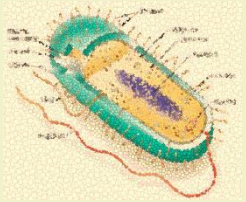
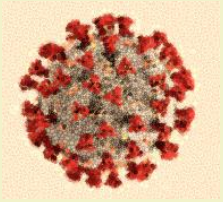
ANTIMICROBIAL RESISTANCE



&

COVID-19



Speaker: Prof. Rubina Yasmin
FCPS, FACP, FRCP(Edin)
Professor & Head
Department of Medicine
Mugda Medical College

Introduction

Key facts -WHO

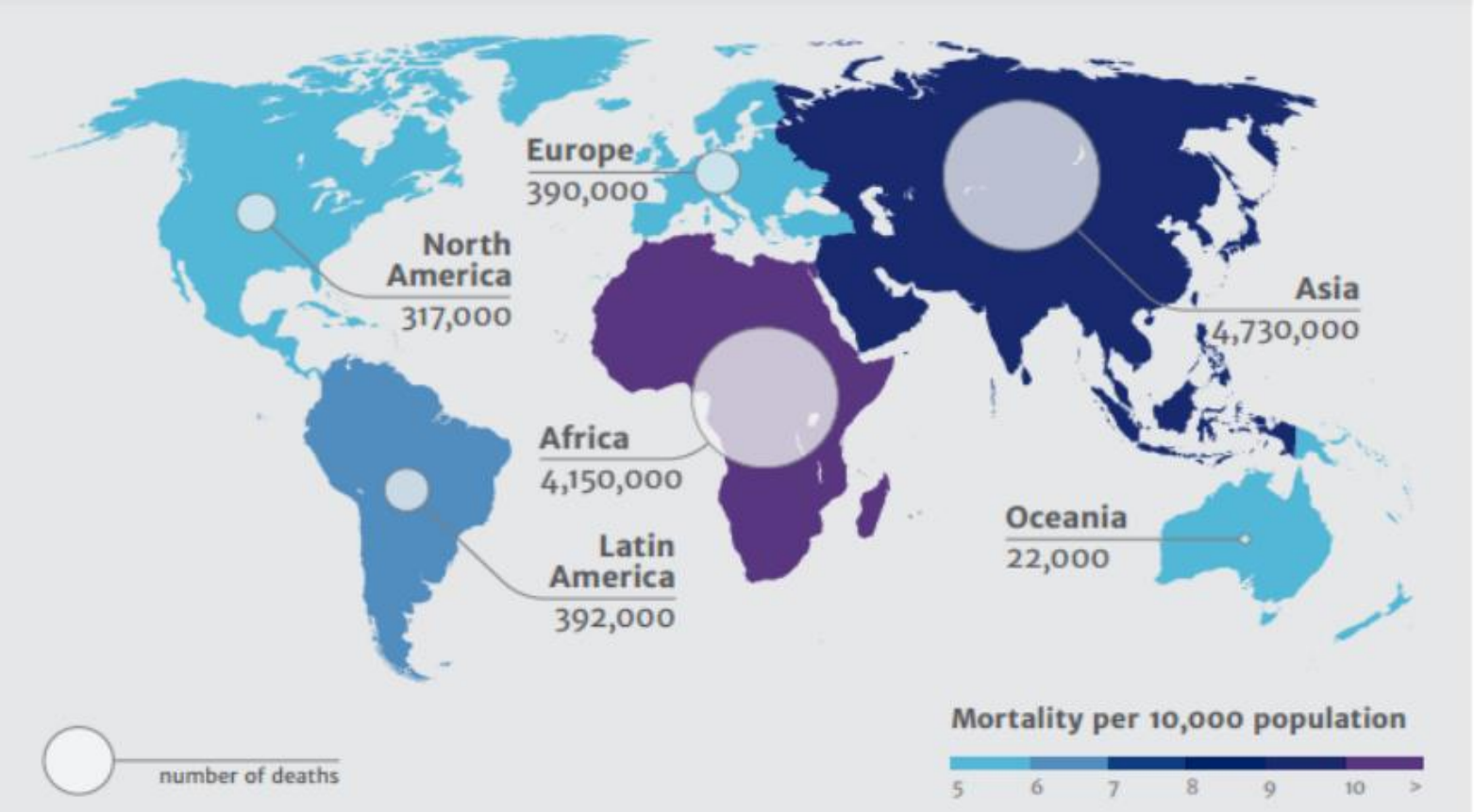
- Antimicrobial resistance (AMR) is a global health and development threat. It requires urgent multisectoral action in order to achieve the Sustainable Development Goals (SDGs).
- WHO has declared that AMR is one of the top 10 global public health threats facing humanity.
- Misuse and overuse of antimicrobials are the main drivers in the development of drug-resistant pathogens.

Introduction

- Lack of clean water and sanitation and inadequate infection prevention and control promotes the spread of microbes, some of which can be resistant to antimicrobial treatment.
- The cost of AMR to the economy is significant. In addition to death and disability, prolonged illness results in longer hospital stays, the need for more expensive medicines and financial challenges for those impacted.
- Without effective antimicrobials, the success of modern medicine in treating infections, including during major surgery and cancer chemotherapy, would be at increased risk.

Impact will be greatest in developing countries

- Death attributable to AMR every year by 2050



Main drivers of antimicrobial resistance

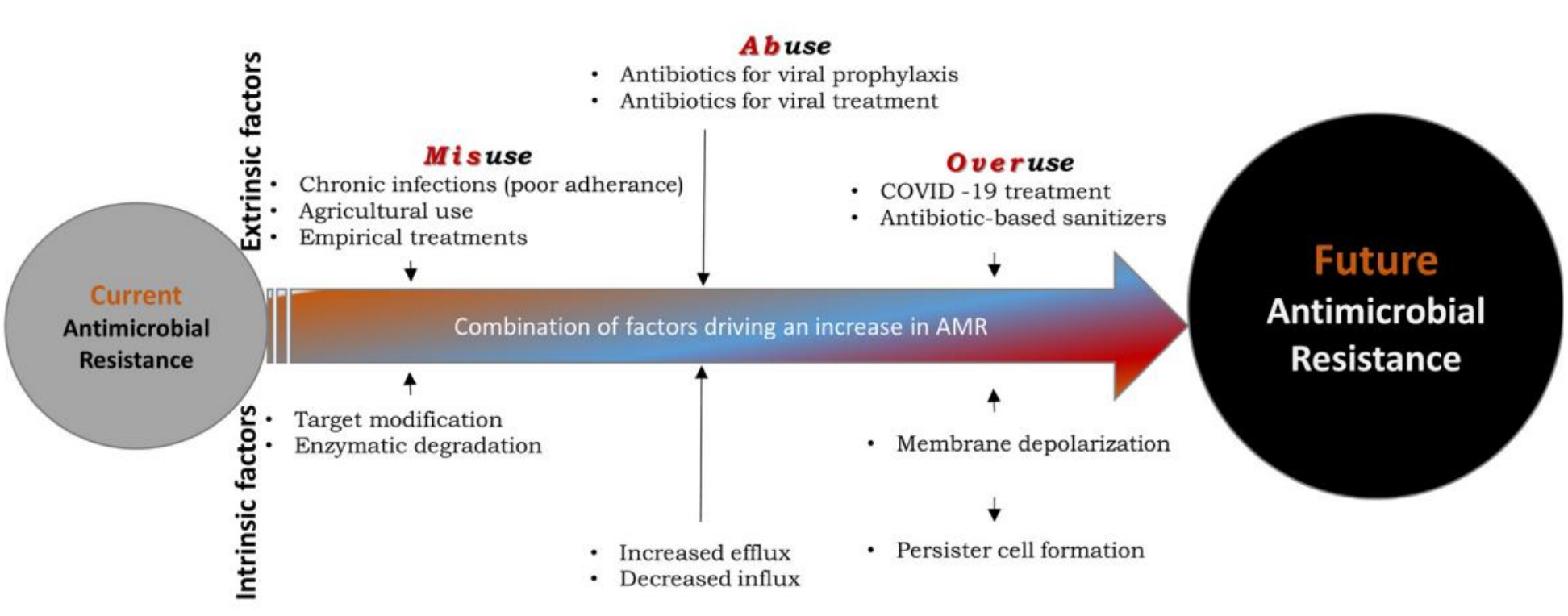
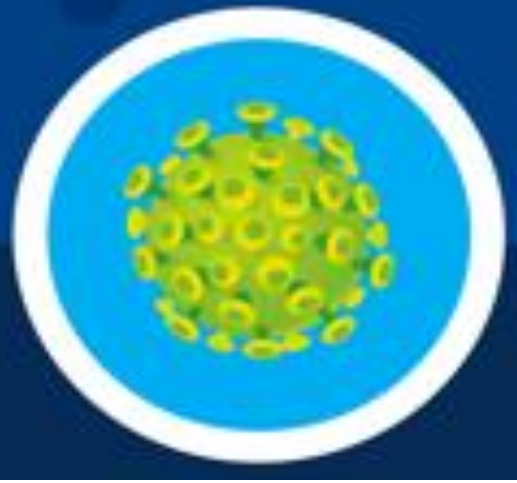


Fig: The main drivers of antimicrobial resistance. Inappropriate use of antimicrobial agents for clinical and non-clinical applications accelerates the rate at which drug resistance develops.

COVID-19 & ANTIMICROBIAL RESISTANCE: DUAL HEALTH THREATS



AMR & COVID-19

- As the world continues to respond to COVID-19, there is a larger hidden threat of antimicrobial resistance (AMR).
- Widespread and unnecessary use of antibiotics in this pandemic have facilitated the emergence and spread of resistant pathogens.
- Widespread use of biocides also contribute to AMR.

AMR & COVID-19

- The use of antibiotics has increased in current pandemic to ameliorate COVID-19.
- Antibiotics were administered in nearly 70% of COVID-19 related hospital admissions and 80-100% of COVID-19 related intensive care unit.
- It has been reported that 68.9% of COVID-19 patients had received antibiotics (mostly azithromycin and ceftriaxone) with a self-medication rate of 33.0% before hospital admission
- Even Individuals also received antibiotics with either mild or moderate COVID-19 who were not hospitalized.

How does covid-19 contribute to AMR?

Early antibiotic therapy for COVID-19 patients was as high as

87.7%

in some hospitals[6]

Only

6.9% of COVID-19 patients were found to have bacterial co-infections or secondary infections[6]

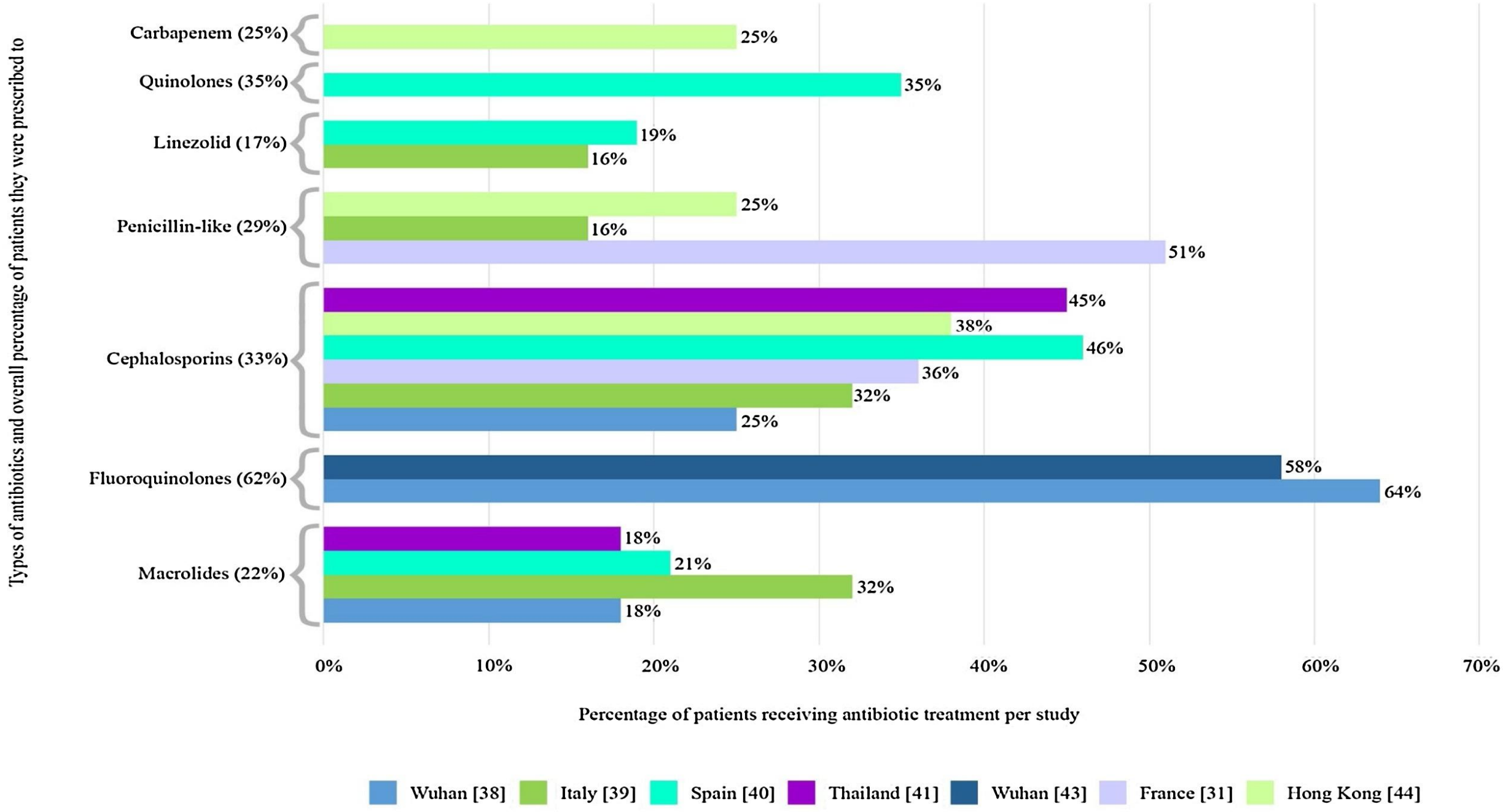
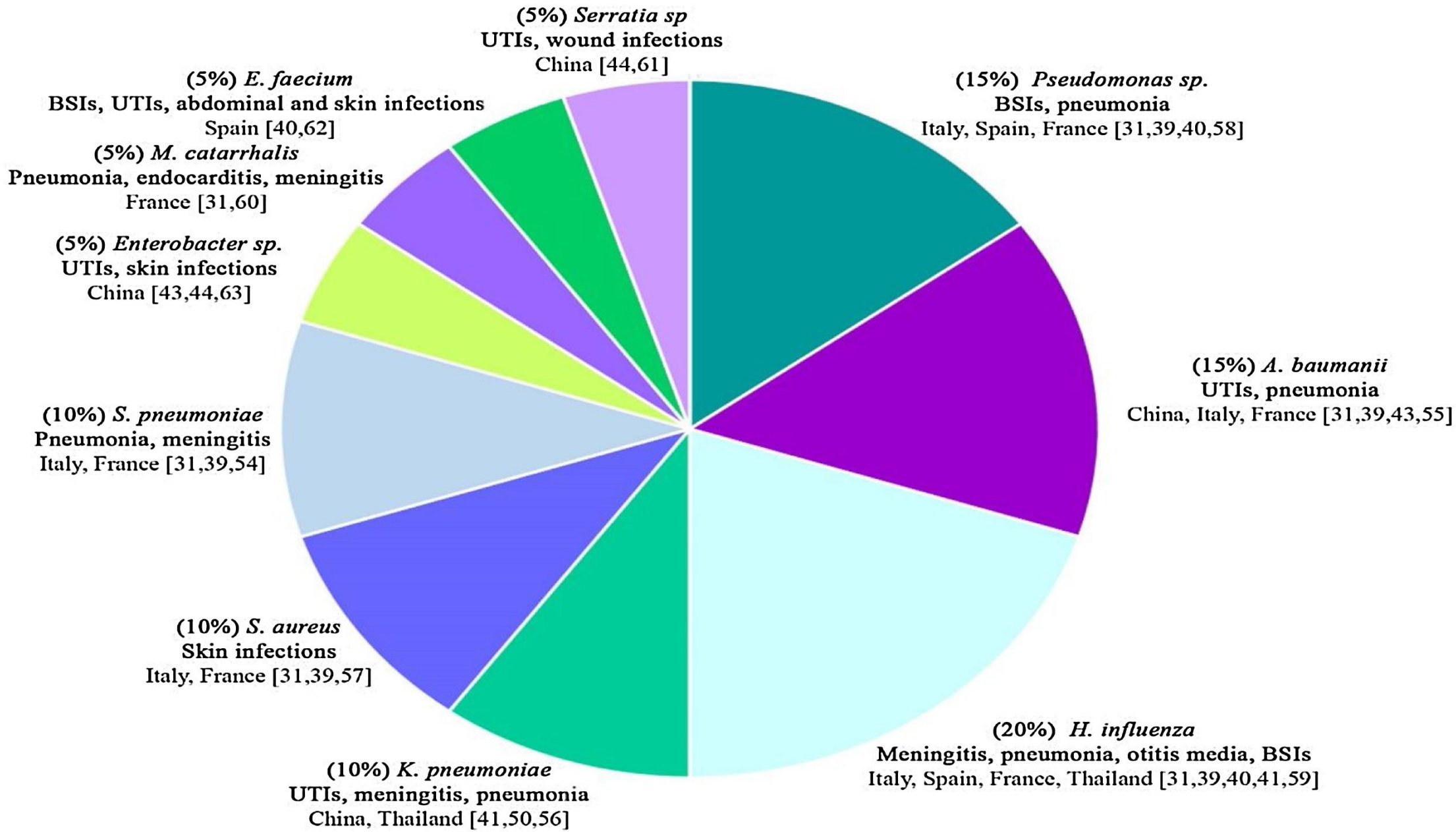

Types of antibiotics and overall percentage of patients they were prescribed to
Carbapenem (25%)
Quinolones (35%)
Linezolid (17%)
Penicillin-like (29%)
Cephalosporins (33%)
Fluoroquinolones (62%)
Macrolides (22%)
25%
35%
19%
16%
25%
16%
51%
45%
38%
46%
36%
32%
25%
58%
64%
18%
21%
32%
18%
0%
10%
20%
30%
40%
50%
60%
70%
Percentage of patients receiving antibiotic treatment per study
Wuhan [38]
Italy [39]
Spain [40]
Thailand [41]
Wuhan [43]
France [31]
Hong Kong [44]

Table 2. The use of antibiotics by clinical characteristics among the suspected COVID-19 patients admitted at 12 selected hospitals in Bangladesh, March–August 2020.

Characteristics	Suspected COVID-19 Patients (*n* = 1188) *n* (%)	Antibiotic Use *n* (%)		
		Overall (*n* = 1090)	COVID-19 Sentinel Surveillance (*n* = 150)	Hospital-Based Influenza Surveillance (*n* = 940)
Signs and symptoms on admission				
Cough (dry/productive)	1097 (92.3)	1027 (94.2)	87 (58.0)	940 (100.0)
Fever	1063 (89.5)	996 (91.4)	56 (37.3)	940 (100.0)
Shortness of breath	845 (71.1)	797 (73.1)	67 (44.7)	730 (77.7)
Runny nose	405 (34.1)	380 (34.9)	9 (6.0)	371 (39.5)
Headache	382 (32.1)	348 (31.9)	29 (19.3)	319 (33.9)
Sore throat	225 (18.9)	210 (19.3)	18 (12.0)	192 (20.4)
Loss of smell or taste (*n* = 205)	69 (33.7)	49 (4.5)	49 (32.7)	0
Comorbidities				
None	708 (59.6)	658 (60.4)	48 (32.0)	610 (64.9)
One or more	480 (40.4)	432 (39.6)	102 (68.0)	330 (35.1)
COVID-19 disease severity (WHO category)				
Mild (symptoms only)	436 (36.7)	357 (32.8)	109 (72.7)	248 (26.4)
Moderate (pneumonia)	389 (32.7)	374 (34.3)	33 (22.0)	341 (36.3)
Severe (severe pneumonia)	326 (27.4)	323 (29.6)	6 (4.0)	317 (33.7)
Critical (ARDS or Sepsis or septic shock or ICU/ventilation)	37 (3.1)	36 (3.3)	2 (1.3)	34 (3.6)
Care seeking before admission (*n* = 205)				
Visited any healthcare provider or facility within two weeks of hospital admission	160 (78.0)	114 (76.0)	114 (76.0)	0
Death occurred in hospital	69 (5.8)	66 (6.1)	13 (8.7)	53 (5.6)


(5%) Serratia sp
UTIs, wound infections
China [44,61]
(15%) Pseudomonas sp.
BSIs, pneumonia
Italy, Spain, France [31,39,40,58]
(5%) E. faecium
BSIs, UTIs, abdominal and skin infections
Spain [40,62]
(5%) M. catarrhalis
Pneumonia, endocarditis, meningitis
France [31,60]
(5%) Enterobacter sp.
UTIs, skin infections
China [43,44,63]
(15%) A. baumanii
UTIs, pneumonia
China, Italy, France [31,39,43,55]
(10%) S. pneumoniae
Pneumonia, meningitis
Italy, France [31,39,54]
(10%) S. aureus
Skin infections
Italy, France [31,39,57]
(20%) H. influenza
Meningitis, pneumonia, otitis media, BSIs
Italy, Spain, France, Thailand [31,39,40,41,59]
(10%) K. pneumoniae
UTIs, meningitis, pneumonia
China, Thailand [41,50,56]

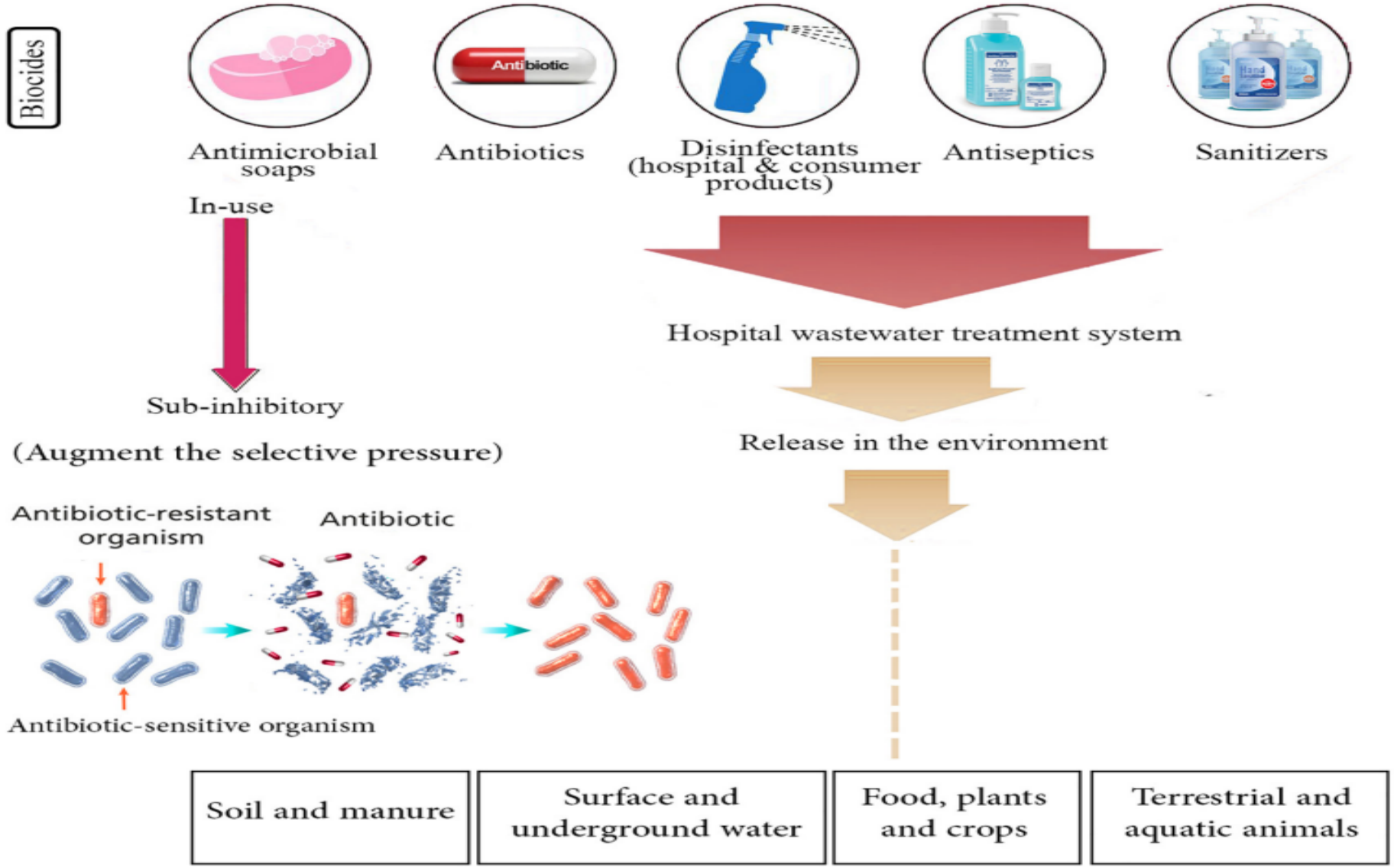
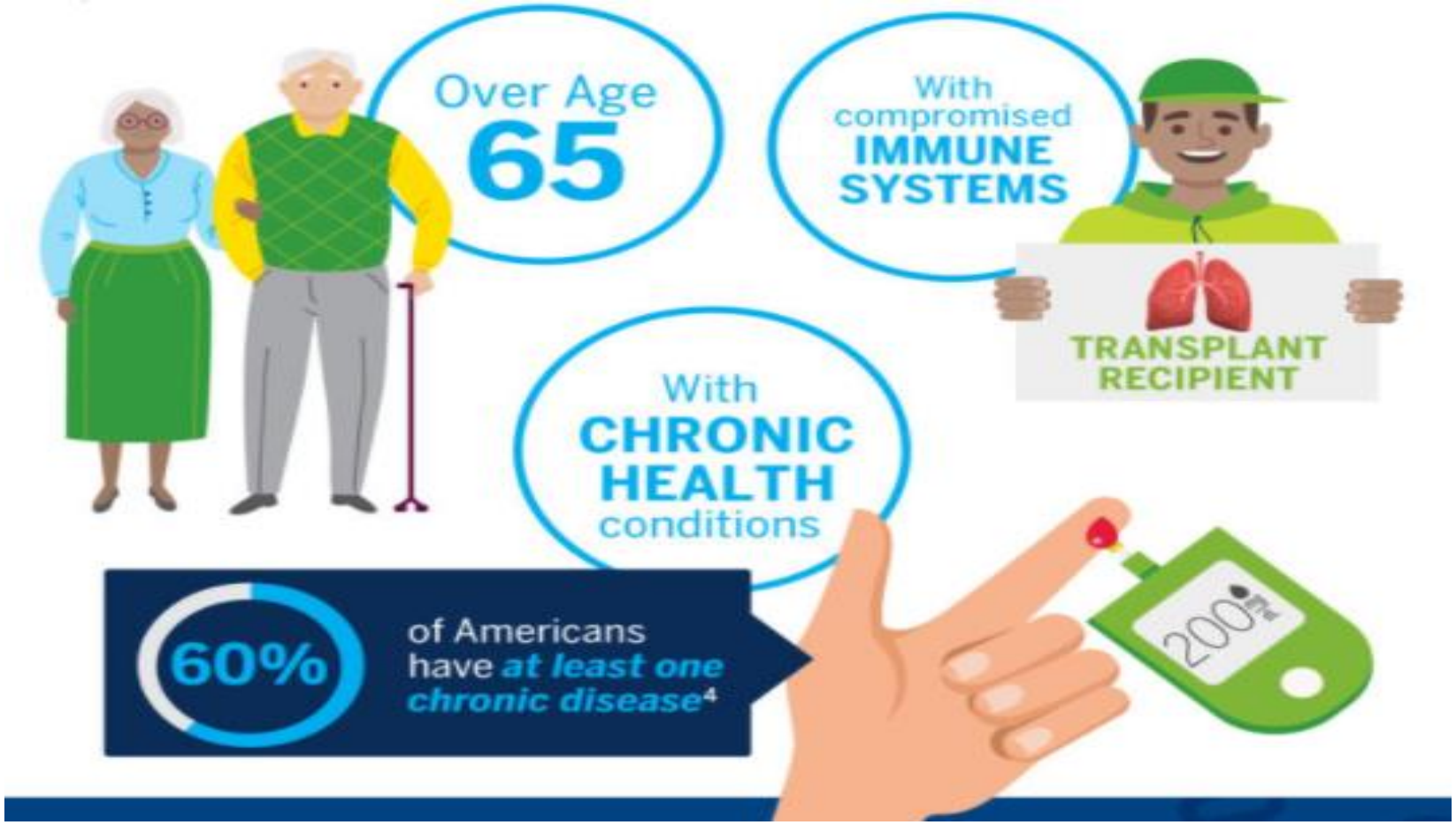


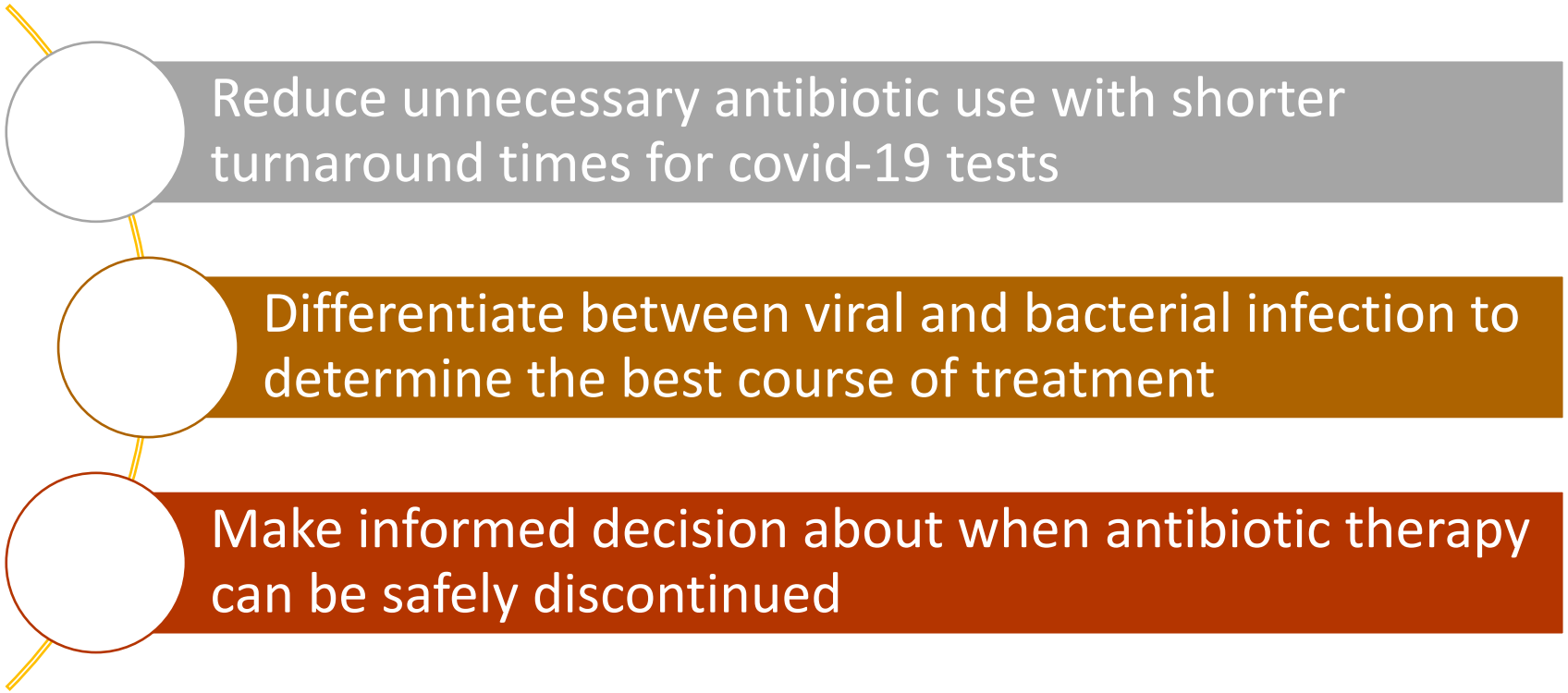
FIGURE 2 | Negative impact of high-concentration release of different kinds of biocides and antibiotics in the environment, which may result in antibiotic resistance enrichment and resistance dissemination. It is presumed that during the COVID-19 pandemic, these antimicrobials are excessively released in the soil and manure, surface and underground water, food, plants and crops, and terrestrial and aquatic animals. On the other hand, enrichment of biocide and antibiotic concentrations at the sub-minimum inhibitory concentration (sub-MIC) in the environment may augment the selective pressure phenomenon, boost the horizontal gene transfer (HGT), and drive the evolution of antimicrobial resistance (AMR) that lead to the selection of antibiotic-resistant bacteria. Therefore, current management practices and strategies to prevent and control AMR should be extremely highlighted in relation to the COVID-19 outbreak.

THOSE MOST VULNERABLE TO COVID-19 ARE ALSO MOST VULNERABLE TO DRUG RESISTANT INFECTIONS



How can we fight covid-19 and AMR?

WITH DIAGNOSTICS



How can we fight covid-19 and AMR?

WITH VACCINES

- Reduce covid-19 infections
- Reduce the potential for unnecessary antibiotic use
- Decrease the likelihood of spreading drug resistance

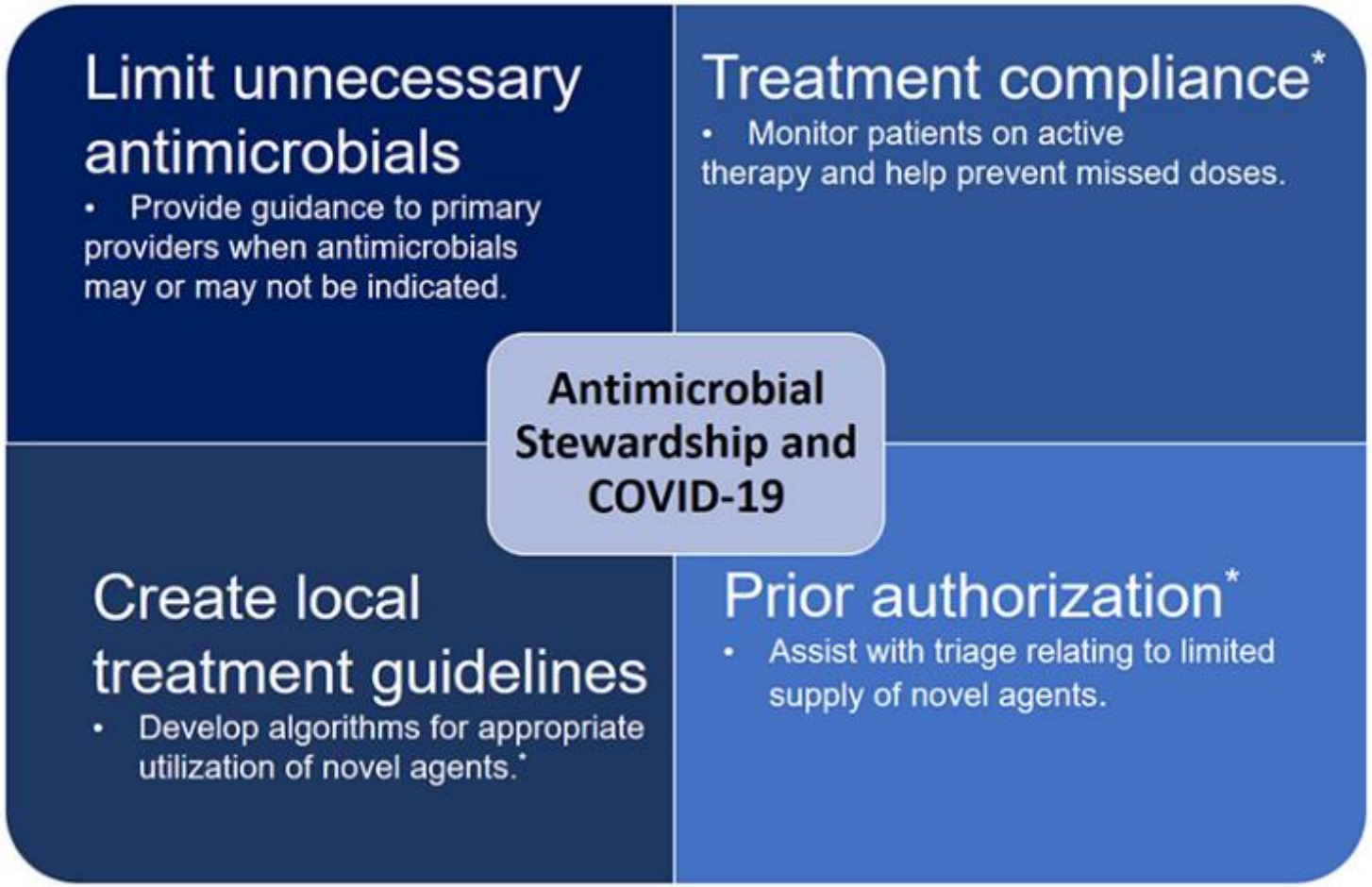
How can general people contribute?

Follow your doctor's instructions for treatment when you are sick

Do not share antibiotics or other prescription medication with other people

Take infection prevention measures: wash your hands, wear a mask in public place and practice safe social distancing

Potential antimicrobial stewardship activities focused on COVID-19



Conclusion

- It is predicted that inappropriate and too much use of antibiotics, biocides, and disinfectants during this pandemic may raise disastrous effects on antibiotic stewardship programs and AMR control all around the world.
- Furthermore, the use of certain antibiotics alone or in combination with antiviral agents or other medications for the treatment of secondary bacterial infections among COVID19 patients may be regarded as a major factor that negatively affects host immune response by disrupting mitochondrial function and activity.

Conclusion

- The rising concerns about excessive use of antimicrobials and biocides and taking too much hygiene also need to be addressed during this pandemic due to their impacts on AMR, public health, and the environment.
- The current management strategies to control AMR and prioritize antibiotic stewardship schemes should be extremely highlighted in relation to the COVID-19 outbreak.

Conclusion

- The One Health approach brings together multiple sectors and stakeholders engaged in human, terrestrial and aquatic animal and plant health, food and feed production and the environment to communicate and work together in the design and implementation of programs, policies, legislation and research to attain better public health outcomes.

Thank You