



Public Health Perspective: CRE and ESBL-E

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Disclaimer

- **The findings and conclusions in this presentation are those of the author and do not necessarily represent the official position of the Centers for Disease Control and Prevention.**

Estimated CRE and ESBL-E cases among U.S. hospitalized patients

	Threat Level	2017-2019 Change	2019-2020 Change	2020 Estimate
CRE	Urgent	Decreased 	Overall: Stable Hospital-onset: 35% 	12,700 cases 1,100 deaths
ESBL-E	Serious	Increased 	Overall: 10%  Hospital-onset: 32% 	197,500 cases 9,300 deaths

CRE: carbapenem-resistant Enterobacterales; ESBL-E: extended spectrum β -lactamase producing Enterobacterales

Distinct features between CRE and ESBL-E

CRE	ESBL-E
<ul style="list-style-type: none">• Emerging	<ul style="list-style-type: none">• Endemic
<ul style="list-style-type: none">• Primarily healthcare-associated	<ul style="list-style-type: none">• Healthcare and community-associated
<ul style="list-style-type: none">• Resistant to commonly used antibiotics	<ul style="list-style-type: none">• Can treat with carbapenems

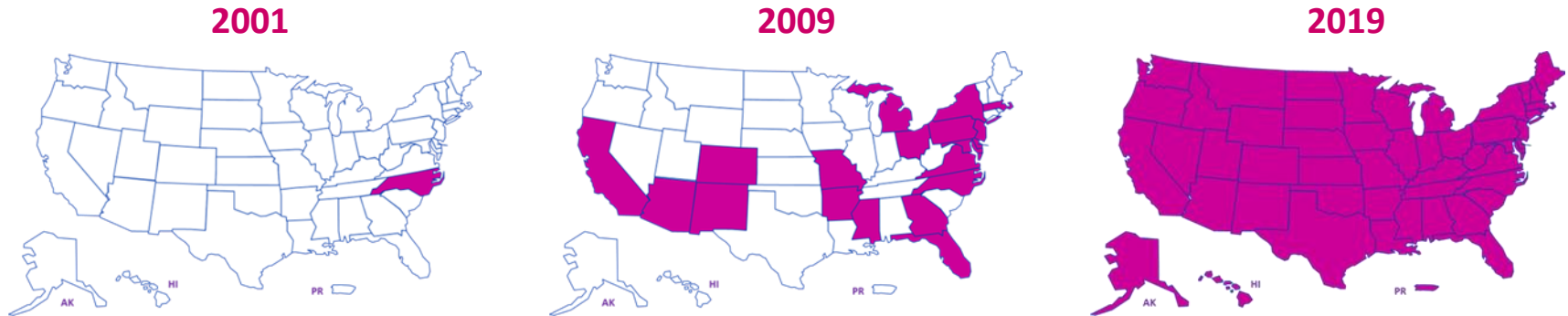
CRE: carbapenem-resistant Enterobacterales; ESBL-E: extended spectrum β -lactamase producing Enterobacterales

Plasmid-mediated resistance contributes to rapid spread and multidrug resistance

- **Multiple mechanisms of CRE resistance:**
 - Chromosomal mutations, upregulation of intrinsic mechanisms
 - **Carbapenemase production** (acquisition of mobile plasmids containing genes encoding carbapenemase): KPC, NDM, IMP, VIM, OXA-48-like
- **ESBLs often encoded by genes on plasmids**
 - CTX-M most common worldwide
- Plasmids can carry genes for **resistance to other antimicrobial agents**

KPC-producing CRE spread across US in less than two decades

- 35% of CRE in US are carbapenemase-producers (CP)
- 77% of CP-CRE in US are KPC



<https://arpsp.cdc.gov/profile/antibiotic-resistance/carbapenem-resistant-enterobacterales>

Patel JB et al. Clin Micro Newsletter 2009;31:8.

CDC surveillance for CRE and ESBL-E

Domestic

Emerging Infections Program

- Multisite Gram-negative Surveillance Initiative (MuGSI)

National Healthcare Safety Network

- Device-associated and surgical site infection
- Antimicrobial Resistance (AR)

AR Laboratory Network

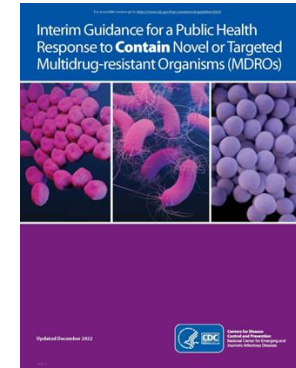
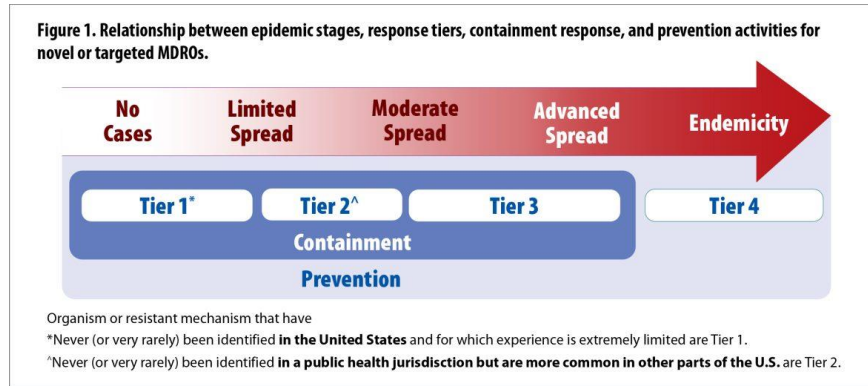
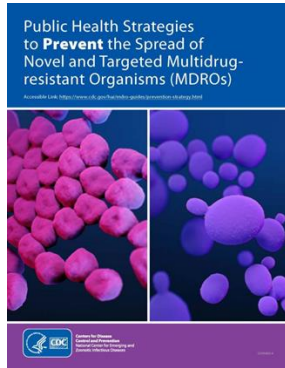
- Public health laboratories in all 50 US states, several large cities, and territories (CRE only)

International

Global AR Lab & Response Network Collaborations

- Antimicrobial Resistance in Communities and Hospitals (ARCH)

Combining prevention and response strategies



<https://www.cdc.gov/hai/mdro-guides/prevention-strategy.html>

<https://www.cdc.gov/hai/mdro-guides/containment-strategy.html>

Prevention Strategies

- Intended to reduce MDRO transmission **at all stages of spread**
- Encompasses **ongoing** interventions

Containment Strategy

- Intended for **pre-endemic** stage
- **Time-limited**, implemented following identification of novel or targeted MDRO
- Layered on existing prevention interventions

Resources

- <https://www.cdc.gov/hai/organisms/cre/index.html>
- <https://www.cdc.gov/hai/organisms/ESBL.html>
- <https://www.cdc.gov/hai/eip/mugsi.html>
- <https://www.cdc.gov/hai/mdro-guides/index.html>

Thank You

For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348 www.cdc.gov

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