

Good afternoon. I'm Commander Ibad Khan and I'm representing the Clinician Outreach and Communication Activity, COCA, with the Emergency Risk Communication Branch at the Centers for Disease Control and Prevention. I would like to welcome you to today's COCA Call, What Clinicians, Pharmacists and Public Health Partners Need to Know About Antibiotic Prescribing and COVID-19. All participants joining us today are in listen only mode. Due to technical difficulties, closed captioning is not available for the live webinar today.

However, please note that a transcript and closed captioned video will be available on demand on the COCA Call's webpage shortly. Free continuing education is offered for this webinar. Instructions on how to earn continuing education will be provided at the end of the call. In compliance with continuing education requirements, CDC, our planners, our presenters and their spouses/partners wish to disclose they have no financial interests or other relationships with the manufacturers of commercial products, suppliers of commercial services, or commercial supporters. Planners have reviewed content to ensure there is no bias.

The presentations will not include any discussion of unlabeled use of a product or a product under investigational use, except Dr. Lauri Hicks would like to disclose that she will be advising against using medications that are not supported by data or recommended for treating COVID-19 -- for example, hydroxychloroquine. CDC did not accept commercial support for this continuing education activity. At the conclusion of today's session, participants will be able to accomplish the following. Describe the impact of the COVID-19 pandemic on antibiotic prescribing, discuss opportunities to improve antibiotic prescribing for patients who have COVID-19, and identify strategies and resources to support antibiotic prescribing decisions and educate patients about appropriate antibiotic use.

After the presentations, there will be a Q&A session. You may submit questions at any time during today's presentation. To ask a question using Zoom, click the Q&A button at the bottom of your screen, then type your question in the Q&A box. Please note that we often receive many more questions than we can answer during our webinars. If you're a patient, please refer your questions to your healthcare provider.

If you're a member of the media, please contact CDC Media Relations at 404-639-3286, or send an email to media@cdc.gov. We have introduced self-knowledge checks throughout this presentation. We hope you enjoy these opportunities to assess your understanding of today's session. Please do not type your answers to these knowledge checks into the Q&A box, as this may disrupt the Q&A portion at the end of the session.

I would now like to welcome our presenters for today's COCA Call. We're pleased to have with us Captain Lauri Hicks, who's the Director of the Office of Antibiotic Stewardship in CDC's Division of Healthcare Quality Promotion, Dr. Christopher Evans, who is with the Healthcare Associated Infections and Antimicrobial Resistance Program at the Tennessee Department of Health. Dr. Jeffrey Gerber, who is an associate professor of pediatrics and epidemiology at the University of Pennsylvania School of Medicine, and an attending physician in the Division of Infectious Diseases at Children's Hospital Philadelphia.

And Dr. Payal Patel, who is an associate professor of infectious diseases with the University of Michigan Health System and the Medical Director of Antimicrobial Stewardship with the VA Ann Arbor Healthcare system. It is now my pleasure to turn it over to Captain Lauri Hicks. Captain Hicks, please proceed.

Thank you so much, Commander Khan. This is Lauri Hicks speaking on behalf of CDC's Office of Antibiotic Stewardship and the Division of Healthcare Quality Promotion. And some of you may know that today is the first day of US Antibiotic Awareness Week, and I thank you for taking the time out of your very busy schedules to join us today. During the COVID-19 pandemic, antibiotic use varied across healthcare settings.

But as you will see in the upcoming slides that I'm going to share with you, azithromycin prescribing was higher than expected in all settings. Next slide. The data I'm about to show you provide a snapshot of antibiotic use across human healthcare during the COVID-19 pandemic. The hospital data come from 526 hospitals reporting to CDC's National Healthcare Safety Network or NHSN. The nursing home data are from PharMerica, a long-term care pharmacy vendor capturing data from about 1,900 nursing homes.

And our outpatient data sources include proprietary data from IQVIA representing retail pharmacy prescriptions in the United States. And Medicare carrier claims and part D files. Next slide. This figure shows overall hospital antibiotic use from January 2019 through August 2021. And you can see early in the pandemic, hospital antibiotic use increased but was lower in 2021 compared to 2019.

The orange line is representing the overall rate of antibiotic use, and that was calculated by summing total days of therapy and dividing that by total days that patients were present. Early in the COVID-19 pandemic, in March and April of 2020, even though the number of admissions shown in light blue bars fell dramatically, you can see that drop off, antibiotic use increased coinciding with the start of the pandemic. And while you can see that there have been fluctuations, the peaks in antibiotic use appear to correspond with the times that COVID-19 cases were highest. Next slide. Hospital antibiotic use fluctuations appear mostly driven by use of azithromycin and ceftriaxone, which you can see in dark blue and light orange, respectively.

As COVID-19 cases go up in March and April of 2020, and again last winter, so does azithromycin and ceftriaxone use. Next slide. So now we're going to transition to the nursing home setting where the story is maybe a little bit different, but not all that much different from the acute care setting. Overall, nursing home antibiotic prescribing decreased during the pandemic. The orange line reflects the number of residents receiving antibiotic prescriptions per 1,000 residents in nursing homes from January 2019 through August 2021.

Antibiotic use was 5% lower on average in 2021 compared to 2019. And this decline may be attributed to decreases in the resident population during the pandemic, which you can see represented by the grey line. But the other reason for this is that we think the proportion of short-stay residents, so residents often coming directly from a hospitalization, those people may be more likely to require an antibiotic, so there were fewer of those types of residents in nursing homes. The resident population remains lower than pre-pandemic levels through August of this year. Next slide.

Despite the overall increases in antibiotic prescribing, nursing home azithromycin and ceftriaxone prescribing increased in 2020 and 2021 compared to 2019. And you can see the peaks here are most notable for azithromycin, which is represented in the dark blue. And then ceftriaxone is represented by the light orange line. I just want to point out that the percentages labeled at the peaks shown here for azithromycin, they're actually indicating increases month over month comparing 2020 to 2019. So just to put this into perspective, azithromycin use was 150% higher in April 2020 and 82% higher in December 2020 compared to the corresponding months in 2019.

Next slide. Moving to the outpatient setting, you can see that the overall number of outpatient antibiotic prescriptions initially decreased in 2020. That's represented by the black line, but it has rebounded in 2021. And you can see that represented in the orange line. The significant decline in antibiotic prescribing in 2020 compared to 2019 likely reflects several factors.

I think many of us are aware that there were changes in healthcare utilization, so decreases in visits and decreases in transmission of respiratory infections for which antibiotics are often prescribed. However, if you look closely, in August 2021, antibiotic use in orange exceeds the prescribing in 2019. That is represented by the dotted gray line. So 2019, the dotted gray line, and you can see that orange line is actually surpassing the gray line in August. That was about a 3.

1% increase compared to pre-pandemic prescribing. Next slide. After an initial peak in outpatient azithromycin prescribing in March 2020, azithromycin use decreased during the pandemic. However, most antibiotic prescriptions in the outpatient setting that have remained have been for azithromycin, and increases in azithromycin prescribing correspond to peaks in the pandemic. In August 2021, there was more azithromycin prescribing than during the same time point pre-pandemic.

Next slide. To further explain why we're seeing these patterns in antibiotic use, we looked at patients who receive a diagnosis of COVID-19. We have found that antibiotics are commonly prescribed for patients with COVID-19. Next slide. This recently published study revealed that most hospitalized patients with COVID-19 receive antibiotics.

Over 80% of antibiotic courses were started at the time of admission, and almost half of all patients received ceftriaxone frequently in combination with azithromycin. Next slide. What is happening in the outpatient setting where patients are less acutely ill? This figure shows that outpatient prescriptions track with COVID-19 cases and visits among adults 65 years and over. The gray bars represent the number of COVID-19 visits, and you can see the number of COVID-19 cases represented by the black line in the same population. The blue portion of the bars represent the percent of visits associated with antibiotic prescribing, and this peaked in in November 2020 at 33% of visits.

So 33% of visits were resulting in an antibiotic prescription in November 2020. And as you can see, many outpatients receive antibiotics when they receive a COVID-19 diagnosis, and most of the antibiotic courses prescribed -- while it's not listed on this slide, most of those courses were azithromycin. Next slide. To summarize these findings, I'll walk you through a quick knowledge check. The following statements regarding antibiotic use during the COVID-19 pandemic are true, except.

So I want you to look here on this list of possible answers and pick the answer that is not true. So A is overall antibiotic prescribing was lower in the outpatient setting. B, overall antibiotic prescribing was lower in nursing homes. Early in the COVID-19 pandemic, overall antibiotic use increased in US hospitals, but was lower in 2021 compared to 2019. D, antibiotic prescribing was uncommon for patients with COVID-19.

And E, azithromycin was commonly prescribed in all healthcare settings, coinciding with peaks in COVID-19 cases. Next slide. And I think you probably know that the answer is D. Data indicate the antibiotic prescribing for patients with COVID-19 is common. So that answer D was incorrect, was not - - I should say the answer was false.

Next slide. So with that, the next section will cover COVID-19 case studies, and I will turn the presentation over to my colleague, Dr. Payal Patel.

Thank you so much, Dr. Hicks. And we are going to go through some of the things that we just heard about, and think about them from a patient perspective. So we wanted to do some case studies just to think about antibiotic use and what's happened to antibiotic use in the country over the last year and a half. Next slide.

So I'm going to start us off with an adult case. And imagine yourself perhaps a year ago or just a few weeks ago seeing this patient. So Mr. S is a 70-year-old man admitted to your hospital with a cough, fever and malaise that started two days ago. He has a history of high blood pressure, hypertension, coronary artery disease and diabetes.

His grandson recently had a fever, and Mr. S and his wife had to care for him as he couldn't go to daycare. Next slide. When you see him on admission, he has a low-grade fever. He is not quite tachycardic.

His heart rate is 94. His blood pressure is okay. But he's sitting about 93% on two liters of oxygen. He's coughing, and he has some decreased sounds at the bases of his lungs and some rales in his left lower lobe. Otherwise, his exam is fairly normal.

Next slide. Here is some imaging and lab results. You will not be surprised to hear that radiology says they cannot rule out infection, and clinical correlation is recommended for that left lower lobe. You also see in his labs, he has a little bit of a bump in his creatinine. He usually has a normal creatinine.

And his white count is just mildly elevated at 13. His rapid diagnostics come back and show that he is positive for COVID-19. His blood cultures are still pending. And otherwise, he has a negative procalcitonin. Next slide.

So again, with a self-knowledge check. And I want you to maybe do a thought exercise and think about yourself or your colleagues at the beginning of the pandemic versus perhaps just a few weeks ago, to think about how much things have changed in how we are treating COVID-19. So I will go through these answer choices and we'll see if you have a thought on which one you would go with. So A is start with broad spectrum antibiotics. You saw that he has something on that chest X ray.

He does have a little bit of an elevated white count, and you're waiting for some more information, but you do know that his COVID-19 PCR is positive. B would be presume that there might be a community-acquired pneumonia, as well as a viral pneumonia, and treat with ceftriaxone and azithromycin. C, consider starting ivermectin. Or D, provide supportive care, initiate dexamethasone and remdesivir and consider treatment with baricitinib or tocilizumab. Next slide.

So you know, I just wanted to highlight, you know, the differences in thinking about a viral pneumonia and how we've been treating COVID-19 in adults being admitted and how things have changed really over the last year. With evidence-based medicine, we've seen that steroids do seem to help. Some of these other COVID-19 directed therapies really have made it into our stewardship guidelines. And we've learned more about how uncommon bacterial infections can be at presentation. So the rationale here is antibiotics are not indicated for treatment of most patients with COVID-19.

Other treatments for COVID-19 are recommended. Next slide. I just wanted to highlight here the frequency of secondary bacterial infections in patients with COVID-19. You heard from Dr. Hicks some of the evidence and some of the reviews that we've seen.

And these have really been important in understanding how to treat people coming in. Early on in the pandemic, we didn't know how common bacterial coinfections were. But thanks to research, we have seen worldwide that bacterial coinfection especially at presentation is quite rare. And so I want providers to think about two instances in time for bacterial infections. That is when the patient is arriving and when they are in the hospital for days, perhaps weeks.

And we've seen that when they are in the hospital for weeks, healthcare-associated infections, unfortunately, have become common. So really, you're thinking about antibiotics at presentation and then later on in their hospitalization. And again, risk factors for healthcare-associated infections can include ICU admission, steroid use, having a severe infection, antibiotic exposure and heart failure. Next slide. What strategies can be used to optimize antibiotic prescribing for patients with COVID-19? Stewardship programs have made a huge difference, especially nationally, in improving antibiotic use throughout the pandemic.

And I'm sure your facility has specific treatment guidelines. And there are many national guidelines available as well. We have resources here and available at the end of the talk. And for those listening who may not have an antibiotic stewardship program at their perhaps long-term care facility yet, you know, using some of that expertise at a systemic level could be helpful. And when antibiotics are initially indicated, thinking about how can we deescalate and think about duration, if they are started in the beginning.

These are some things we hope you would take away. Next slide. And with that, I will hand over to Dr. Gerber.

Thanks, Dr. Patel. So let's talk about pediatrics. And I think it's important, although this infection and disease has been largely centered on adults, there have been more than 6 million infections in kids. And now, although they make up only 22% of the population, last week, kids accounted for more than 27% of all SARS-CoV-2 infections.

So another case study, here we have a 10-year-old boy with a two-day history of fever, cough and headache. No significant past medical history, has a neighbor he's been playing with who tested positive for SARS-CoV-2 virus yesterday. On physical exam, everything is normal except for a temperature of 101, and some cervical lymphadenopathy. Specifically there's no tachypnea and the lungs sound clear on auscultation. He has a COVID-19 rapid answer test that is positive.

And the parent, concerned he might get pneumonia, is asking if he needs antibiotics. Next slide, please. So here's our self-knowledge check. Please think through these and choose the best option for managing this patient. A, start him on amoxicillin.

B, provide a clear diagnosis and counsel his parent about when antibiotics are indicated and side effects of antibiotics. C, offer recommendations for symptomatic therapy and a contingency plan for follow up if he were to get worse. D, tell his parents this is just a virus and encourage fluids. Or E, B and C. All right, so hopefully you thought through this, and the answer is B and C.

So a combination of providing a clear diagnosis and counseling his parent about when antibiotics are indicated and reminding them about side effects due to antibiotics, as well as C, offer recommendations for symptomatic therapy and a contingency plan for follow up if he gets worse. And the rationale for these answers are that antibiotic treatment in this particular case, which really is a viral upper respiratory tract infection without any specific signs or symptoms indicative of a bacterial secondary or

superinfection. Antibiotics in this setting really could only cause harm. And then two, really B and C together suggest to remind us that proven communication strategies for addressing patient and parent concerns are recommended, especially when parents might be interested in antibiotic prescription. Next slide, please.

So building on that, there are some lessons that we've learned from pediatrics that we can apply to improving antibiotic prescribing for everybody, including adults. And you'll see the logo in the bottom right corner DART. This is a project led by we Lee Mangione-Smith, who is a pediatrician health services researcher, who for a couple of decades has been working on this type of communication around treatment of kids with respiratory tract infections. And so when you are faced and, you know, the data are strong in children, but it would be surprising if they didn't apply to adults. When you're faced with a situation where a parent or a patient is intent on receiving antibiotics or questioning why they're not getting antibiotics, the clinician can effectively and efficiently communicate with parents and patients when antibiotics are not needed.

And so Dr. Mangione-Smith, in a series of terrific studies, has derived sort of a formula for doing this in a way that's really efficient and effective. So first, review the physical exam findings. So in this particular case where the parent is concerned about pneumonia, you can say, "Although your child has a fever, they're not breathing fast. And when I listened to the lungs, they sound clear.

" Deliver a clear diagnosis. In this case, this is a viral infection with SARS-CoV-2, the virus that causes COVID-19 disease, and in this case a mild case of COVID-19. And then providing a two-part negative and positive recommendation. And Dr. Mangione-Smith and her team have found this two-part, and in this sequence negative and positive, is the most effective way to both get parents to understand they don't need antibiotics and leave the office more satisfied.

So an example of this might be the negative is, "Well, in this case, unfortunately, since it's a viral infection, antibiotics won't work. However, here are a few things you can do. " And you might provide some symptomatic relief, in this case ibuprofen or Tylenol. Here are some things you can do to make things feel better. And lastly, providing a contingency plan.

Don't leave them hanging out to dry. Remind them that while you're worried about pneumonia here in this particular case, here are a couple things to look for -- fast breathing, or, you know, significant fatigue or other signs of distress. Give us a call back in a couple of days and we can check in. Next slide, please. And very nicely, CDC has some online resources that outline all of this, including some tearaway sheets that you can print out around symptom relief.

So I won't go through these in detail. But on the left, some relief for common symptoms of colds and cough, as well as viral illnesses on the right. They suggest some nice and safe antibiotic alternatives for viral infections, which of course don't respond to antibiotics. Next slide, please. And now I will pass off to Chris Evans.

Thank you. Our last case today involves an older adult in the nursing home setting. And this particular case started as a real patient, but I took some creative liberties with it. Dr. Hicks took some creative liberties with it.

And while the patient may be fictitious now, I think it represents an extremely realistic situation that our long-term care residents are facing every day. This is the case of Mrs. J, who is a 79-year-old female who has a history of diabetes and congestive heart failure. She has been a resident of her nursing home

for several years now and was cared for by an unvaccinated nursing assistant who tested positive for COVID-19 in March of 2020. Now to digest this a little bit, in March of 2020, every nursing assistant was unvaccinated against COVID, because we didn't have a vaccine at the time.

But we've chosen this timeframe to illustrate some other thoughts about this particular case. And note that even today, a number of staff in the nursing home continue to be unvaccinated. So this still represents a realistic situation today. In early April, Mrs. J developed a cough and slight increase in shortness of breath.

Her vital signs remained stable, though her exam was remarkable for crackles in her lung bases. She did have a chest X-ray which was performed on the following day, which showed faint patchy opacities on both sides. However, know that, remember, she had congestive heart failure, has had numerous chest X-rays. And all of this remains unchanged from her previous imaging. She did receive a COVID-19 test, but at the time during the pandemic, testing was difficult to obtain.

And when it was obtained, it would take anywhere from several days to a week to come back. And her COVID-19 PCR returned a few days later with a positive result. At the time of her symptoms, she started on a whole cocktail of antibiotics, including hydroxychloroquine, azithromycin, as well as ceftriaxone to cover any potential bacterial infections that she might have. Next slide, please. So this particular chart illustrates the relative change in prescribing prevalence of select antibiotics in the nursing home setting from 2019 to 2020.

So comparing their 2020 usage to what we observed pre-pandemic in 2019. And I'll start with what everybody's eye is probably most drawn to, the highest peak, which is that of hydroxychloroquine, which increased pretty dramatically in the extreme early stages of the pandemic. Until the FDA came out in April and said the combination of hydroxychloroquine and azithromycin can have extreme effects on cardiac rhythm irregularities, and advised against it in that the risk of those rhythm irregularities is probably greater than the benefit that the drug might actually be giving. And in fact, by now, this was mentioned in the disclosure, is now really not based on strong evidence to utilize this with regards to benefiting patients with COVID-19. I will illustrate also what Dr.

Hicks illustrated, which is the azithromycin line, which in the early part of the pandemic actually increased dramatically as well, up to about 150% of 2019 levels. And this one, as we saw earlier, has come down but continues to have spikes in use throughout the pandemic. And then finally, the dexamethasone line, which is in the purple line, actually in the summer surge of 2020 saw an increase after the recovery trial was released, that showed that corticosteroid use may have a significant role in treating critically ill and really severe patients with COVID-19. Next slide, please. So Mrs.

J is actually a two-part case. She completes a course of the hydroxychloroquine, azithromycin and ceftriaxone, despite the fact that she had a viral infection with no significant change in status until about mid-April. On April 16, she developed a fever and chills, and she did still have a lingering cough, but that's not unexpected after an acute respiratory infection. Now she's slightly confused and has new onset diarrhea, abdominal pain and tenderness. She has an elevated white blood cell count.

She does have a repeat chest X-ray which shows no change. But because she's having new onset diarrhea, her stool is sent down for *C. difficile* testing, which does return positive. She started on therapy, but her condition deteriorates and she does require hospitalization two days later. I think what Mrs.

J's case really illustrates well is that antibiotics, regardless of whether they're used appropriately or inappropriately, are not necessarily the benign agents that many people think them to be. And they do have unintended consequences, most notably that we observed in Mrs. J, which is the development of secondary bacterial *C. difficile* infections, which comes primarily from her use of broad spectrum antibiotics, and most notably the third generation cephalosporin ceftriaxone. The other unintended consequences not necessarily illustrated in her case is the development of antibiotic resistance, which may lead to patients being colonized and subsequently infected with organisms that are much more difficult to treat, have worse outcomes and actually pose a number of infection control and prevention risks as well.

Next slide, please. So for the self-knowledge check on this particular case, what do you think could have been done to improve the quality of care and prevent the *C difficile* infection in this case? So the first one being follow the treatment guidelines for management of COVID-19 illness. Not prescribing antibiotics when they provide no benefits. Implementing COVID-19 vaccination and infection prevention and control measures for preventing nursing home and healthcare associated-infections. Leveraging consultant pharmacists to provide support for making appropriate treatment decisions, or all of the above.

And you can go to the next slide. Hopefully, most people will agree that all of the above are steps that could have been taken to improve the quality of care in this patient and hopefully prevent the *C. difficile* infection. Following these treatment guidelines and avoiding prescribing antibiotics, such as the ceftriaxone and azithromycin, when they provide no benefit could have helped prevent the case of *C. difficile* infection.

Nursing homes across the country have actually done enormous efforts to implement COVID-19 vaccination in all of their residents and their staff, as well as improve their infection prevention and control measures during this pandemic. And then also, every single nursing home has a consultant pharmacist. And as a pharmacist myself, I will say that we get lots of questions that are not antibiotic-related. But the bulk of the questions that we respond to usually do involve antibiotics, and that pharmacists are well equipped to answer questions about choice of antibiotics, dosing of antibiotics and duration, all of which can help to improve the quality of care in our long-term care residents. Next slide.

And I think Lauri, I can turn this back over to you now.

Great, thank you, Dr. Evans. And I am going to wrap up our PowerPoint presentation with a summary slide that just gives the bottom line. The bottom line is that optimizing antibiotic use is truly about improving quality of care. And that's the goal here.

We encourage those of you who are in a clinical setting to follow COVID-19 treatment guidelines, and we can share those links with you so that you have those at your fingertips. We know that adherence to infection prevention protocols help to minimize spread of COVID-19 and other infections that lead to antibiotic use. And Dr. Evans just pointed out that patients who have COVID-19 may be at higher risk for complicated healthcare-associated infections. Dr.

Patel mentioned this as well. We encourage you to leverage proven strategies to improve antibiotic use, and educate your patients that antibiotics are ineffective treatment for viral syndromes like COVID-19. In fact, right now, it's an opportune time to capitalize on the knowledge gained from COVID-19. And most people know that COVID-19 is caused by a virus. And last, but definitely not least, remember that

everyone, each and every one of us, has a role to play in improving antibiotic use, and that's the case whether you're a patient, a clinician, a pharmacist, someone who works in public health, or a parent.

So thank you very much for your attention. And I'll send it back to you, Commander Khan.

Presenters, thank you so much for providing our audience with this timely and important information. We will now go into our Q&A session. Please remember to ask a question using Zoom, click the Q&A button at the bottom of your screen, then type your question. And please know that we receive many more questions than we can answer during our webinars and may not be able to get to your question. Our first question asks, presenters, while you make a good point that most patients who have COVID-19 do not require antibiotic therapy, are there any situations when managing a patient that you would consider treating with antibiotics who has either tested positive or is presumed positive test pending for SARS-CoV-2?

Yeah, I can start off. This is Payal Patel. This is a great question. And, you know, I think this is something that antibiotic stewardship programs identified early on as a high-yield target. And so if you're worried about how this is being thought about at your center, I would say, you know, no need to recreate the wheel.

There's a lot of nice algorithms that have been used in different settings. For example, at the University of Michigan, we did use procalcitonin as part of, you know, trying to decide if you did have a negative procalcitonin, along with other evidence of a COVID-19 infection. That did in our patient population, and probably nationally and internationally, mean that the chance of them having a secondary bacterial infection at admission is probably very low. So using something like that, that has been used, you know, perhaps before can really help in an algorithm way to help the stewardship program implement when and when not to consider antibiotics, at least upon admission.

Great, thank you so much for that. Our next question asks, do you consider vaccination whether it's COVID-19 or another vaccine, a helpful tool for improving antibiotic use?

It's Jeff Gerber. I'll maybe take a first crack at that. Absolutely. There are data showing that vaccination against influenza reduces antibiotic use for upper respiratory tract infections. Vaccination against pneumococcus reduces antibiotic use, particularly through reducing the diagnosis of pneumonia.

And it stands to reason that vaccinating people against COVID-19, because it often presents as a respiratory tract infection, should reduce overall antibiotic use. We were seeing -- Dr. Hicks presented a correlation between COVID-19 diagnosis and antibiotic use. So it stands to reason -- I don't know that it's been proven yet, but I'll be shocked if it's not an effective strategy.

Thank you. Can you elaborate a bit more on what role public health sector can play in supporting improvements in antibiotic use?

This is Dr. Evans. I'm happy to take that. I work in the State Health Department. I'm happy to answer this one.

So our health departments, particularly at the state level, have dedicated people working to assist in improving antibiotic use across our state, assisting facilities with implementing core elements of stewardship programs that abide by the core elements, and then tracking antibiotic use and using that antibiotic use for action. We do this in a number of settings. We do this in the acute care side using the

National Healthcare Safety Network data. We do this on the outpatient side doing, as Dr. Hicks mentioned, some proprietary methods.

And then a lot of times in our long-term care settings, they're done through collaborative works, work that we've done, getting multiple long-term care facilities on board, all in an effort to obtain those data to identify facilities that may require more intervention that we can go in and perform onsite assessments with and give very specific interventions about ways that they can improve their stewardship programs, and improve their appropriate antibiotic use prescribing across the board. Every state's a little bit different, but in Tennessee, those are some of the steps that we have been doing to actually try to use our antibiotics data to improve our stewardship efforts across our state.

Thank you very much. Another question. Where do you suggest people go who are looking for more important information on improving antibiotic use in their settings?

Great, thank you. Commander Khan, this is Lauri Hicks. I'm going to ask the coordinators to move back to a slide. We have a slide with resources here. Great, thank you so much for sharing that.

And you'll see here that there are a number of resources on this slide. This is not a comprehensive list by any means. But I wanted to share these three different sources of information as reliable sources and very relevant to the discussions we were having today. So the CDC has antibiotic use resources on our website. And it's a very comprehensive website.

There's all kinds of materials available there. There are, I would say, education materials for clinicians, education materials for patients, and materials that pharmacists can use -- many, many different types of resources there that I encourage you to take a look at. There's also a CDC training on antibiotic stewardship that's available for free continuing education. And that's also available for individuals if you're interested and participate in the CMS MIPS program, you can also get MIPS credit for participating in that training. And in terms of actual treatment guidelines for COVID-19, I highly recommend the National Institutes of Health COVID treatment guidelines.

They have been the leader in this space in terms of publishing recommendations and guidelines for managing patients, along with the Infectious Diseases Society of America Real Time Learning Network. They've also been putting out a lot of guidance for management of patients with COVID-19. You can find those resources on their website. And I also have a link to their COVID-19 guideline treatment and management section. And I don't know, Dr.

Patel, I know you've been involved with the Real Time Learning Network. Is there anything else that you would like to add?

Yeah. I would just say we do have a section on antimicrobial stewardship within the Real Time Learning Network. And we also more recently have been going towards making more infographics for both patients as well as frontline providers. And in the question and answer, you'll see one of the first infographics that we've made on ivermectin and some of the risks associated with that. And we're going to continue to be kind of working with that.

And I hope that that's a resource for everyone on this call in the future. So please check out our website, which is the last link here on the resources slide.

Thank you very much for sharing these excellent resources. Perhaps we can leave this slide up and for our audience to note that the slides, including this resource slide, can be found on this COCA Call's web page. And we'll share the link towards the end as well. Our next question asks, presenters, do you anticipate higher antibiotic prescribing at family practice and community clinics in the near future as more people return to those practice sites?

I will take a first stab at this. And I think this might, you know, go to some of the other questions that we've had as well. You know, before the pandemic started, one of the things that we had been focusing on as a nation is really increasing antibiotic stewardship at the outpatient level, meaning clinics, you know, family practice, primary care. And then the pandemic happened. And so it's definitely kind of been on pause for many centers.

But I think that that is going to be a focus here in the United States. And so the hope is that that is really going to be a focus of incoming stewards and existing stewardship programs. So I think we are thinking about that as we kind of come towards what's next.

Speaking of what's next, this is Doctor Evans. The other thing that I would just add is the utilization of telehealth services during the pandemic have increased pretty drastically. And I think what will be very curious as we go forward, is to see how that continues and how stewardship translates into telehealth and telemedicine, and also how that affects antibiotic prescribing. I'm not sure that we necessarily know all of those answers yet, but it will be curious to see how that plays out in the future.

Thank you very much, both of you, for your perspective. Our next question asks, our facilities are still getting questions about hydroxychloroquine and ivermectin. Do you have any counseling recommendations or tips or lessons learned you all can share from your practice areas?

This is Dr. Evans, I actually specifically put the hydroxychloroquine case in there. So I'll respond. I think one of the things that truly has helped to drop the use of that particular agent or combination with azithromycin were things like the FDA's kind of warning coming out and saying, Please don't do this, the combination could have adverse reactions. And the risks truly do outweigh the benefits in these cases.

I think similar language can be said for the adverse reactions of things like ivermectin, as well, as we go forward into that. In the long-term care setting, the use of that agent hasn't actually increased quite like it has in sort of the outpatient settings as well. But I think having strong language from entities like the CDC, from the FDA, would drive practice and offer resources for people who are seeing patients asking for those particular agents.

Yes, and this is Lauri. I would just say that when I've been reviewing the data, I think the key piece of information that I've been trying to share with friends and family members who ask me about treatments for COVID-19 is that when you look at the data related to ivermectin, there now have been some studies that look at outcomes in individuals who've taken ivermectin for COVID-19, either comparing to I think placebo or what is considered standard of care. And there's no clear reduction in mortality. There's no reduction in the need for ventilator support. There's no impact on symptom resolution.

And so the data are so far not ending indicating that there is any benefit. And as Dr. Evans mentioned, when you give somebody a medication that doesn't have any benefit, but it could only cause harm, you know, I think that is a problematic approach to medicine. And that's what we're trying to avoid in general with unnecessary antibiotic use as well, is we're trying to avoid giving patients medications that

will not benefit them and could potentially lead to harm. And so I would say in the case of ivermectin, that is along the lines of what we're trying to communicate.

And the same thing goes for hydroxychloroquine. Even though our program is very much focused on medications that treat bacterial infections, antibiotics, I think the same could be said for these other agents that are being touted as possible treatments. So I think the key is just to follow the science here.

Thank you very much. Our next question asks that, in light of the sort of unprecedented time that we find ourselves in and the unusual flu seasons that we have had in the past, do you anticipate seeing an increase in antibiotic use in this flu season? And if so, are there additional strategies or lessons learned that you can share?

Yeah. Oh, go ahead.

Okay, I'll just take a first stab at this as someone who's residing, unfortunately, in a town undergoing a major flu outbreak right now here in Michigan. You know, I think that, again, it's really helpful to do a thought exercise and think about this year, you know, versus last year. Think about how we are with the COVID-19 vaccines and how things were before they were in use. And that is the same when thinking about antibiotic use. So we've had, you know, now, unfortunately, more than a year to optimize some of the treatment guidelines that we have in place, and diagnostics as well.

So many centers are testing for flu, RSV often as well as COVID-19 together. And I think really focusing on those in the winter season will be very helpful. And I suspect that we will probably not see it worsen this year, because we've had this whole time to focus on antibiotic use. And I think we should do ourselves a favor and compare antibiotic use at this time to a year ago, because I'm confident at least in the US, that we will see an improvement. Now, will flu infections go down? I think that has more to do with human behavior.

And that is a little bit more unpredictable. But that's my two cents.

Yeah, and this is Lauri Hicks. I think when one comment that Dr. Gerber made earlier was about the value of vaccinations in reducing and improving antibiotic use. And I think flu is another perfect example of how a vaccine can be leveraged to improve antibiotic use. Now, again, influenza virus, so antibiotics don't work for viruses.

But we know that every year as our viruses increase in circulation and people develop respiratory infections, we see increases in antibiotic use corresponding with those increases in viral circulation. So yeah, I think it wouldn't be surprising to see an uptick in antibiotic prescribing, because we see a lot of antibiotic prescribing for patients who have known diagnoses of influenza. But as Dr. Patel was saying, I believe that, you know, we can leverage our diagnostic resources to help inform those decisions. And the other thing is, I think in the case of influenza, and it sounds like also for COVID-19, we're going to have antiviral medications quite soon.

Well, we know we have antiviral medications for flu that should be leveraged in patients who meet criteria for use of those. So I think that's the one thing I would like to say, is that sometimes we see that patients often receive an antibiotic but not an antiviral, when the antiviral is what would actually help them and actually is what is indicated. So really trying to change the mindset that an antibiotic is the right treatment for every respiratory infection is the direction that we're trying to go in.

Thank you very much. Our next question asks, as a new clinical pharmacist in a healthcare setting, can you share some strategies that I can use or a role I can play in antibiotic stewardship at our healthcare system?

This is Dr. Evans again. Yes, absolutely. I think there are a myriad of resources out there. Most notably, this slide previously that Dr.

Patel put up that included the core elements of hospital antibiotic stewardship programs. If I'm interpreting the question, is you're within an acute care hospital setting. There are those same type of elements or documents available for each type of healthcare setting, if that is not the case. But that is just the start and there's a whole host of interventions, et cetera, that you can do. And I would honestly like to just take and like, let's sit down and chat and see where you are and what your next steps would be.

If you were in a Tennessee facility, that's what we would be doing anyway. But honestly, I think that is the best place to start to see how to get your program up and running and who needs to be at the table. And then what interventions you are going to place, and then what are you going to track and report.

Great, thank you very much. And we have time for one last question. And I think Captain Hicks, you did touch on this briefly. And what the question essentially is asking is, do you project that antibiotic use for COVID-19 patients will decrease as Pfizer and Merck COVID-19 medications receive authorization?

Yes, this is Lauri. That is my hope. But I did mention that even though we have antiviral treatment for flu, that we still see a lot of antibiotic use for influenza. So I think this is really about taking the opportunity and the knowledge gained during the pandemic that COVID-19, this syndrome is caused by a virus, and really taking that opportunity to educate our patients that antibiotics don't work for viruses. And so I think when these other options become available, it will be easier for clinicians.

So I think one of the challenges that we hear related to patient and provider interactions, especially in the outpatient setting, is that the clinician wants to be able to help the patient. They want to do something for the patient. And so it's really about hoping that they're making a choice that is actually going to help the patient, as opposed to lead to potential harm. And so in the case of an antiviral option or, you know, other supportive care for COVID-19, I think that is the route that we are hoping that clinicians will go instead of prescribing an antibiotic when it will not provide any benefit.

Great, thank you very much. I want to take a moment to thank everyone for joining us today, with a special thanks to our presenters, Captain Hicks, Dr. Evans, Dr. Gerber and Dr. Patel.

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