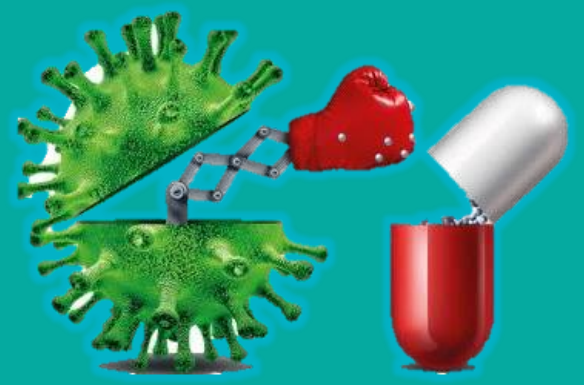
International Pharmaceutical Students' Federation

# How Pharmacists Combat Antimicrobial Resistance: Optimising Practices and Raising Awareness



**Dr Rasha Abdelsalam Elshenawy**

Antimicrobial Resistance Consultant, South Centre, Geneva, Switzerland

# Objectives

## Identify

how pharmacists contribute to combating antimicrobial resistance in healthcare and public health settings.

## Explore

pharmacists' roles as leaders in antimicrobial stewardship programmes and their impact on optimising antimicrobial use.

## Learn

effective approaches to involve patients in AMR prevention through education, counselling, and optimised antimicrobial prescribing.

## Examine

real-world examples of effective AMS practices to identify strategies that can be applied in different settings.

## Understand

how pharmacists can raise awareness and advocate for responsible antimicrobial use to combat AMR globally.

# Conflict of Interest

- I have no conflict of interest.

# Understanding Antimicrobial Resistance

- **Antimicrobial resistance (AMR)** is a rapidly escalating global health challenge that will cause 39 million deaths between 2025 and 2050.
- It is a global health threat that could kill one person every three seconds by 2050 if no action is taken.
- **Role of Pharmacists:** Pharmacists are central to minimising AMR, especially through AMS efforts, patient education, and optimising antibiotic use.

# The Importance of Antimicrobial Stewardship (AMS)

- **AMS Objective**: Minimising resistance by ensuring antibiotics are prescribed only when clinically indicated.
- **AMS Frameworks**: UK's "Start Smart, Then Focus" toolkit, the AMS competency framework, and other best practices.
- **Pharmacists' Role**: Supporting and enforcing AMS principles across healthcare settings.

# Sustainability in Antimicrobial Stewardship

- **Antimicrobial stewardship** is crucial for protecting public and global health by ensuring the responsible use of antimicrobials to combat AMR.
- **Sustainability** is key in addressing AMR, as it ensures the long-term effectiveness of antibiotics while reducing environmental impact.


**By**: Rasha Abdelsalam Elshenawy, UH 2020

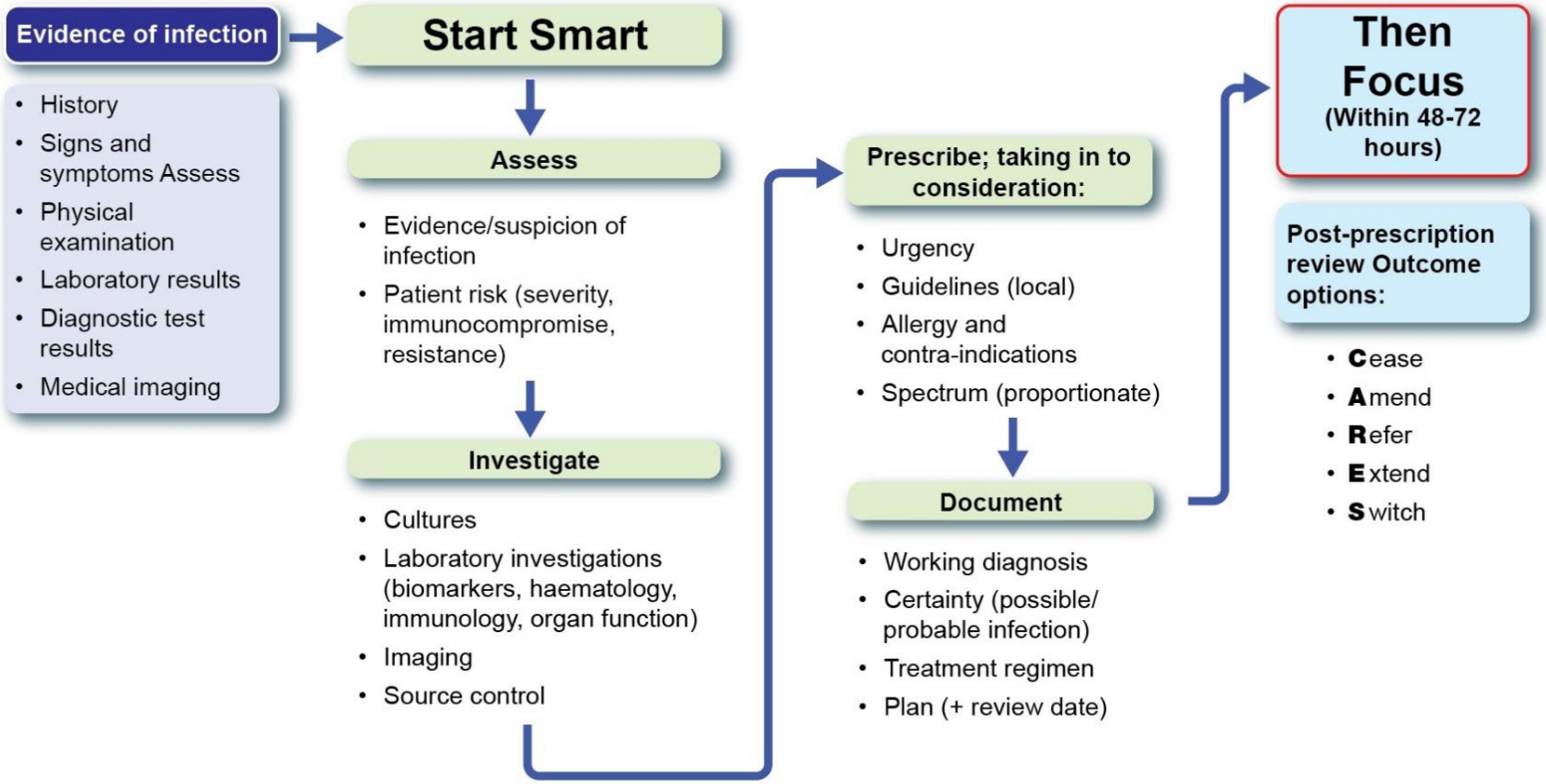
# The Role of Pharmacists in Antimicrobial Resistance

| Public Health | Patient Education | Collaborative Care | Vaccination Promotion | Community Outreach | AMS Practice |
|---|---|---|---|---|---|
| Promote awareness of antimicrobial resistance | Educate patients on responsible antibiotic use. | Work with healthcare teams to optimize prescribing practices. | Advocate for vaccinations to prevent infections. | Conduct initiatives to raise awareness of AMR. | Actively engage in antimicrobial stewardship programs. |
| 1 | 2 | 3 | 4 | 5 | 6 |

UK.GOV (2024b). Confronting antimicrobial resistance 2024 to 2029. [online] GOV.UK. Available at: https://www.gov.uk/government/publications/2024-to-

# **UKHSA** Antimicrobial Stewardship Clinical Management Algorithm

## Start Smart, Then Focus




UKHSA. “Antimicrobial Stewardship: Start Smart - Then Focus.” GOV.UK, 2023. www.gov.uk/government/

# Pharmacists as Leaders in Antimicrobial Stewardship

- **Collaborative Role:** Pharmacists work closely with prescribers to ensure antibiotics are chosen based on culture and sensitivity results.
- **Streamlining Protocols:** They help develop protocols for empiric therapy, de-escalation, and IV-to-oral switch.
- **Case Study:** Highlight a successful AMS intervention where pharmacists reduced broad-spectrum antibiotic use by implementing a stricter review process.


**By**: Rasha Abdelsalam Elshenawy, UH 2020

# 1. Participating in AMS multidisciplinary team

### Pharmacist-Led Training

Pharmacists educate doctors, nurses, & other pharmacists on AMS principles and safe prescribing practices.

### Continuous Monitoring

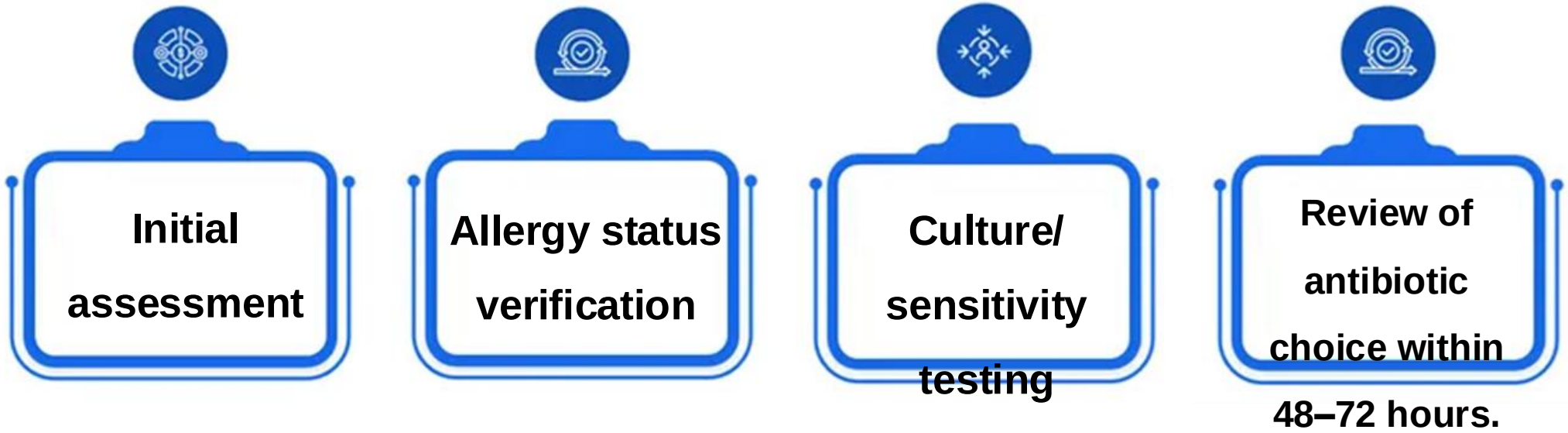
They monitor prescription patterns and provide feedback to ensure guidelines are followed.

**Example:** Share a pharmacist-led training programme's impact, showing a reduction in inappropriate antibiotic prescriptions.

# 2. Effective Antimicrobial Reviews

**Personalising Reviews**: Tailor reviews to individual patients to ensure AMS practices align with clinical needs.

**Structure of Reviews**:




**Outcome Options**: CARES – Cease, Amend, Refer, Extend, Switch.

# 3. Patient-Centred Role in AMR Prevention

## Patient Education

- Limit antimicrobial therapy to 5-7 days unless otherwise indicated.
- Document diagnosis, antibiotic choice, and review dates to ensure continuity and prevent misuse.

## Public Health Awareness

- During WAAW, pharmacists run campaigns to educate the public about the dangers of antibiotic misuse and overuse.

## Digital Tools

- Pharmacists utilise apps and resources to help patients manage their medications accurately.

# 4. Supporting the One Health Approach

01 **One Health**: Recognises link between human, animal, & environmental health in fighting AMR.

02 **Pharmacist Role:** Educate on responsible antibiotic use across human and veterinary sectors.

03 **Global Effort:** Pharmacists contribute to global AMR surveillance and stewardship.

# 5. Pharmacist-Led Research and Innovation

| | |
|---|---|
| **Research Contributions** | Pharmacists conduct studies on AMR trends and AMS strategies. |
| **Innovative Solutions** | Emerging technologies, such as mobile apps, for tracking antibiotic usage. |
| **Example** | Showcase a pharmacist-led role that contributed to AMR management improvements. |

# 6. Future Directions in AMS and AMR Combat

**Leadership in AMS**

Pharmacists are increasingly taking on leadership roles in AMS and AMR policy-making.

**Technology Integration**

Greater use of data analytics and mobile tools to optimise AMS practices.

**Global Collaboration**

Pharmacists will play a key role in international AMR strategies and partnerships.

# Best practice for effective antibiotic review and antimicrobial stewardship


Elshenawy, R.A. (2024). How pharmacists can contribute to effective antimicrobial reviews. [online] The Pharmaceutical Journal. Available at: https://pharmaceutical-journal.com/article/ld/how-pharmacists-can-contribute-to-effective-antimicrobial-reviews.

# Case Study - Applying ‘CARES’ in AMS


Case Overview: Discuss a real-world scenario where the ‘CARES’ approach (Cease, Amend, Refer, Extend, Switch) was applied in AMS.

Outcome: Show how structured reviews can enhance antibiotic use and improve patient outcomes.

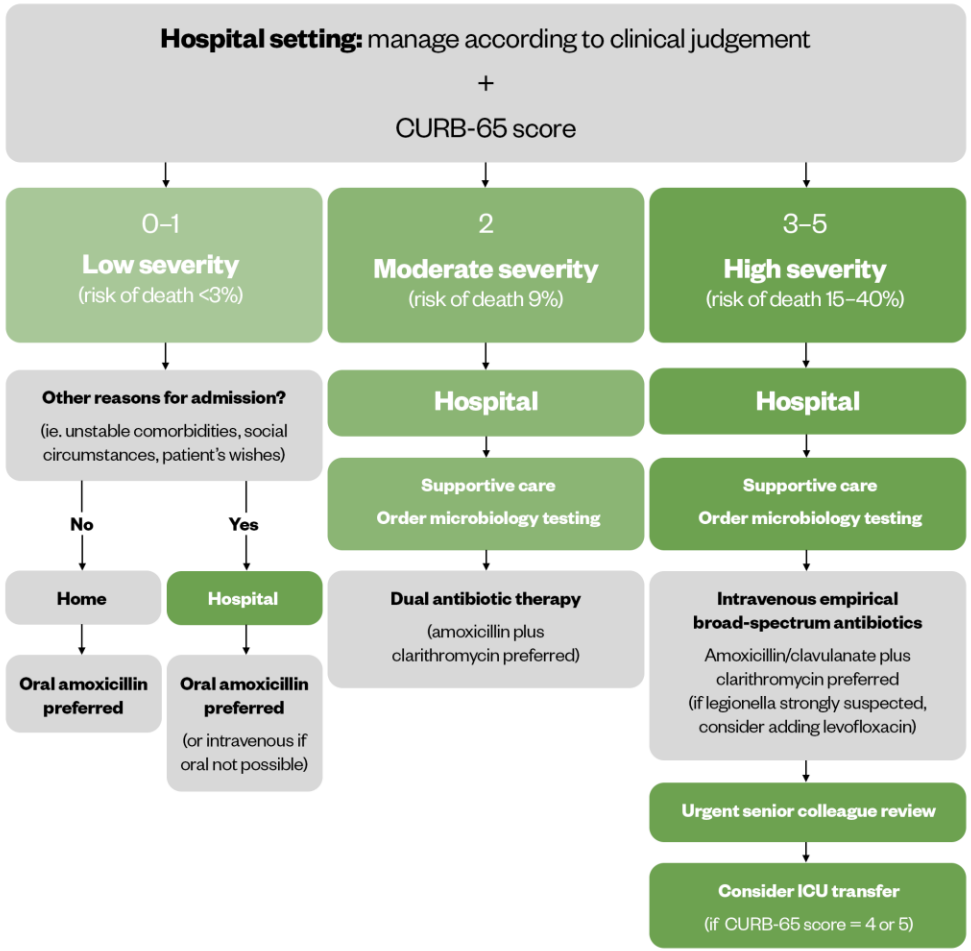
Lessons Learned: Key insights from applying AMS principles in practice.

# Best practice for effective antibiotic review and antimicrobial stewardship


## Principles of Initial Antibiotic Assessment

### Initial Assessment:

- Follow the "Start Smart" principle by verifying infection presence through history, clinical signs, lab results, and imaging.
- Differentiate between empirical and pathogen-directed antibiotics based on diagnosis and severity.
- Use tools like **CURB-65** for specific infections (e.g., community-acquired pneumonia) to assess severity.

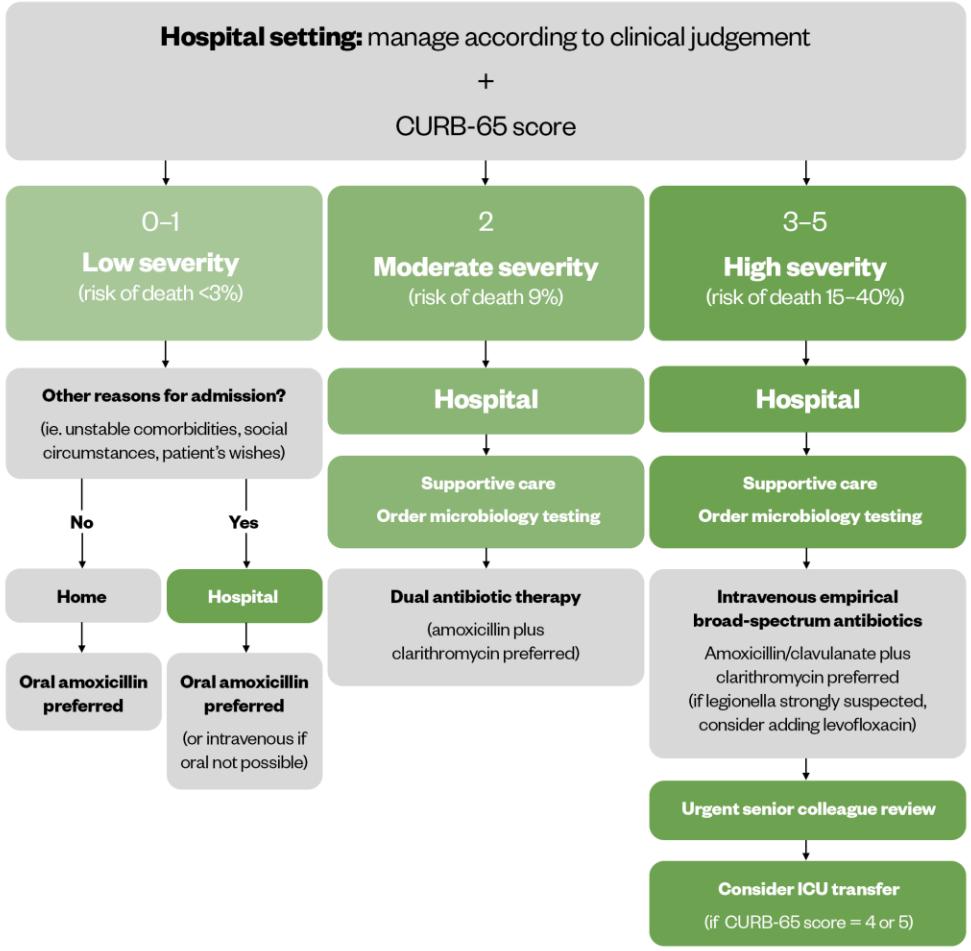


# Best practice for effective antibiotic review and antimicrobial stewardship


## Principles of Initial Antibiotic Assessment

### Key Considerations:

- Assess allergy status to avoid inappropriate second-line antimicrobials.
- Utilise diagnostic tests (e.g., microscopy, culture, sensitivity) to guide therapy adjustments.
- Review within 48-72 hours using the “Then Focus” approach to tailor treatments and ensure adherence to guidelines.



# Best practice for effective antibiotic review and antimicrobial stewardship


## Person-Centred Care and Stewardship Outcomes

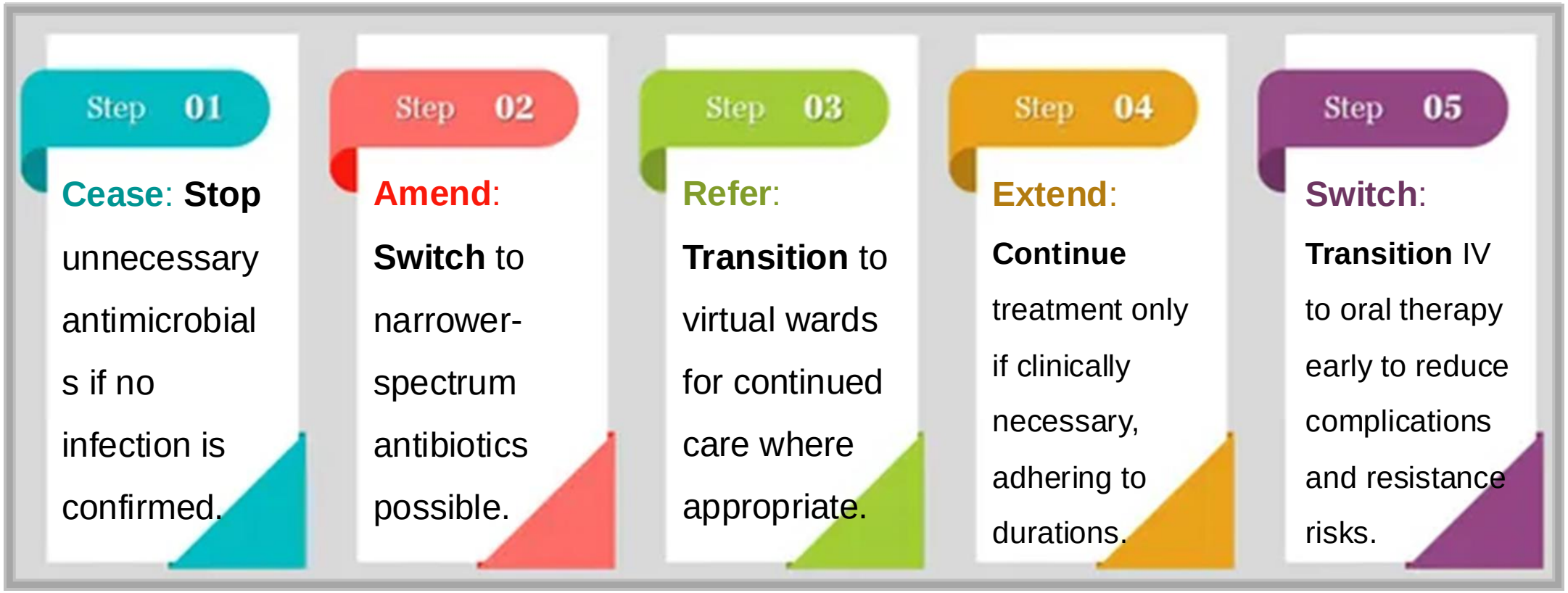
### Person-Centred Care:

- Ensure safe and effective antibiotic use by considering individual needs, including dose adjustments and drug interactions.
- Educate patients on antibiotic side effects, such as fluoroquinolone-induced tendon rupture or aminoglycoside nephrotoxicity.
- Emphasise clear communication and shared decision-making for a better understanding of AMR risks.

# Best practice for effective antibiotic review and antimicrobial stewardship

## Person-Centred Care and Stewardship Outcomes

### Outcomes of Antimicrobial Review (CARES):



# Best practice for effective antibiotic review and antimicrobial stewardship


## Supporting Effective Antimicrobial Stewardship

### Duration and Documentation

- Limit antimicrobial therapy to 5-7 days unless otherwise indicated.
- Document diagnosis, antibiotic choice, & review dates to ensure continuity & prevent misuse.

### Interprofessional Collaboration

- Engage healthcare teams in antibiotic decisions and updates based on microbiology and patient progress.
- Monitor antibiotic use patterns to optimize prescribing practices.

### Patient Education

- Inform patients about the proper use of antibiotics and implications of AMR.
- Reinforce key messages during reviews and utilize evidence-based resources for patient engagement.

# Case Study 1

Elshenawy, R.A. (2024). How pharmacists can contribute to effective antimicrobial reviews. [online] The Pharmaceutical Journal. Available at: https://pharmaceutical-journal.com/article/ld/how-pharmacists-can-contribute-to-effective-antimicrobial-reviews.

# Case Study: D.L.


## Patient Profile:

- 44-year-old woman.
- Presented to A&E in June with symptoms of cough, lethargy, fever, and chills (4-day duration).
- Active lifestyle: runs 25 miles per week, has no recent travel, and works from home.

## Vital Signs:

- Respiratory rate: 32 breaths/min.
- Blood pressure: 124/71 mmHg.
- Heart rate: 98 beats/min.
- Oxygen saturation: 93% on room air.
- Fever: 102.1°F (38.9°C).
- White blood cell count: 19.0×10⁹/L.
- Blood urea nitrogen: 17 mg/dL.

## Findings:

- Chest X-ray: consolidation in the left lower lobe.
- Diagnosis: Pneumonia.

Elshenawy, R.A. (2024). How pharmacists can contribute to effective antimicrobial reviews. [online] The Pharmaceutical Journal. Available at: https://pharmaceutical-journal.com/article/ld/how-pharmacists-can-contribute-to-effective-antimicrobial-reviews.

# Case Study: D.L.

**CURB-65 Score Calculation**

**Question**: What is D.L.'s CURB-65 score?


**Options**:

A. 1

B. 2

C. 3

D. 4

# Case Study: D.L.


**CURB-65 Criteria:**

1.Confusion: **No** (0 pt).

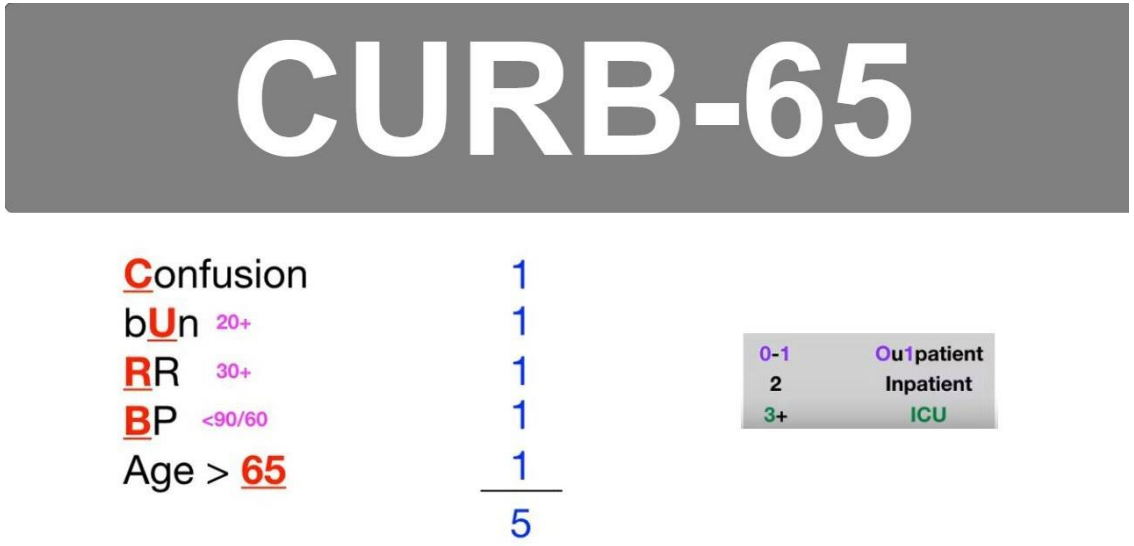
2.BUN >19 mg/dL: **No** (0 pt).

3.Respiratory Rate >30: **Yes** (1 pt).

4.Blood Pressure <90/60 mmHg: **No** (0 pt).

5.Age ≥65: **No** (0 pt).

Total Score: 1



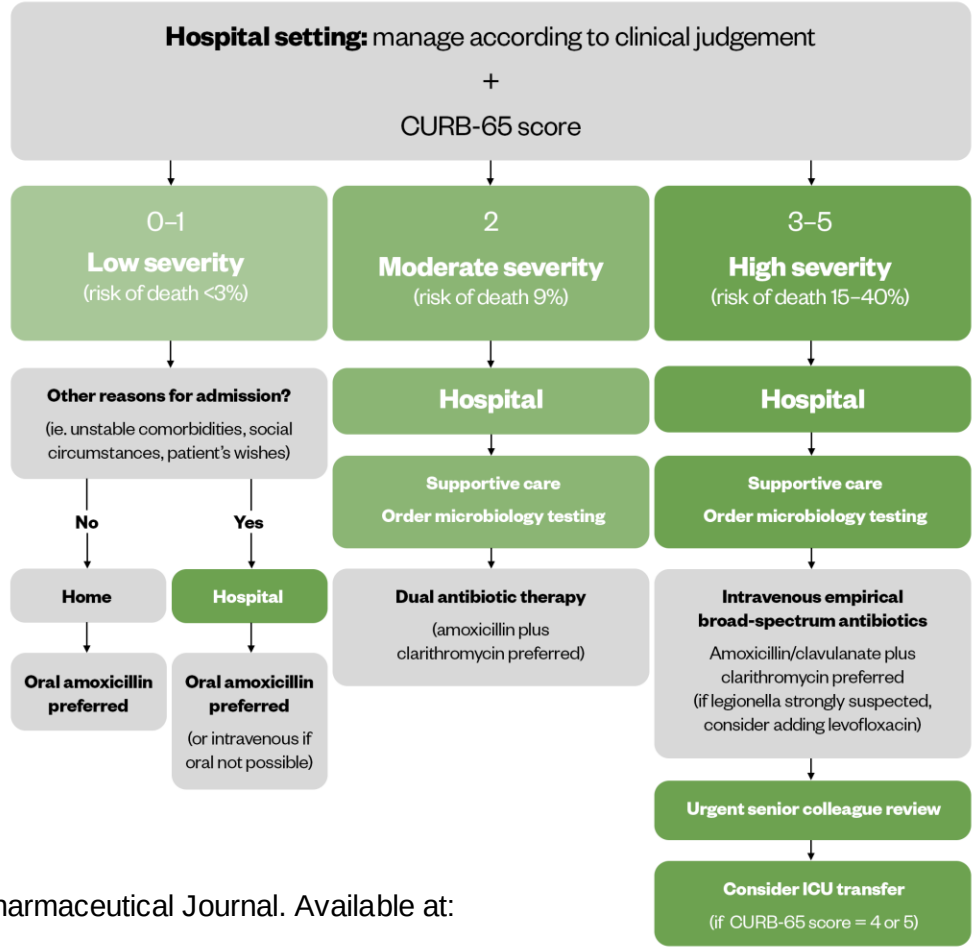

Elshenawy, R.A. (2024). How pharmacists can contribute to effective antimicrobial reviews. [online] The Pharmaceutical Journal. Available at: https://pharmaceutical-journal.com/article/ld/how-pharmacists-can-contribute-to-effective-antimicrobial-reviews.

# Case Study: D.L.


## Answer: A

**Significance**:

- CURB-65 helps assess pneumonia severity and guides hospital admission decisions.
- A score of 1 suggests **low mortality risk**; hospitalisation is appropriate for management.

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# Case Study: D.L.


**Discharge Plan**

**Question**: What is the most appropriate next step for D.L.?

**Options**:

A. Discontinue antibiotic therapy

B. Continue antibiotic therapy for two more days with azithromycin orally

C. Continue antibiotic therapy for two more days with ceftriaxone orally

D. Continue antibiotic therapy for two more days with levofloxacin orally

# Case Study: D.L.


**Discharge Plan** **Answer: A. Discontinue antibiotic therapy**

**Rationale**: D.L. is clinically stable:

- Afebrile for >72 hours.
- Respiratory rate: 18 breaths/min.
- Blood pressure: 112/70 mmHg.
- Oxygen saturation: 98% on room air.
- WBC: $12 \times 10^3$ cells/$mm^3$. notes for the slides!

# Case Study: D.L.


**Why discontinue?**

- No clinical instability or infection concerns.
- Continuing therapy is unnecessary and may cause adverse effects and antimicrobial resistance.

# Case Study: D.L.


**Incorrect Options**: **B-D**: Additional therapy is unwarranted.

- **Azithromycin**: High S. pneumoniae resistance risk.
- **Levofloxacin**: Risk of tendon rupture and other side effects.
- **Ceftriaxone**: Unnecessary broad-spectrum coverage.

This structure ensures clarity, stepwise explanation, and focus on clinical reasoning. Let me know if you'd like any design enhancements or additional notes for the slides!

Elshenawy, R.A. (2024). How pharmacists can contribute to effective antimicrobial reviews. [online] The Pharmaceutical Journal. Available at: https://pharmaceutical-journal.com/article/ld/how-pharmacists-can-contribute-to-effective-antimicrobial-reviews.

# Case Study 2

# Case 2: Treatment of Community-Acquired Pneumonia

- Mr. James, a 55-year-old male, presents with mild community-acquired pneumonia (CAP) at his local GP clinic. The GP prescribes co-amoxiclav.
- However, the likely pathogen, Streptococcus pneumoniae, could be treated effectively with amoxicillin (a narrow-spectrum antibiotic), which is the first-line treatment for uncomplicated CAP.
- Mr. James has no known allergies and has not taken antibiotics recently.

**Answer the Following Questions:**

**Q1) What is the first-line treatment for uncomplicated community-acc**

**pneumonia (CAP) caused by the identified pathogen?**

A) Co-amoxiclav

B) Amoxicillin

C) Azithromycin

D) Ciprofloxacin

NICE
National Institute for
Health and Care Excellence

**Q1) What is a potential concern with prescribing co-amoxiclav without sputum cultures?**

A) Increased patient comfort

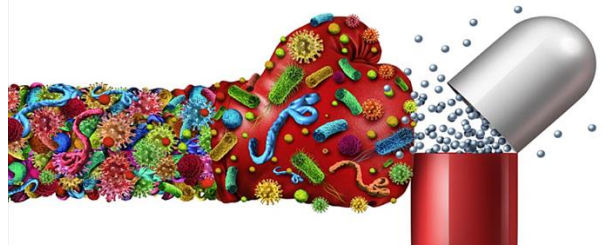
B) Risk of antimicrobial resistance

C) Enhanced effectiveness of treatment

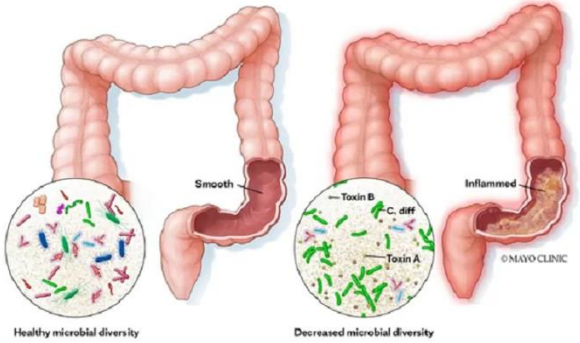
D) Improved recovery time

# Patient Safety Focus

- Using a broad-spectrum antibiotic like co-amoxiclav unnecessarily exposes Mr. James to higher risks of side effects, such as **gastrointestinal issues and Clostridium difficile infection (CDI).** The first-line treatment for CDI is oral vancomycin.



- Broad-spectrum antibiotic use also contributes to the development of **antimicrobial resistance in both the patient and the community.**

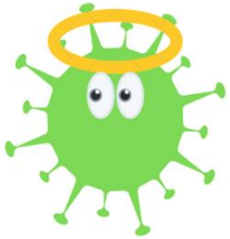


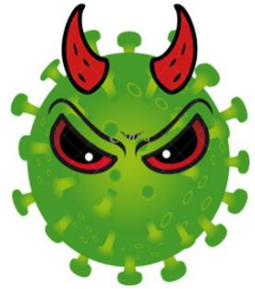
# Pharmacist’s Role in Antibiotic Selection

**1. Pharmacist’s Role in Antibiotic Selection:**

The pharmacist reviews the prescription and advises switching to **amoxicillin**, a more appropriate narrow-spectrum antibiotic for CAP, which is just as effective in this case and safer for the patient.

Antimicrobial stewardship intervention involves **de-escalation or amend.**



# Pharmacist’s Role in Antibiotic Selection

**2. Assessing Allergies:**

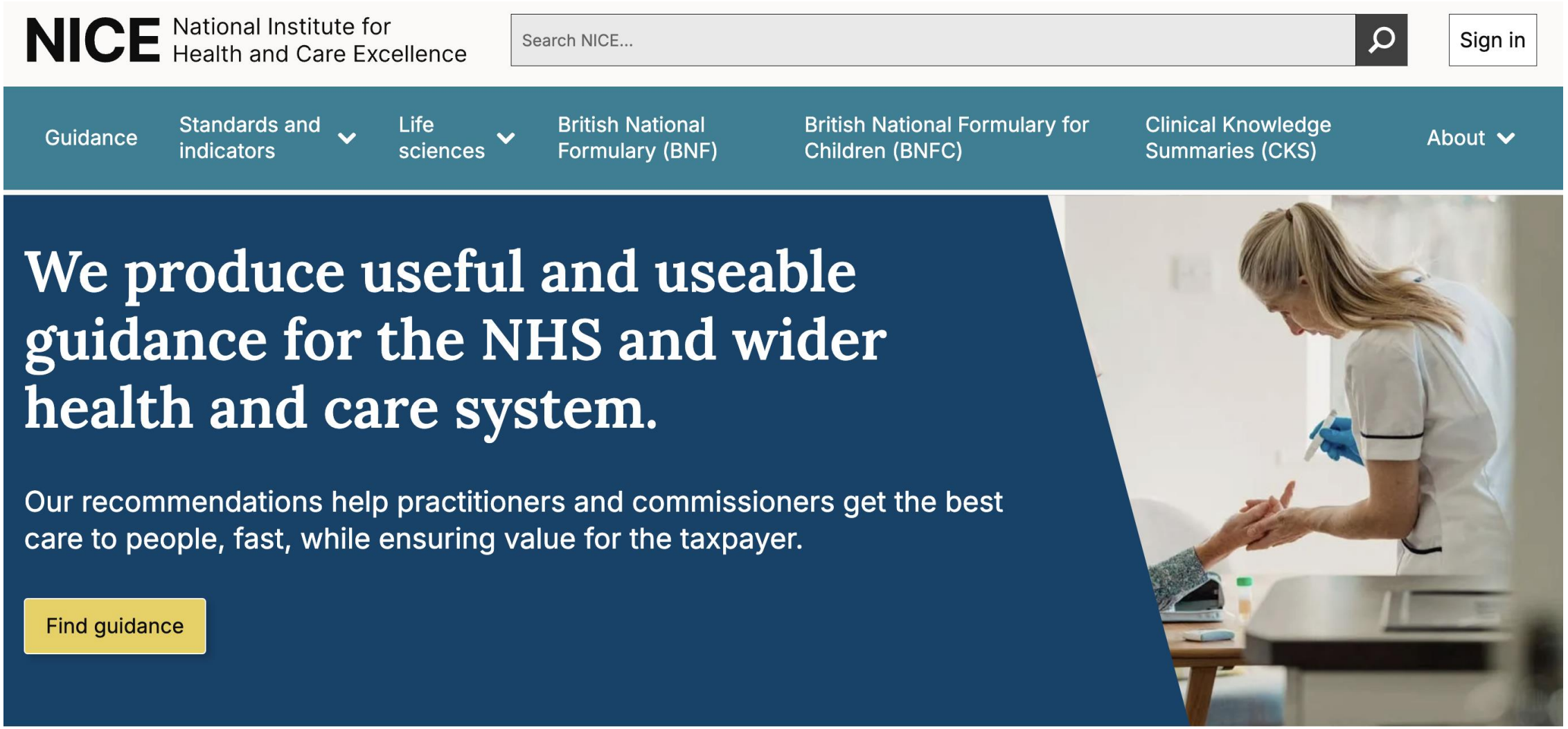
The pharmacist should confirm Mr. James’s lack of penicillin allergies, which would support the safe use of amoxicillin.

**3. Minimising Side Effects:**

The pharmacist educates Mr. James about the lower risk of side effects with narrow-spectrum antibiotics like amoxicillin, as compared to co-amoxiclav.

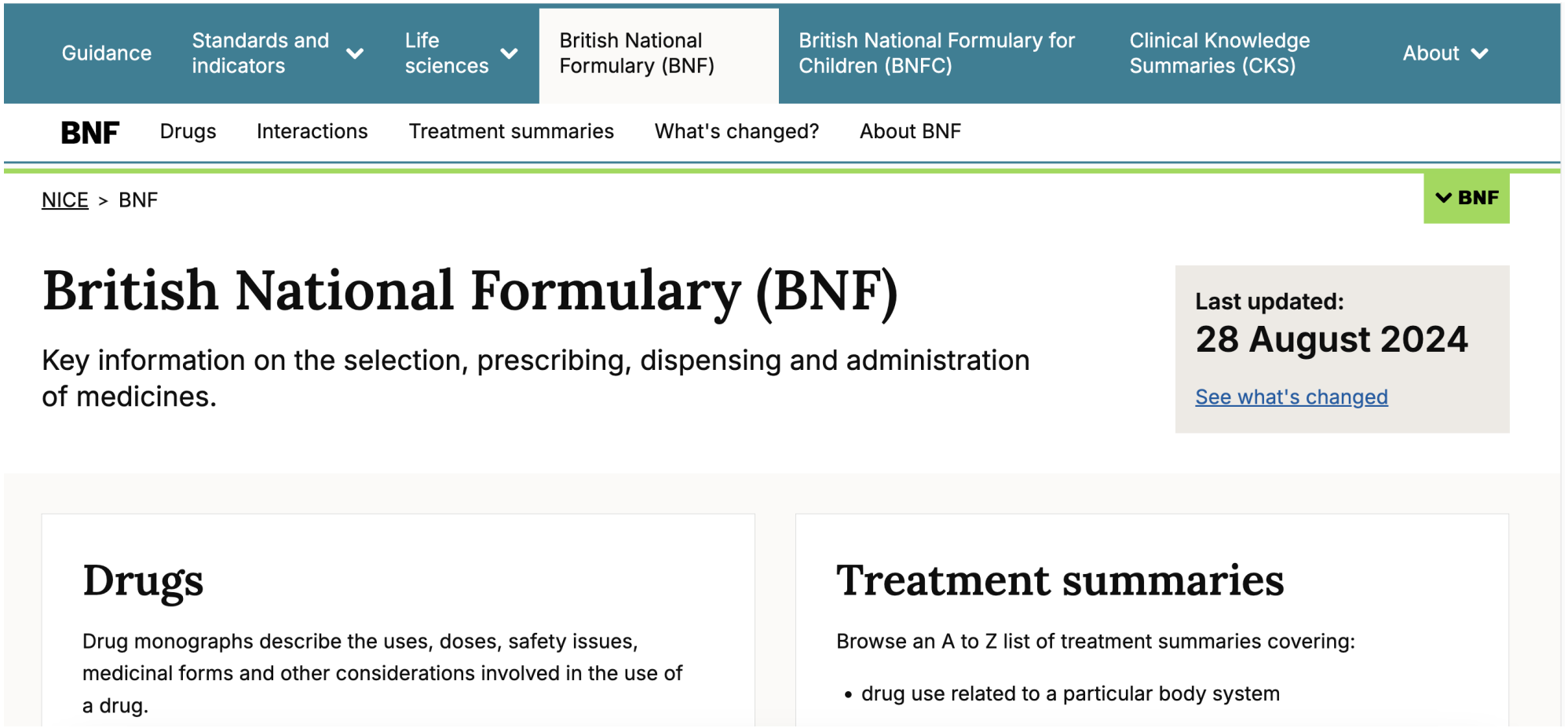
# Antimicrobial Stewardship Resources

# 2. NICE: National Institute for Health and Care Excellence



# 3. British National Formulary (BNF)

Key information on the selection, prescribing, dispensing and administration of medicines.



# 4. UK Health Security Agency - GOV.UK

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UK Health Security Agency

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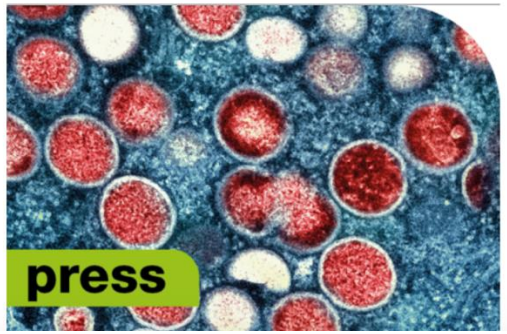
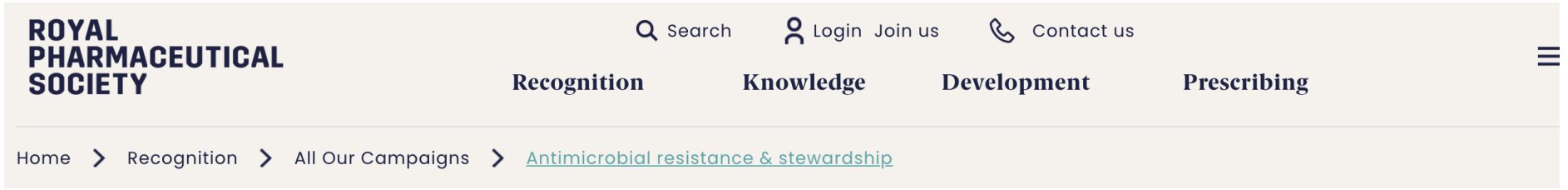
Vaccine Development and Evaluation Centre (VDEC)

## Featured


# 5. Royal Pharmaceutical Society | RPS




## Antimicrobial Resistance and Stewardship

### Committing to tackling antimicrobial resistance (AMR)

This is our main resource for the fight against antimicrobial resistance, and promoting the best use of antimicrobial stewardship.

We're bringing pharmacy expertise and knowledge to the fight, and we need your help.

RPS (2022). Antimicrobial resistance & stewardship | RPS. [online] www.rpharms.com. Available at: https://www.rpharms.com/recognition/all-our-campaigns/antimicrobial-resistance-stewardship.

# 6. The UK Next Five - Year Action Plan

## *Confronting Antimicrobial Resistance*

University of Hertfordshire UH

# Further Recommended Readings


University of Hertfordshire UH

NHS Bedfordshire Hospitals NHS Foundation Trust

1

The couple was admitted to the COVID-19 ICU ward

The wife was deteriorating due to Multi-Drug Resistance (MDR) Bacteria. She was lucky, there was an antibiotic Reserved to treat her

2

A tale of two pandemics - COVID-19 and Antimicrobial Resistance (AMR)


Antimicrobial Stewardship (AMS) maintains the effective and right use of antibiotics

3


Identify factors affecting antibiotics use before and during the COVID-19 pandemic

Provide practical ways to improve safety and quality of patient care

**By**: Rasha Abdelsalam Elshenawy, UH 2021

# 1. ‘Start Smart’ -‘Then Focus’

COVID

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## Impact of COVID-19 on ‘Start Smart, Then Focus’ Antimicrobial Stewardship at One NHS Foundation Trust in England Prior to and during the Pandemic

by Rasha Abdelsalam Elshenawy *, Nkiruka Umaru and Zoe Aslanpour

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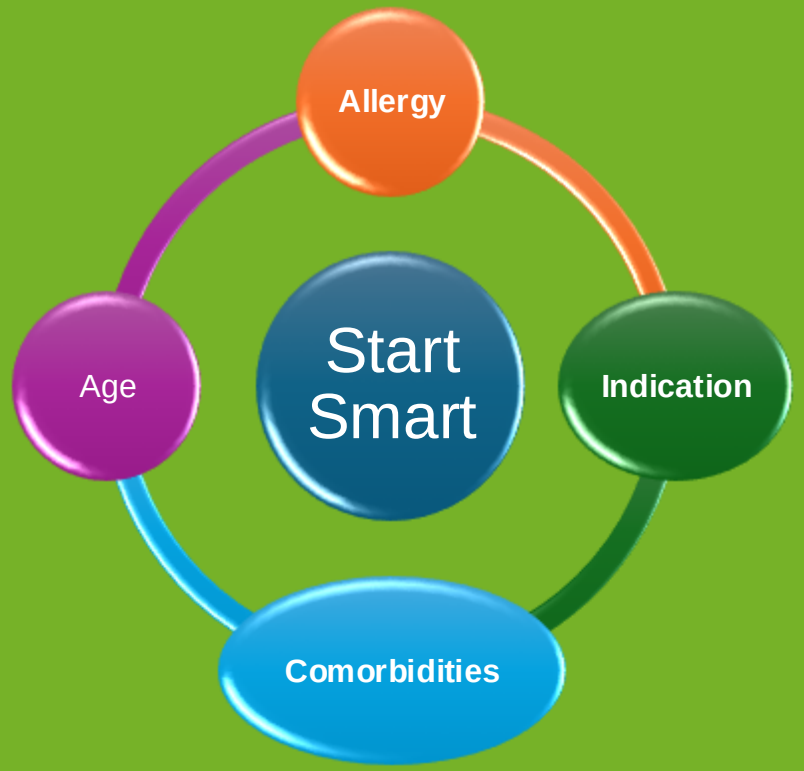
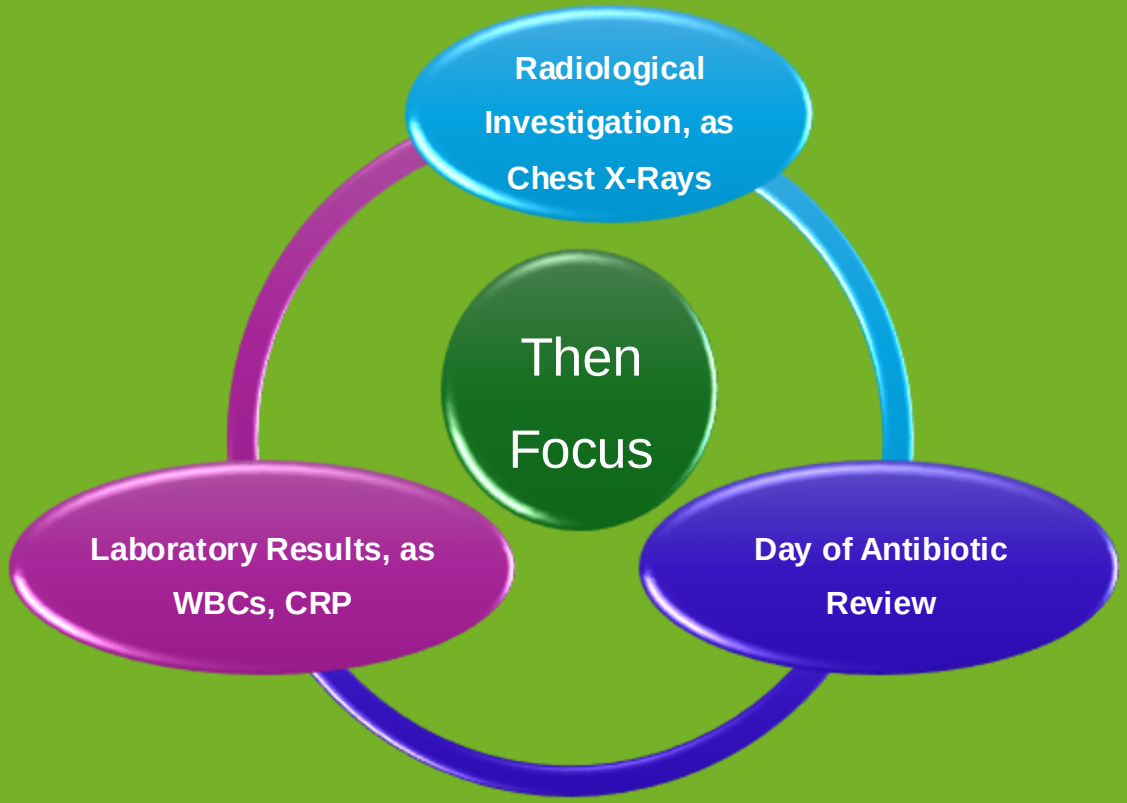
# Factors Affecting ‘Start Smart’ Antibiotic Prescribing

- Factors affecting empirical or initial antibiotic prescribing include the following:



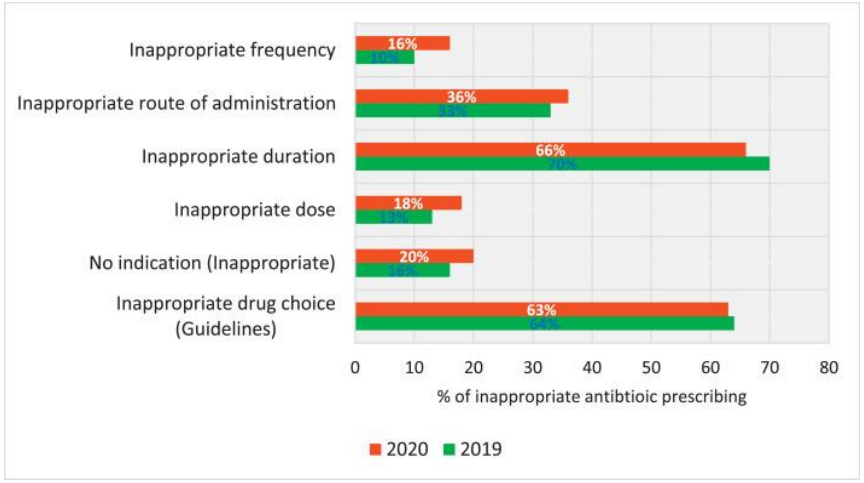
# Factors Affecting ‘Then Focus’ Antibiotic prescribing

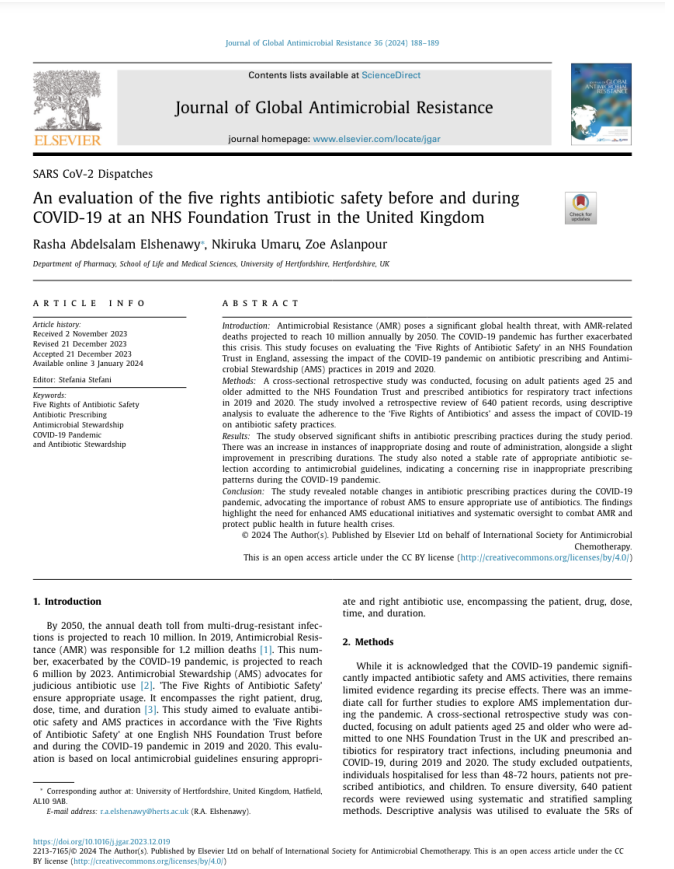
- Factors affecting pathogen-directed antibiotic prescribing include the following:



# 2. Journal of Global Antimicrobial Resistance

- Examining the pandemic's impact on the **'Five Rights of Antibiotic Use' (right patient, drug, dose, time, and duration**).
- This could be used in quality improvement projects to maintain the sustainability of AMS implementation and mitigate AMR challenges.

Journal of Global Antimicrobial Resistance 36 (2024) 188–189

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journal homepage: www.elsevier.com/locate/jgar

SARS CoV-2 Dispatches

An evaluation of the five rights antibiotic safety before and during COVID-19 at an NHS Foundation Trust in the United Kingdom

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ABSTRACT

*Introduction:* Antimicrobial Resistance (AMR) poses a significant global health threat, with AMR-related deaths projected to reach 10 million annually by 2050. The COVID-19 pandemic has further exacerbated this crisis. This study focuses on evaluating the 'Five Rights of Antibiotic Safety' in an NHS Foundation Trust in England, assessing the impact of the COVID-19 pandemic on antibiotic prescribing and Antimicrobial Stewardship (AMS) practices in 2019 and 2020.

*Methods:* A cross-sectional retrospective study was conducted, focusing on adult patients aged 25 and older admitted to the NHS Foundation Trust and prescribed antibiotics for respiratory tract infections in 2019 and 2020. The study involved a retrospective review of 640 patient records, using descriptive analysis to evaluate the adherence to the 'Five Rights of Antibiotics' and assess the impact of COVID-19 on antibiotic safety practices.

*Results:* The study observed significant shifts in antibiotic prescribing practices during the study period. There was an increase in instances of inappropriate dosing and route of administration, alongside a slight improvement in prescribing durations. The study also noted a stable rate of appropriate antibiotic selection according to antimicrobial guidelines, indicating a concerning rise in inappropriate prescribing patterns during the COVID-19 pandemic.

*Conclusion:* The study revealed notable changes in antibiotic prescribing practices during the COVID-19 pandemic, advocating the importance of robust AMS to ensure appropriate use of antibiotics. The findings highlight the need for enhanced AMS educational initiatives and systematic oversight to combat AMR and protect public health in future health crises.



1. Introduction

By 2050, the annual death toll from multi-drug-resistant infections is projected to reach 10 million. In 2019, Antimicrobial Resistance (AMR) was responsible for 1.2 million deaths [1]. This number, exacerbated by the COVID-19 pandemic, is projected to reach 6 million by 2023. Antimicrobial Stewardship (AMS) advocates for judicious antibiotic use [2]. 'The Five Rights of Antibiotic Safety' ensure appropriate usage. It encompasses the right patient, drug, dose, time, and duration [3]. This study aimed to evaluate antibiotic safety and AMS practices in accordance with the 'Five Rights of Antibiotic Safety' at one English NHS Foundation Trust before and during the COVID-19 pandemic in 2019 and 2020. This evaluation is based on local antimicrobial guidelines ensuring appropriate and right antibiotic use, encompassing the patient, drug, dose, time, and duration.

2. Methods

While it is acknowledged that the COVID-19 pandemic significantly impacted antibiotic safety and AMS activities, there remains limited evidence regarding its precise effects. There was an immediate call for further studies to explore AMS implementation during the pandemic. A cross-sectional retrospective study was conducted, focusing on adult patients aged 25 and older who were admitted to one NHS Foundation Trust in the UK and prescribed antibiotics for respiratory tract infections, including pneumonia and COVID-19, during 2019 and 2020. The study excluded outpatients, individuals hospitalised for less than 48–72 hours, patients not prescribed antibiotics, and children. To ensure diversity, 640 patient records were reviewed using systematic and stratified sampling methods. Descriptive analysis was utilised to evaluate the 5Rs of

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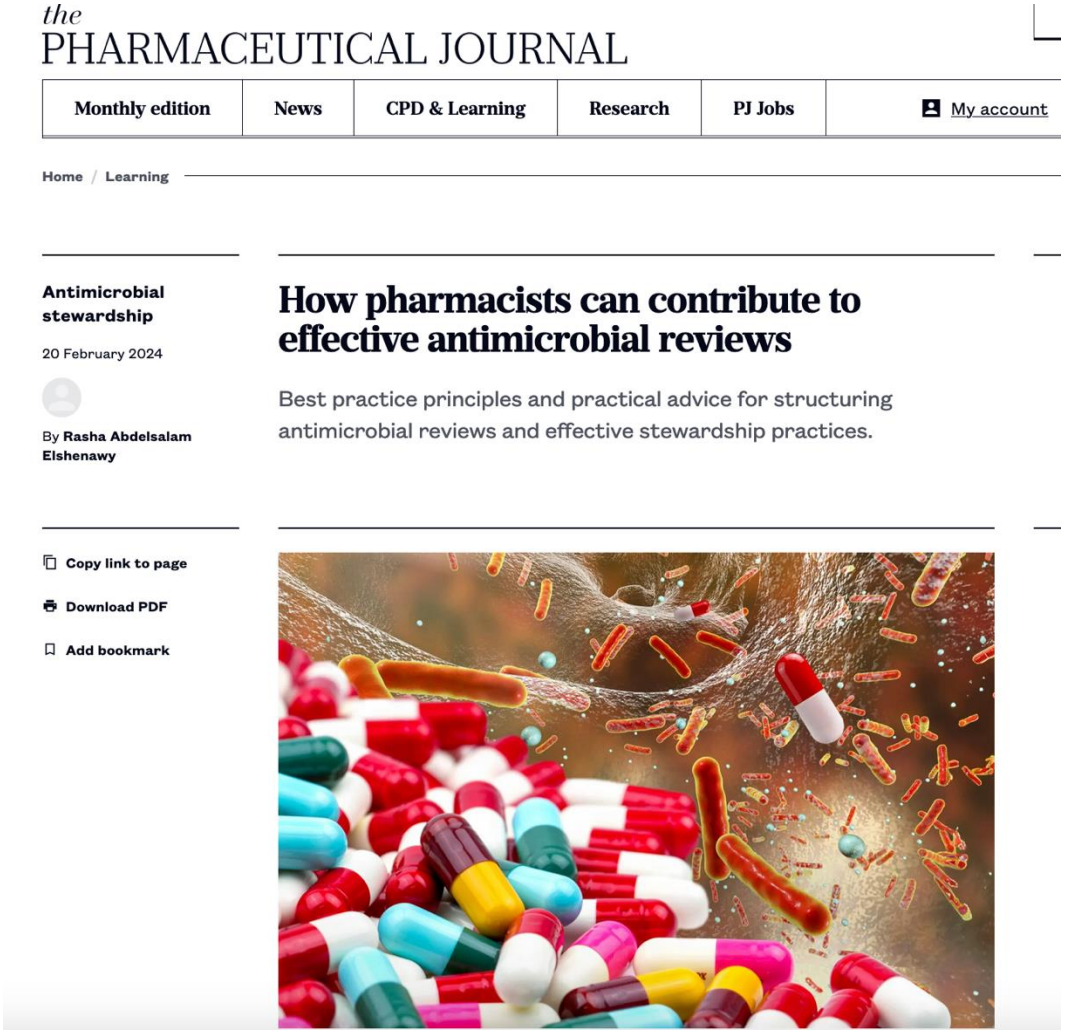
https://doi.org/10.1016/j.jgar.2023.12.019
2213-7165/

Abdelsalam Elshenawy. An evaluation of the five rights antibiotic safety. 2024. https://www.sciencedirect.com/science/article/https://doi.org/10.1016/j.jgar.2023.12.019

# 3. The Pharmaceutical Journal

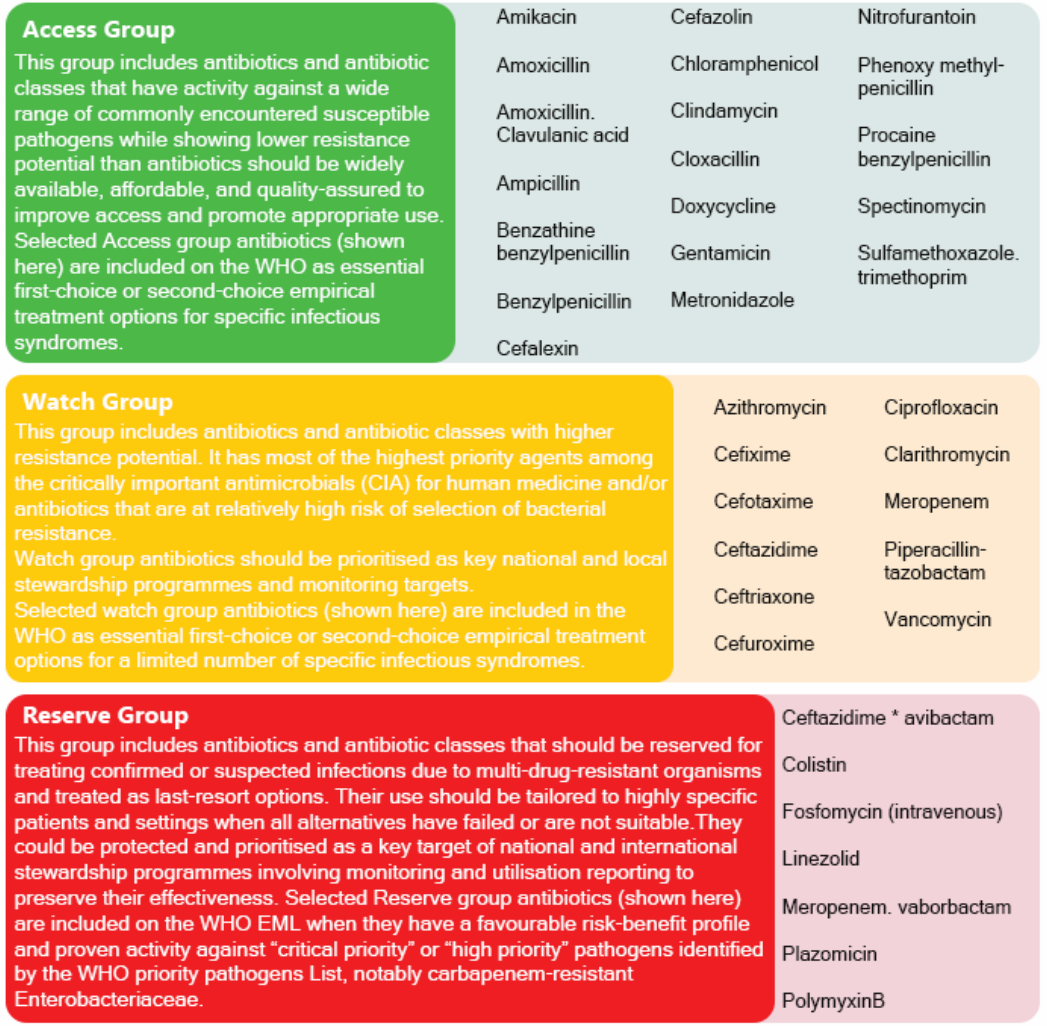
**How pharmacists can contribute to effective antimicrobial reviews**


Elshenawy, R.A. (2024). How pharmacists can contribute to effective antimicrobial reviews. [online] The Pharmaceutical Journal. Available at: https://pharmaceutical-journal.com/article/ld/how-pharmacists-can-contribute-to-effective-antimicrobial-reviews.

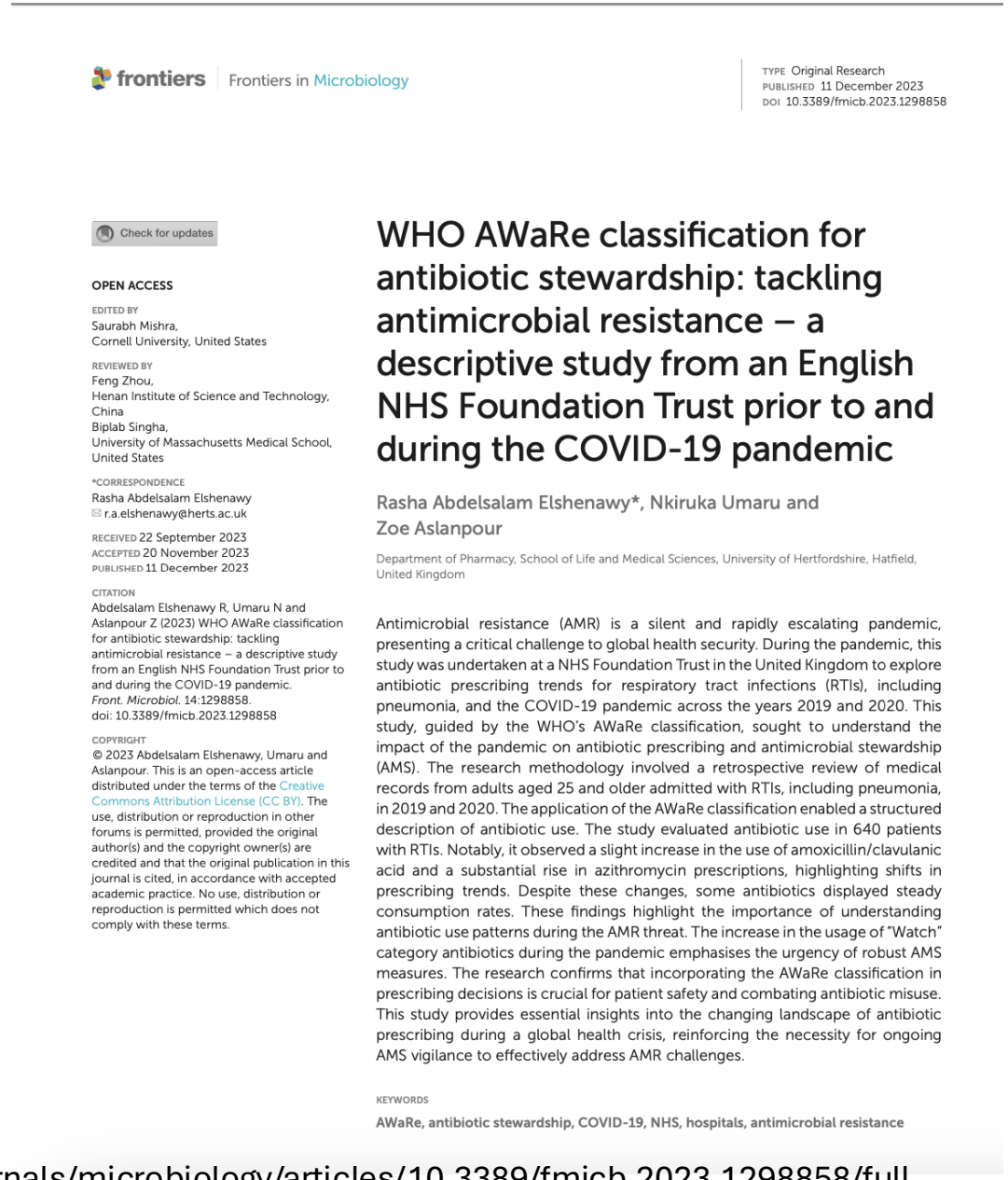
# 4. AWaRe Classification of Antimicrobials

- The AWaRe classification of antibiotics as a tool to support antibiotic stewardship efforts at local, national and global levels.
- Antibiotics are classified into three groups, Access, Watch and Reserve, to emphasise the importance of their appropriate use.




**WHO**, 2023. *AWaRe classification of antibiotics for evaluation and monitoring of use, 2023*. [online] www.who.int.

**“WHO AWaRe classification for antibiotic stewardship: tackling antimicrobial resistance – a descriptive study from an English NHS Foundation Trust prior to and during the COVID-19 pandemic”**



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# WHO AWaRe classification for antibiotic stewardship: tackling antimicrobial resistance – a descriptive study from an English NHS Foundation Trust prior to and during the COVID-19 pandemic

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Department of Pharmacy, School of Life and Medical Sciences, University of Hertfordshire, Hatfield, United Kingdom

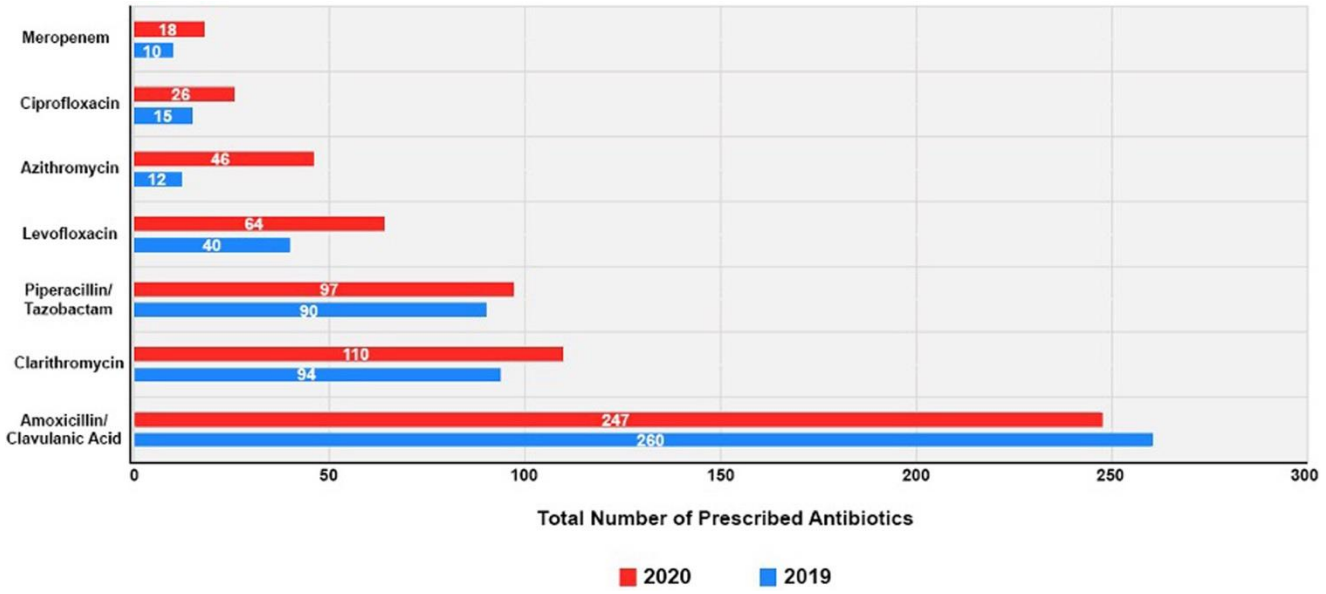
Antimicrobial resistance (AMR) is a silent and rapidly escalating pandemic, presenting a critical challenge to global health security. During the pandemic, this study was undertaken at a NHS Foundation Trust in the United Kingdom to explore antibiotic prescribing trends for respiratory tract infections (RTIs), including pneumonia, and the COVID-19 pandemic across the years 2019 and 2020. This study, guided by the WHO's AWaRe classification, sought to understand the impact of the pandemic on antibiotic prescribing and antimicrobial stewardship (AMS). The research methodology involved a retrospective review of medical records from adults aged 25 and older admitted with RTIs, including pneumonia, in 2019 and 2020. The application of the AWaRe classification enabled a structured description of antibiotic use. The study evaluated antibiotic use in 640 patients with RTIs. Notably, it observed a slight increase in the use of amoxicillin/clavulanic acid and a substantial rise in azithromycin prescriptions, highlighting shifts in prescribing trends. Despite these changes, some antibiotics displayed steady consumption rates. These findings highlight the importance of understanding antibiotic use patterns during the AMR threat. The increase in the usage of "Watch" category antibiotics during the pandemic emphasises the urgency of robust AMS measures. The research confirms that incorporating the AWaRe classification in prescribing decisions is crucial for patient safety and combating antibiotic misuse. This study provides essential insights into the changing landscape of antibiotic prescribing during a global health crisis, reinforcing the necessity for ongoing AMS vigilance to effectively address AMR challenges.

KEYWORDS

**AWaRe, antibiotic stewardship, COVID-19, NHS, hospitals, antimicrobial resistance**

Frontiers Microbiology (2023). Available at: https://www.frontiersin.org/journals/microbiology/articles/10.3389/fmicb.2023.1298858/full.

This paper provided a **heatmap for antibiotic use** in 2019 and 2020 according to AWaRe criteria and top prescribed antibiotics.



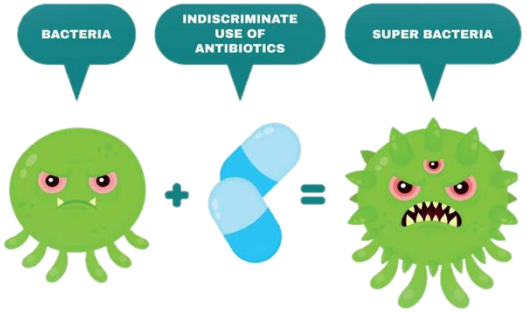

**WHO Access, Watch, Reserve (AWaRe) classification for antibiotics evaluation and monitoring before and during the COVID-19 pandemic**

| | Mar-19 | Jun-19 | Sep-19 | Dec-19 | Mar-20 | Jun-20 | Sep-20 | Dec-20 |
|---|---|---|---|---|---|---|---|---|
| **Access** | | | | | | | | |
| Amoxicillin | 2 | 1 | 2 | 3 | 6 | 6 | 0 | 1 |
| Amoxicillin/clavulanic acid | 67 | 61 | 56 | 76 | 25 | 70 | 86 | 66 |
| Benzylpenicillin | 1 | 0 | 2 | 0 | 3 | 0 | 0 | 0 |
| Doxycycline | 1 | 1 | 3 | 2 | 1 | 2 | 0 | 1 |
| Flucloxacillin | 2 | 2 | 3 | 2 | 0 | 5 | 2 | 1 |
| Gentamicin | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 |
| Metronidazole | 3 | 7 | 2 | 0 | 4 | 4 | 2 | 4 |
| Sulfamethoxazole/Trimethoprim | 0 | 1 | 1 | 0 | 4 | 2 | 0 | 0 |
| Clindamycin | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cephalexin | 0 | 0 | 2 | 1 | 1 | 0 | 0 | 0 |
| **Watch** | | | | | | | | |
| Azithromycin | 0 | 1 | 2 | 0 | 13 | 19 | 3 | 11 |
| Ceftazidime | 2 | 2 | 0 | 0 | 0 | 1 | 0 | 0 |
| Ceftriaxone | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 |
| Cefuroxime | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| Ciprofloxacin | 3 | 3 | 1 | 8 | 7 | 5 | 9 | 5 |
| Clarithromycin | 14 | 21 | 26 | 33 | 32 | 21 | 25 | 32 |
| Levofloxacin | 12 | 9 | 8 | 11 | 14 | 13 | 14 | 23 |
| Meropenem | 2 | 0 | 1 | 1 | 5 | 4 | 4 | 5 |
| Piperacillin/Tazobactam | 29 | 30 | 15 | 16 | 29 | 21 | 22 | 25 |
| Teicoplanin | 0 | 0 | 1 | 0 | 3 | 0 | 0 | 0 |
| Vancomycin | 1 | 4 | 0 | 1 | 0 | 1 | 0 | 0 |
| **Reserve** | | | | | | | | |
| Aztreonam | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| Cefazidime/Azobactam | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 |
| Linezolid | 3 | 2 | 1 | 1 | 0 | 0 | 1 | 1 |

| |
|---|
| 0: Absence of antibiotic usage |
| 1 - 9: Minimal antibiotic consumption |
| 10 - 29: Moderate level of antibiotic usage |
| 30 and above: High level of antibiotic consumption |

Frontiers Microbiology (2023). Available at: https://www.frontiersin.org/journals/microbiology/articles/10.3389/fmicb.2023.1298858/full.

# Summary - Key Takeaways




Central Role in AMS

Open Floor for Questions


Importance of Training & Resources

Acknowledgement of WAAW

Impact of WAAW

Call to Action


# Conclusion

**Acknowledgement of WAAW**:

Encourage participation in WAAW to amplify education efforts and community engagement.

**Importance of Training and Resources**:

Continuous education and resource access are vital for effective AMS

**Impact of WAAW**:

Use this week to promote AMS efforts, public awareness, and cross-sector collaboration.

**Open Floor for Questions**:

Invite attendees to discuss AMS challenges, solutions, and future directions.

**Central Role in AMS**:

Pharmacists are essential in combatting AMR through AMS.

**Call to Action**:

Pharmacists must lead AMS efforts to reduce AMR and ensure responsible antibiotic use and sustainable AMS practices.

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# THANK YOU!

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