphasizing the dangers of sepsis and the need for urgent treatment.

When someone has sepsis, they really need their urgent treatment to work. In other words, they really need effective antibiotics. If the infection that triggered the sepsis is resistant to antibiotics, the patient is in dire straits. Reducing over-prescribing for conditions that don't really need antibiotics, such as toothache, means that antibiotics are more likely to work when they are really needed.

Eye-catching awareness raising campaigns about sepsis show memorable graphic images of people who have sustained life-changing injuries and disfigurement from sepsis. Antibiotic-resistant infections can result in life-changing injuries and disfigurement too, which leads on to the second story.

Following a road traffic accident 17 years ago, my friend, Vanessa Carter (her real name),³ required a facial implant and multiple facial surgeries, for extensive facial injuries, including an orbital blowout, and fractured cheek bones. The implant subsequently became infected with methicillin-resistant *Staphylococcus aureus* (MRSA), which Vanessa battled for 3 years.⁴

Earlier this year, Vanessa spoke in an FDI World Dental Federation webinar about her ordeal as a result of MRSA. In her role as a patient advocate to illuminate the dangers of antibiotic resistance, she was also interviewed by the ReAct news website.⁴ When asked how many courses

of antibiotics she had been given for recurrent infections she said: 'I have absolutely no idea, I wish I did.'

'One maxillofacial surgeon prescribed a 14-day course of Augmentin [co-amoxiclav] more than once... During the 11 months of ongoing re-infection, I was getting antibiotics all the time and I didn't know anything about antibiotic resistance back then.'

'During my final month of surgeries to salvage the prosthetic, it was removed and taken away for testing. I requested to see a copy of the test and at the top it said methicillin-resistant *Staphylococcus aureus* (MRSA). It gave a list of all the different types of antibiotic drugs that I was now resistant to, for example tetracycline and cephalothin.'

Vanessa said that she was unaware of the dangers of antibiotic resistance until after her MRSA was diagnosed.

She told ReAct: 'As a patient, I was totally oblivious to what antibiotic resistance was and I was not able to play my part.'

'This is only one reason why I advocate about antibiotic resistance, to empower patients with knowledge. If we are not fulfilling our antibiotic courses... we are actually part of the problem. As too when we take antibiotics for the wrong reasons.'

Antimicrobial resistance is a real and increasing danger to world health, wealth and sustainable development

The World Health Organization (WHO) calls antimicrobial resistance one of the top 10 public health threats and highlights the threat also to food security and global development.⁵ The World Bank estimates the cost to the global economy as \$3.4 trillion by 2030.⁶ The United Nations recognizes antimicrobial resistance within its 17 sustainable development goals.⁷

'We must act strongly and across disciplines if we are to curb the silent pandemic of antimicrobial resistance' agreed the G7 health ministers during their meeting in Cornwall earlier this year. 'The COVID-19 pandemic has brought into stark focus the impact a novel and initially untreatable infectious disease can have on humanity to maintain and extend the efficacy of existing and emerging antimicrobials in treating infectious diseases. We reiterate the need for ongoing education and reinforced stewardship of the use of antimicrobials, including avoiding their use where there is no science-based evidence of effectiveness.'

WHO emphasizes that the problem can affect anyone, of any age, and in any country, and although resistance occurs naturally, misuse of antibiotics in humans and animals is accelerating the process. 'A growing number of infections – such as pneumonia, tuberculosis, gonorrhoea, and salmonellosis – are becoming harder to treat as the antibiotics used to treat them become less effective.'

'Antibiotic resistance leads to longer hospital stays, higher medical costs and increased mortality.'

Alarming, it has been estimated that within 30 years, antibiotic resistance is expected to be responsible for more deaths than cancer.

Dentistry delivers overall health and wellbeing

Dental antibiotic stewardship is, of course, important for oral health. But it has a far broader impact on a person's overall health and wellbeing. Harms from antibiotics don't generally manifest in the mouth – so dental teams aren't always aware of the side effects (for example upset stomach or rash) that the patient experienced after taking an antibiotic prescribed by them. Similarly, the most serious adverse outcomes (including the life-threatening

side effects of antibiotics) generally happen in parts of the body away from the mouth, such as *C. diff* in your gut, or anaphylactic shock.

Whilst *C. diff* or anaphylaxis occur within minutes, hours or days of taking an antibiotic, the impact of antibiotic resistance is usually more distant in time. Following a course of antibiotics, bacteria that are resistant can be isolated from an individual for up to a year after they took it.⁸ Antibiotic-resistant pneumonia is a common terminal event for patients being treated for malignancy. Attributing the source of that resistance is obviously harder than for side effects that occur closer in time.

'Are you allergic to antibiotics?'

My third story goes back to a time before evidence-based guidelines for dental antibiotic prescribing. This story relates to a newly qualified dentist in the 1980s. On his first week in practice, one of his patients suffered an anaphylactic reaction necessitating attendance by paramedics and transfer to hospital.

The culprit was a 3-g bolus dose of amoxicillin taken an hour before a scaling. Administration of the antibiotic was routine in those days for any patient giving a history of rheumatic fever, even if they hadn't previously suffered endocarditis. The patient had taken amoxicillin uneventfully in the past, but on this occasion, it reacted in a devastating way. Thankfully, prophylactic prescribing is no longer routinely recommended, although patients still remain at risk of severe acute allergic reactions to antibiotics prescribed by dentists or other prescribers.

These reactions don't just happen to patients. They could happen to you, your friends or your family. Just a few years ago, a well-known UK dentist suffered anaphylaxis to amoxicillin prescribed by his GP for a chest infection. He describes waking up in A&E with a splitting headache from the adrenaline that was administered by the paramedics. He too had taken amoxicillin uneventfully in the past. So do ask your patients whether they have had an allergy to antibiotics in the past, but equally do provide them with safety netting advice about what to do if they get signs of adverse outcomes, such as allergy or CDI.

In the UK, most dental antibiotics are prescribed for treating infections and pain. The appropriateness of antibiotics for dental pain is worthy of a whole article and not included in this one, except to say that if you prescribe antibiotics for pulpitis or alveolar osteitis, please, 'have a word with yourself.'

Therapeutic prescribing of dental antibiotics is not, however, the most common indication in all countries. In the US, for example, most antibiotics prescribed by dentists are for prophylactic indications, including the prevention of distant-site infections, such as infective endocarditis, and local-site infections, such as implant placement. Until very recently, the second-choice antibiotic in the US (ie for penicillin-allergic patients) was clindamycin. Clindamycin has a known mortality rate due to CDI⁹ and has been linked to high rates of CDI in some communities.¹⁰ For this reason, the US prescribing guidance has changed to cephalosporins as their second choice, noting that the potential cross-reaction with penicillin is no longer considered to be a problem.¹¹ They note also that more than 90% of patients labelled as penicillin allergic are, in fact, not allergic to penicillin.¹²

The unnecessary use of antibiotics is driving the problem of resistance. Dental clinicians know of the problem, but don't always believe that they are part of the problem. Yet dentists are responsible for about 10% of antibiotic prescribing across global healthcare. And even more antibiotics go to dental patients if we take account of prescribing for dental conditions by doctors,

pharmacists or patients buying antibiotics over the counter in those parts of the world where they are freely available.

Procedures not prescriptions

Dentistry is a surgical discipline. But too often the principles of surgical drainage and debridement are abandoned by practitioners with hard-to-achieve targets, time-pressures, and the perverse financial incentives of NHS contracts. In some parts of the UK, for unscheduled urgent appointments, the NHS contract incentivises short (prescription-only) appointments over the more time-consuming (but guideline-congruent) provision of dental procedures.

Before COVID, studies in both the UK and US showed that up to 80% of dental antibiotics were unnecessary or inappropriate.¹³ Before COVID lockdown, the UK had been seeing a year-on-year reduction in dental antibiotics, but this was sharply reversed in 2020. The dramatic 25% increase experienced in England (with similar patterns in the other UK nations) is understandable, as severely restricted access to dental procedures left clinicians with no options. However, the rates have been slow to reduce back towards pre-COVID rates. This is probably linked to reduced access to dental procedures and the use of remote dental care to fill the shortfall in capacity to see people for treatment for their acute dental pain or infection.¹⁴ Notable, the increase in dentistry was not reflected across NHS – no other part of the NHS saw an increase in antibiotic prescribing during 2020.¹⁵

The UK Dental Antimicrobial Stewardship toolkit¹⁶ includes links to a range of resources that you might find useful, such as guidelines (on both antibiotic and analgesics for acute dental conditions¹⁷) and on-line training resources. There are also patient-facing posters and leaflets, together with a micro-drama, which I produced as part of my PhD. 'From the Dentist's Chair' is a series of five short episodes in which one of the characters has died as a result of the misuse of antibiotics. You are invited to watch the first four episodes and try to guess which character has met with an unfortunate end.¹⁸

The FDI World Dental Federation has also created a free, online course to accompany its white paper on the dental team's essential role in reducing antibiotic resistance.^{19,20} At the time of writing, the course has been completed by over 1800 people in 104 countries, including students from the University of Glasgow's dental school. The FDI is encouraging national dental associations around the world to sign a pledge supporting dental teams to optimize dental antibiotic use. Members of the dental team wanting to sign a personal pledge are encouraged to check out the Antibiotic Guardian website, where there are a range of options (including those tailored for dentists) is available.²¹

Spread awareness. Stop resistance

As dental professionals, we have an extremely important role in curbing antibiotic resistance. By using our diagnostic and surgical skills to secure oral health and prevent infections, we reduce the need for antibiotics to treat infections. By providing procedures rather than prescriptions wherever possible, we reduce the impact of oral disease on the overall health and wellbeing of our patients. By spreading awareness, we can all play our part in stopping the development and spread of antibiotic resistance.

World Antimicrobial Awareness Week takes place each year, 18–24 November.



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