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Diagnostics in the antimicrobial stewardship jigsaw

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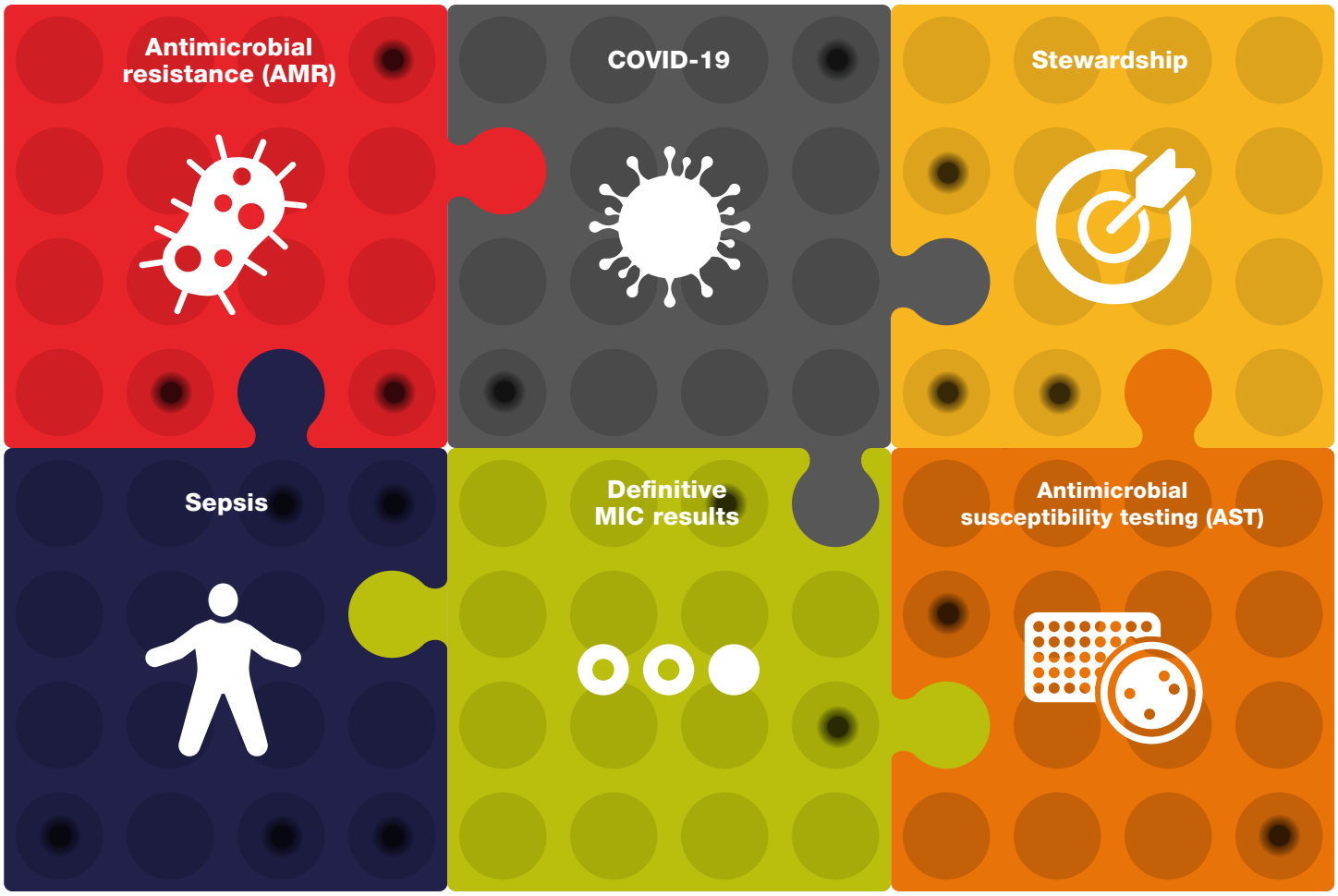
Antimicrobial stewardship is a major weapon in the war on antimicrobial resistance (AMR) – and effective diagnostics are a crucial part of the jigsaw puzzle. Because if we do not act, including using new and existing antibiotics as responsibly as possible, deaths from this “silent pandemic” could rise dramatically in the years ahead.[1]



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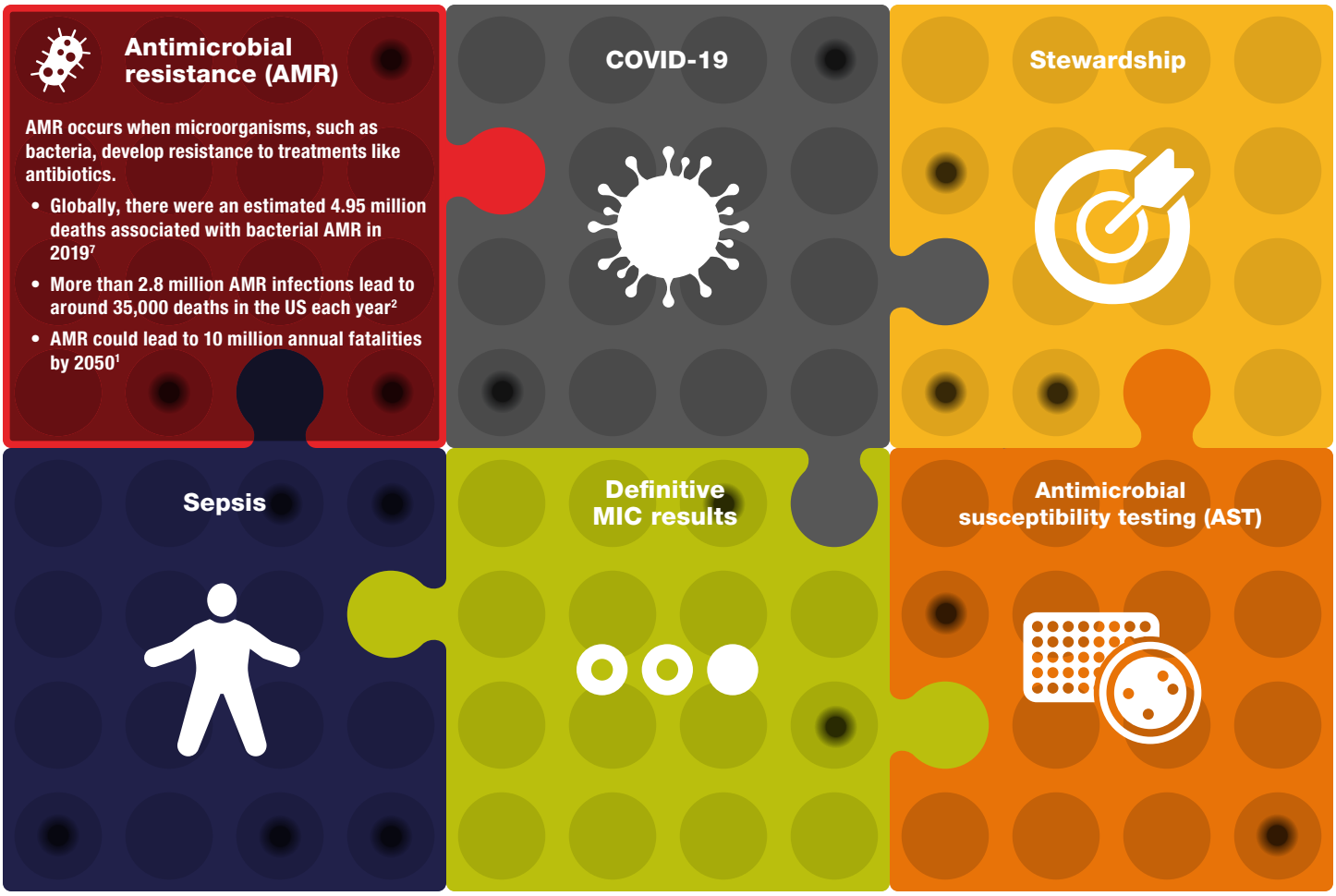

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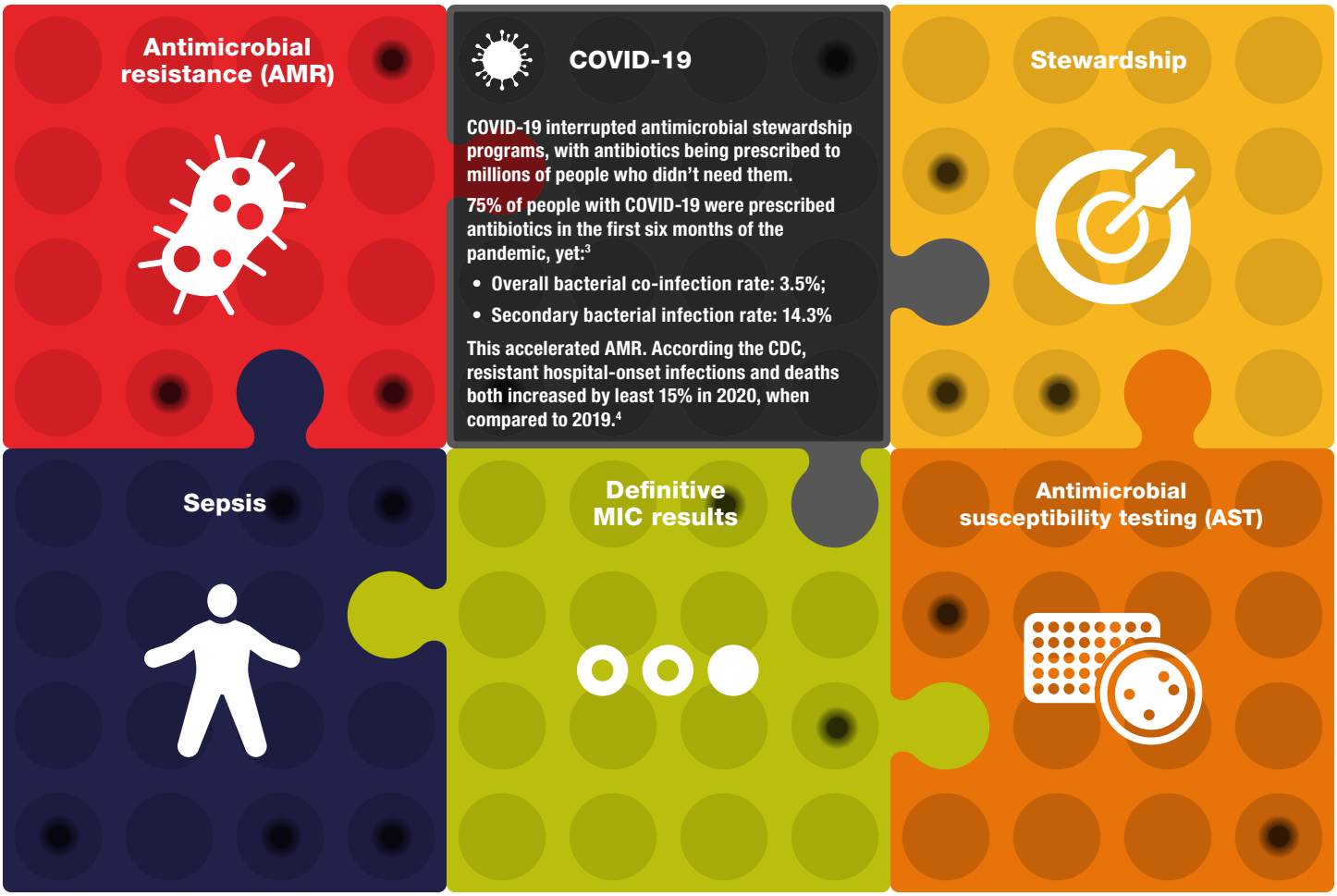

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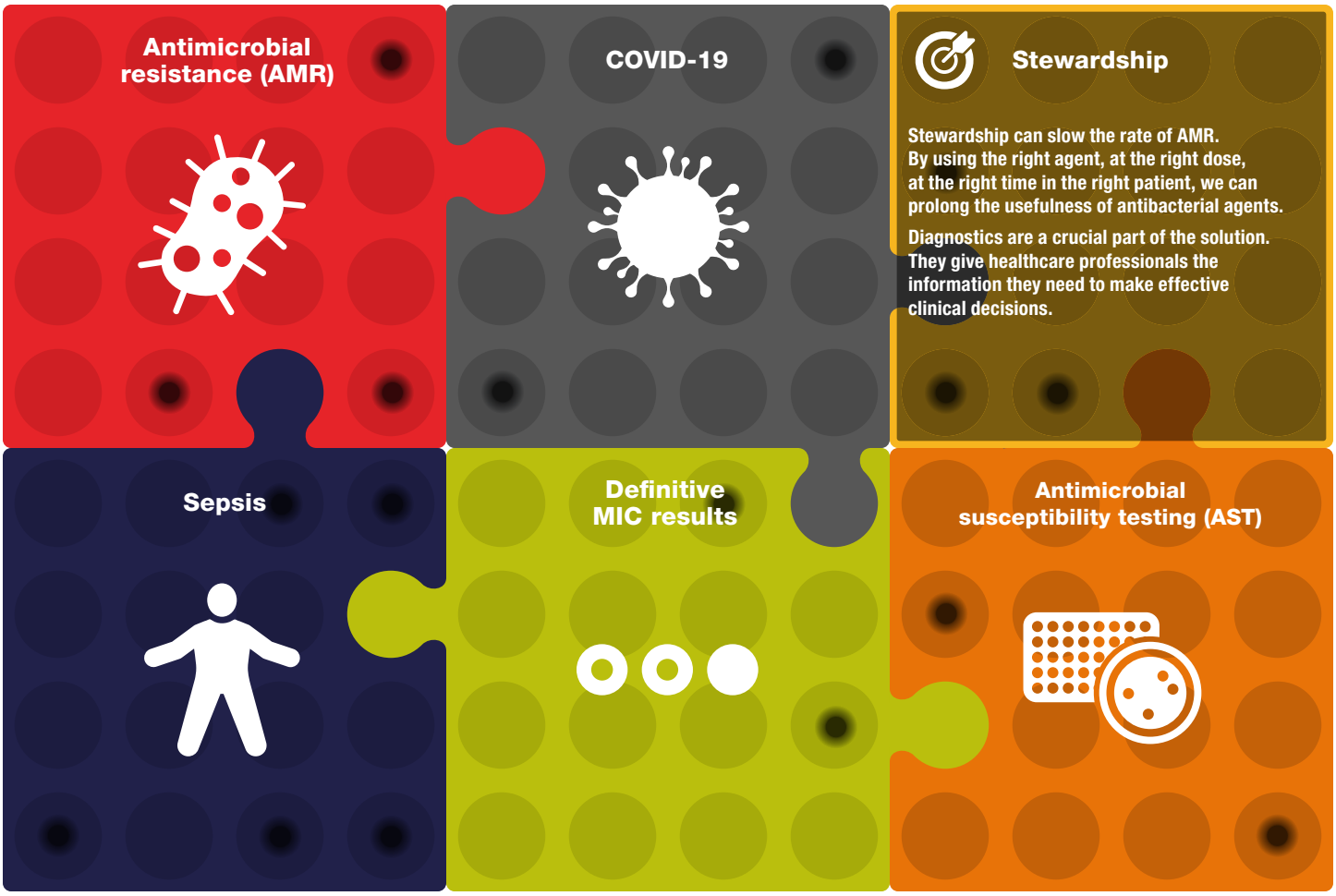

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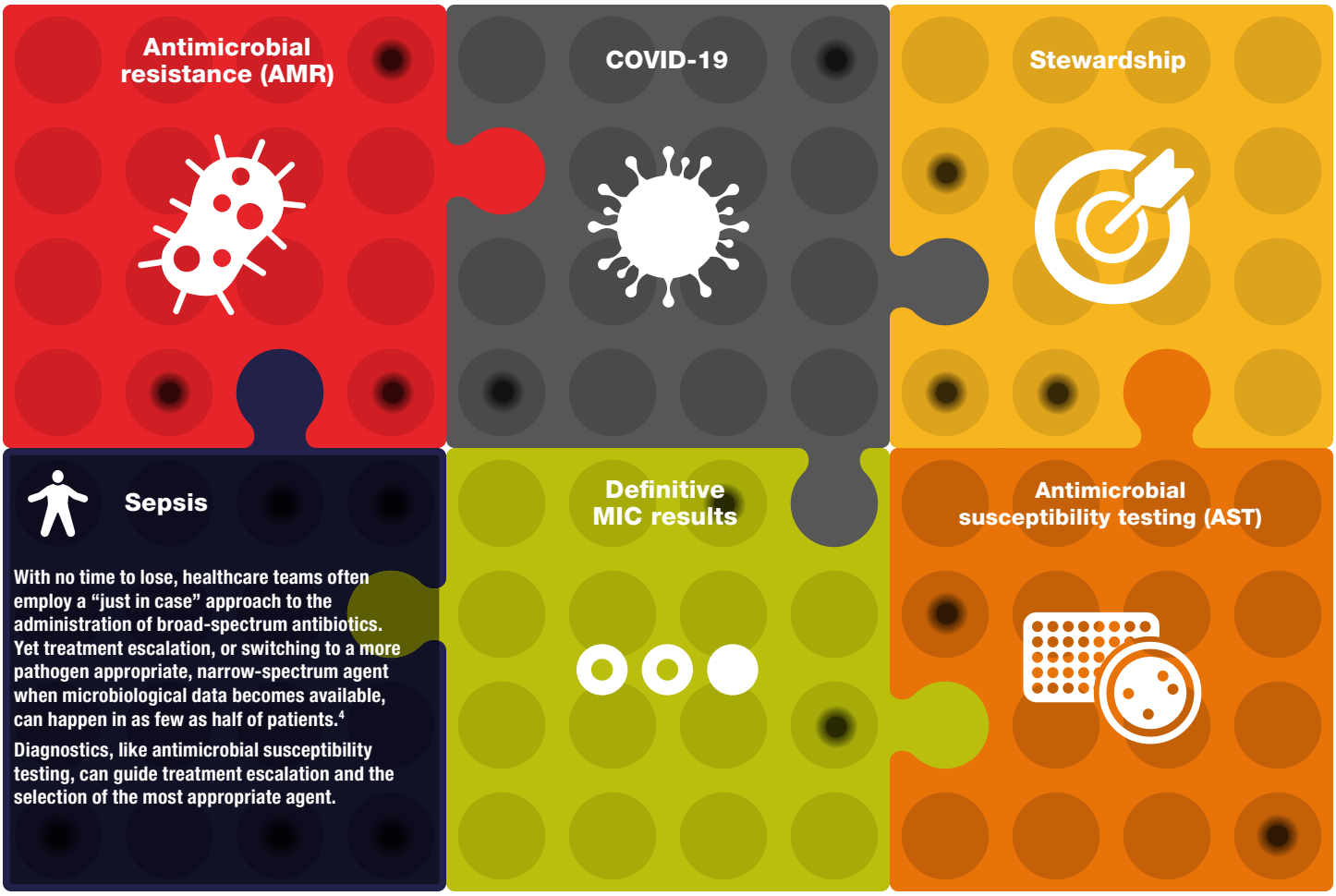

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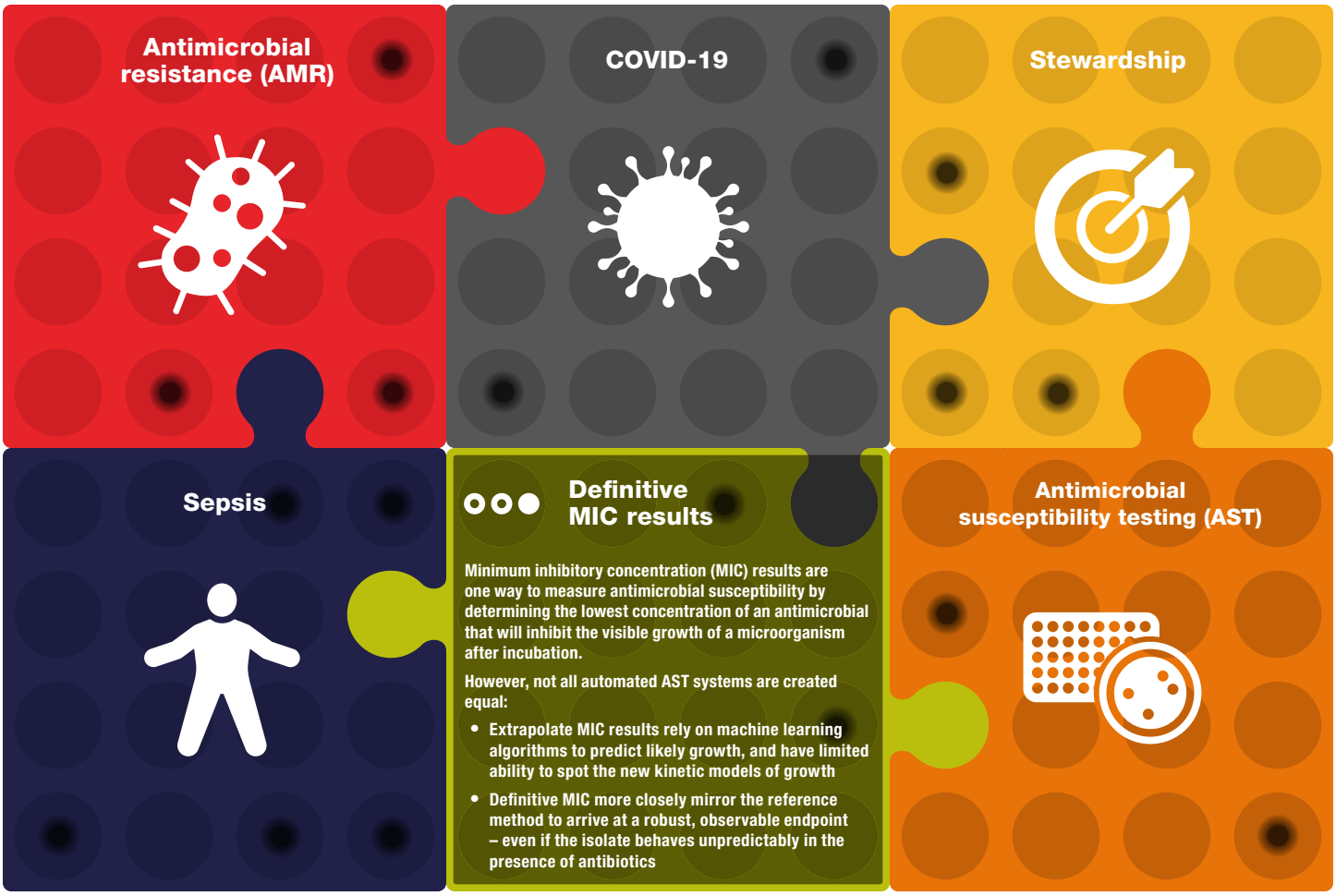

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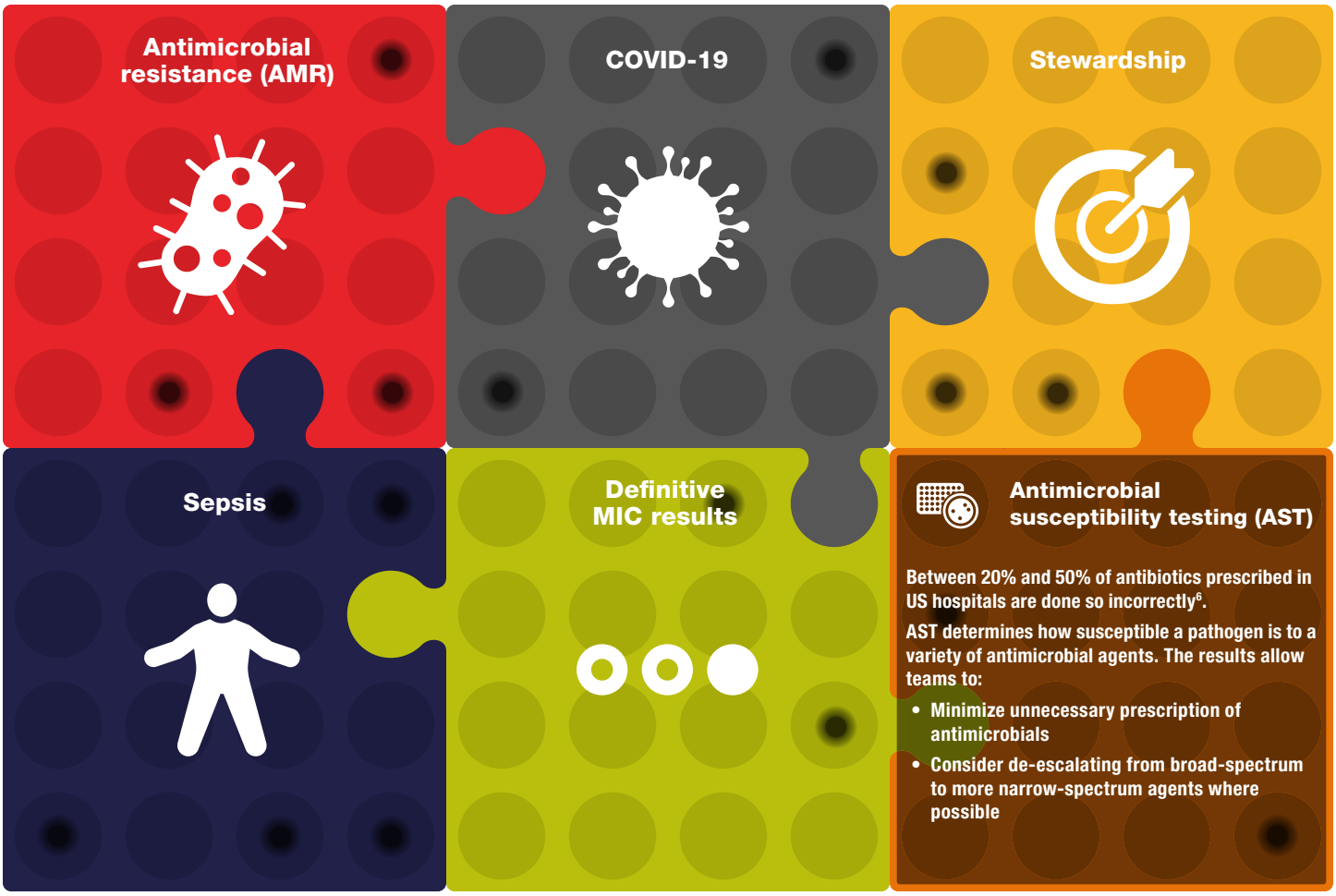

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Antimicrobial resistance (AMR)

AMR occurs when microorganisms, such as bacteria, develop resistance to treatments like antibiotics.

- Globally, there were an estimated 4.95 million deaths associated with bacterial AMR in 2019[7]
- More than 2.8 million AMR infections lead to around 35,000 deaths in the US each year[2]
- AMR could lead to 10 million annual fatalities by 2050[1]

COVID-19

COVID-19 interrupted antimicrobial stewardship programs, with antibiotics being prescribed to millions of people who didn't need them.

75% of people with COVID-19 were prescribed antibiotics in the first six months of the pandemic, yet:[3]

- Overall bacterial co-infection rate: 3.5%;
- Secondary bacterial infection rate: 14.3%

This accelerated AMR. According the CDC, resistant hospital-onset infections and deaths both increased by least 15% in 2020, when compared to 2019.[4]

Stewardship

Stewardship can slow the rate of AMR. By using the right agent, at the right dose, at the right time in the right patient, we can prolong the usefulness of antibacterial agents.

Diagnostics are a crucial part of the solution. They give healthcare professionals the information they need to make effective clinical decisions.

Sepsis

With no time to lose, healthcare teams often employ a "just in case" approach to the administration of broad-spectrum antibiotics. Yet treatment escalation, or switching to a more pathogen appropriate, narrow-spectrum agent when microbiological data becomes available, can happen in as few as half of patients.[4]

Diagnostics, like antimicrobial susceptibility testing, can guide treatment escalation and the selection of the most appropriate agent.

Definitive MIC results

Minimum inhibitory concentration (MIC) results are one way to measure antimicrobial susceptibility by determining the lowest concentration of an antimicrobial that will inhibit the visible growth of a microorganism after incubation.

However, not all automated AST systems are created equal:

- Extrapolate MIC results rely on machine learning algorithms to predict likely growth, and have limited ability to spot the new kinetic models of growth
- Definitive MIC more closely mirror the reference method to arrive at a robust, observable endpoint – even if the isolate behaves unpredictably in the presence of antibiotics

Antimicrobial susceptibility testing (AST)

Between 20% and 50% of antibiotics prescribed in US hospitals are done so incorrectly[6].

AST determines how susceptible a pathogen is to a variety of antimicrobial agents. The results allow teams to:

- Minimize unnecessary prescription of antimicrobials
- Consider de-escalating from broad-spectrum to more narrow-spectrum agents where possible

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