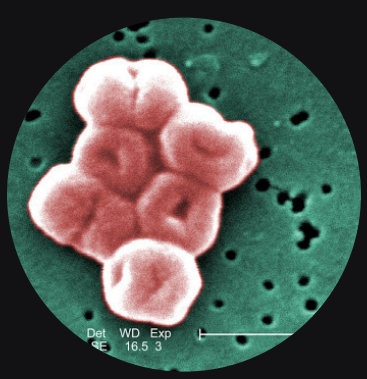
12 PRIORITY BACTERIA

FOR RESEARCH ON NEW ANTIBIOTICS

WHO priority pathogens list for R&D of new antibiotics

1 *Acinetobacter baumannii*



Priority: Critical.
Antibiotic Resistance: Carbapenem
Type of infection: blood, urinary tract, and lungs (pneumonia), or in wounds in other parts of the body. It can also be asymptomatic, especially in respiratory secretions (sputum) or open wounds. Its infections typically occur in people in healthcare settings. **Vulnerability** includes patients in hospitals, especially on breathing machines (ventilators), and/or are in intensive care units. Prolonged hospital stays are also a risk factor for the development of these infections

Photo Credit: CDC/ Matthew J. Arduino, Courtesy: Public Health Image Library

2 *Pseudomonas aeruginosa*

Priority: Critical.
Antibiotic Resistance: Carbapenem
Type of infection: blood, lungs (pneumonia), or other parts of the body after surgery. Vulnerability includes patients in hospitals, especially those on breathing machines (ventilators), devices such as catheters, and wounds from surgery or burns

Photo Credit: Janice Haney Carr, CDC

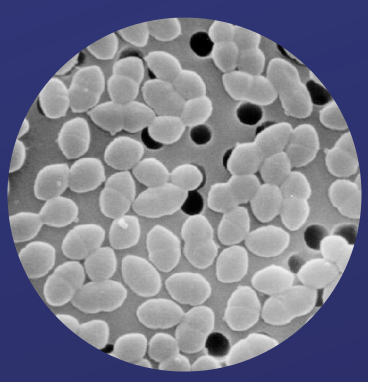
3 *Enterobacteriaceae*

Klebsiella pneumoniae spp., *Escherichia coli* spp., *Enterobacter* spp., *Serratia* spp., *Proteus* spp., *Providencia* spp, *Morganella* spp.

Priority: Critical
Antibiotic Resistance: carbapenem, 3rd generation cephalosporin.
Type of infection: Most commonly occurs in people attending healthcare centres, including those in hospitals and nursing homes. It can also cause infections in healthy people who have not been recently been in healthcare settings, meaning urinary tract infections.

Photo credit: NIH NIAID, www.flickr.com/photos/niaid/16578744517/

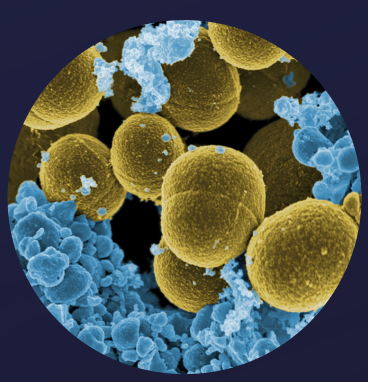
4 *Enterococcus faecium*



Priority: High.
Antibiotic Resistance: vancomycin
Type of infection: Infections occur to people who have been previously treated with antibiotics, including vancomycin, for long periods of time, people who are hospitalized, have undergone surgical procedures, or have medical devices inserted in their bodies (such as catheters), people with weakened immune systems, such as patients in intensive care units, or in cancer or transplant wards

Photo Credit: Janice Haney Carr CDC

5 *Staphylococcus aureus*



Priority: High
Antibiotic Resistance: methicillin-resistant, vancomycin intermediate and resistant.
Type of infection: **Sepsis** when spread to the bloodstream. **Pneumonia**, when underlying lung disease. **Endocarditis** (infection of the heart valves), which can lead to heart failure or stroke. **Osteomyelitis** (bone infection), which can be caused by bacteria traveling in the bloodstream or by direct contact (puncture wound of foot or intravenous, drug abuse). Anyone can develop an infection caused by this pathogen, although higher **vulnerability** includes people with chronic conditions (diabetes, cancer, vascular disease, eczema, lung disease) or who inject drugs. Also includes patients with weakened immune systems or have undergone procedures, in intensive care units, or have medical devices inserted in their bodies.

Photo credit: NIH NIAID www.flickr.com/photos/niaid/5148710483

6 *Helicobacter pylori*

Priority: High.
Antibiotic Resistance: clarithromycin
Type of infection: Its infection is the most common cause of gastritis and peptic ulcer disease worldwide. This type of infection is very common and increases with age. *H. pylori* infects about half of the world's population and the infection is mainly acquired in early childhood by direct contact transmission

Photo Credit: Janice Carr CDC

Campylobacter spp.

Priority: High
Antibiotic Resistance: fluoroquinolone
Type of infection: diarrhea, abdominal pain, and fever. It inhabits the digestive tract of many farm animals (cattle, sheep, pigs, and fowl). The feces of these animals may contaminate water in lakes and streams. Meat (usually poultry) and unpasteurized milk may also be contaminated. People may be infected by: Eating or drinking contaminated (untreated) water, unpasteurized milk, undercooked meat (usually poultry), or food prepared on kitchen surfaces touched by contaminated meat. Also by contact with an infected person (particularly oral-anal sexual contact), or in contact with an infected animal

Photo credit: CDC phil.cdc.gov/Details.aspx?pid=16870

Salmonella spp.

Priority: High
Antibiotic Resistance: fluoroquinolone
Serotypes: (1) Serotypes with humans as the only reservoir: ***S. enterica*** ser. Typhi and ser. Paratyphi types A, B and C, pathogenic only in humans and commonly cause enteric (typhoid) fever.
(2) Those adapted to nonhuman hosts or causing disease almost exclusively in animals: ***S. enterica*** ser. Dublin (cattle), ***S. enterica*** subsp. ***arizonae*** (reptiles), and ***S. enterica*** ser. Choleraesuis (swine)—also cause disease in humans. Those with a broad host range: including > 2000 serotypes (eg, ***S. enterica*** ser. Enteritidis and ser. Typhimurium) that cause salmonellagastroenteritis.

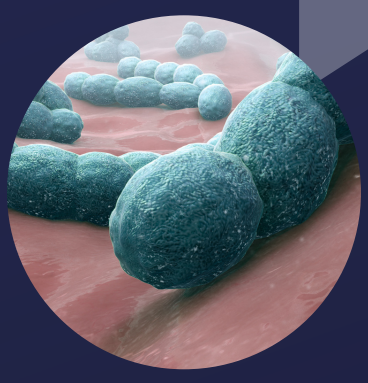
Photo credit: Centers for Disease Control and Prevention

Neisseria gonorrhoeae

Priority: High
Antibiotic Resistance: fluoroquinolone, 3rd generation cephalosporin
Type of infection: only in humans and is almost always transmitted by sexual contact. Urethral and cervical infections are most common, but infection in the pharynx or rectum can occur after oral or anal intercourse, and conjunctivitis may follow contamination of the eye. After an episode of vaginal intercourse, likelihood of transmission from women to men is about 20%, and even higher from men to women. Neonates can acquire conjunctival infection during passage through the birth canal, and children may acquire it resulting of sexual abuse.

Photo credit: Center for Disease control.

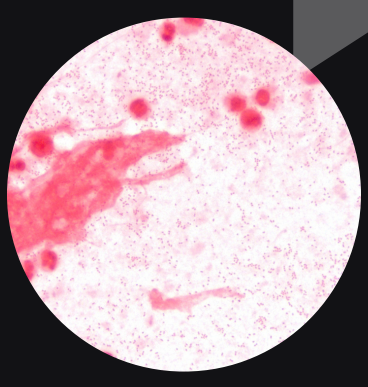
Streptococcus pneumoniae



Priority: Medium
Antibiotic Resistance: penicillin-non-susceptible
Type of infection: can cause necrotizing pneumonia. ***S. pneumoniae*** remains the most common cause of death in patients with community-acquired pneumonia.

Photo credit: www.scientificanimations.com, www.scientificanimations.com/wiki-images/

Haemophilus influenzae



Priority: Medium
Antibiotic Resistance: ampicillin
Type of infection: Present in the normal microbiota of the upper respiratory tract and rarely cause illness. Pathogenic strains enter the upper respiratory tract through droplet inhalation or direct contact. Responsible for many childhood mucosal infections, (meningitis, bacteremia, septic arthritis, pneumonia, tracheobronchitis, otitis media, conjunctivitis, sinusitis, and acute epiglottitis). Together with endocarditis and urinary tract infections, may occur in adults. Occasionally, nonencapsulated strains cause invasive infections in children, but they may cause up to half of serious infections in adults. The ***H. influenzae*** biogroup ***aegyptius*** may cause mucopurulent conjunctivitis and bacteremic Brazilian purpuric fever.
Photo credit: Microman12345 Own work

Shigella spp.

Priority: Medium
Antibiotic Resistance: fluoroquinolone
Type of infection: Shigellosis, typical cause of inflammatory dysentery, responsible for 5 to 10% of diarrhea in many regions. The source of the infection are feces of infected people or convalescent carriers; humans are its only reservoir. Direct spread occurs via the fecal-oral route. Indirect dissemination is carried out using contaminated food. Flies act as vectors. Its symptoms are fever, nausea, vomiting and diarrhea, which is usually bloody.

Photo credit: Janice Haney Carr, USCDCP

Source: WHO - Global priority list of antibiotic-resistant bacteria to guide research, discovery, and development of new antibiotics. Mycobacteria (incl. Mycobacterium tuberculosis, cause of human tuberculosis), is not included as it is already a global priority for which innovative new treatments are urgently needed.

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