

# National Estimates of the Proportion of Bacterial Pathogens Expressing Resistant Phenotypes in US Hospitals, 2012-2017

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## Background

In 2019, CDC updated national estimates of antibiotic resistance, published in Antibiotic Resistance Threats in the United States, 2019.

This study provides both national estimates and trends in proportion of bacterial pathogens expressing resistant phenotypes (%R), specifically for: MRSA, VRE, CRE, ESBL, CRAsp, and MDR Pseudomonas\*

## Methods

- **Data Source:** Hospitals submitting data to the Premier Healthcare Database, Cerner Health Facts and BD Insights Research Database from 2012- 2017.
- Included incident clinical cultures yielding the bacterial species of interest among hospitalized patients
- Community-onset (CO) cultures were obtained ≤ day 3 of hospitalization; hospital-onset (HO) were obtained ≥ day 4.
- Determined estimates of hospital-specific percent resistant (%R) for each species
- Used a raking procedure to generate weighted adjustments to match the distribution for all U.S. acute care hospitals based on U.S. census division, bed size, teaching status, and urban/rural designation
- Applied a weighted means survey procedure to calculate national estimates for each year
- Used a weighted multivariable logistic regression
- Adjusted for hospital bed size, U.S. census division, urban/rural designation, teaching status, month of discharge, age distributions, and data source

### CONTACT INFO

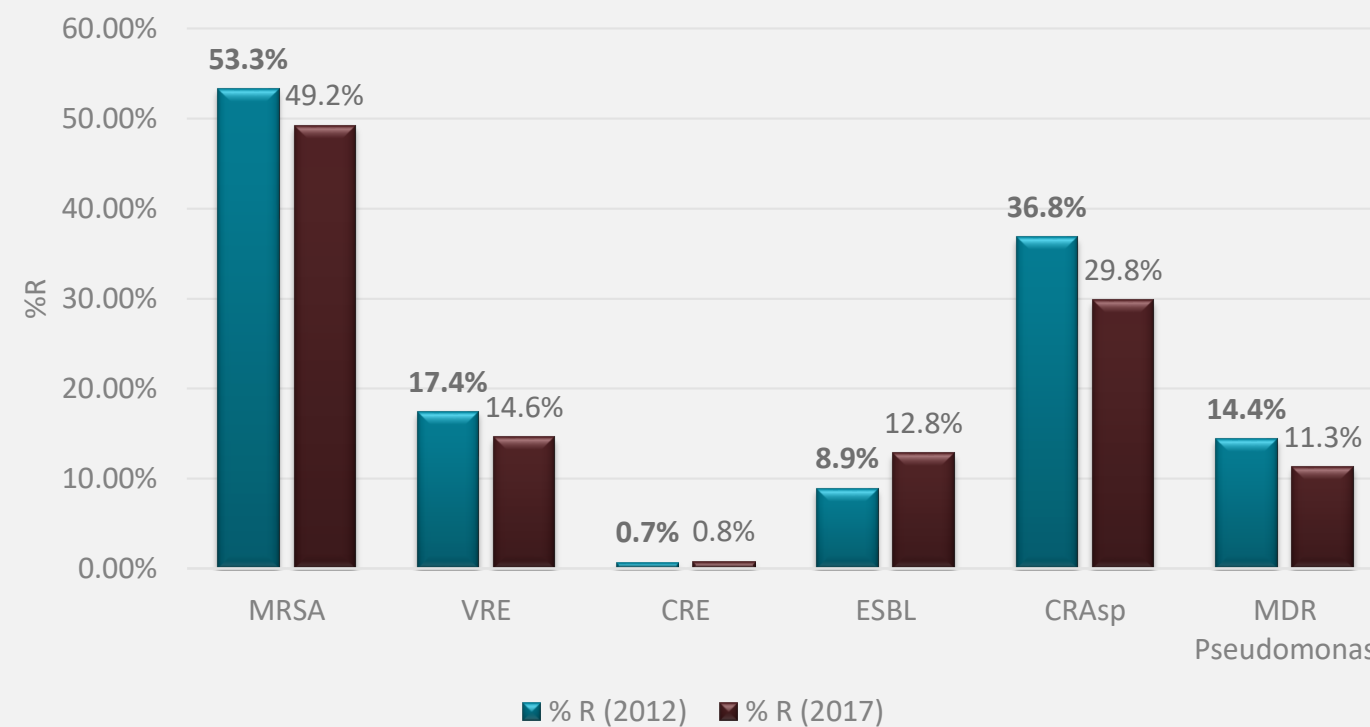
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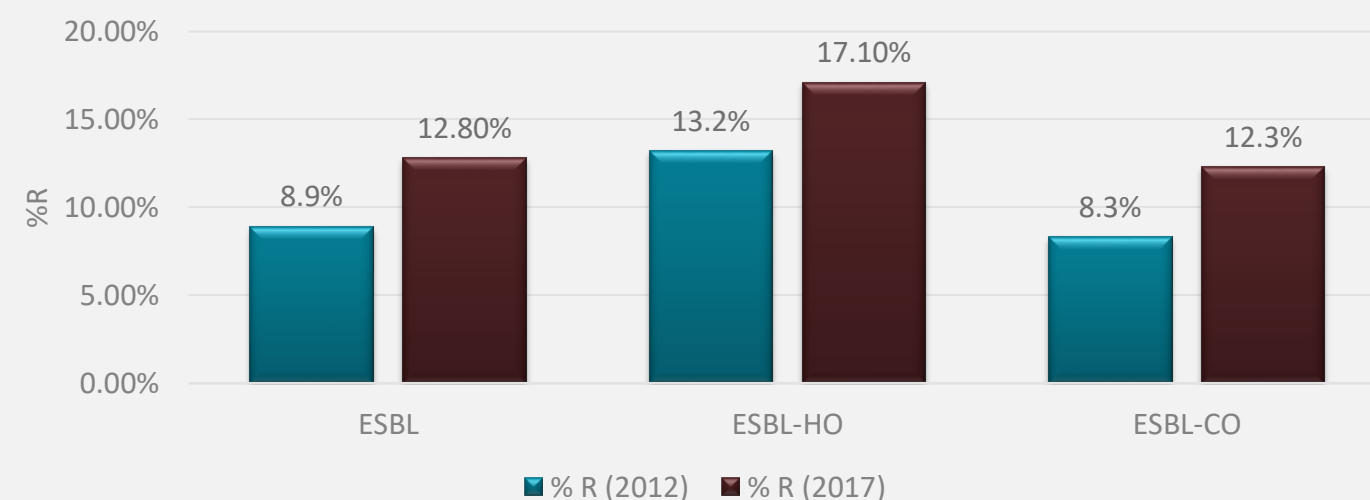
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**While the proportion of bacterial pathogens expressing a resistant phenotype is decreasing for most pathogens, the % of Enterobacteriaceae expressing an ESBL phenotype has increased 44%, especially among CO infections**

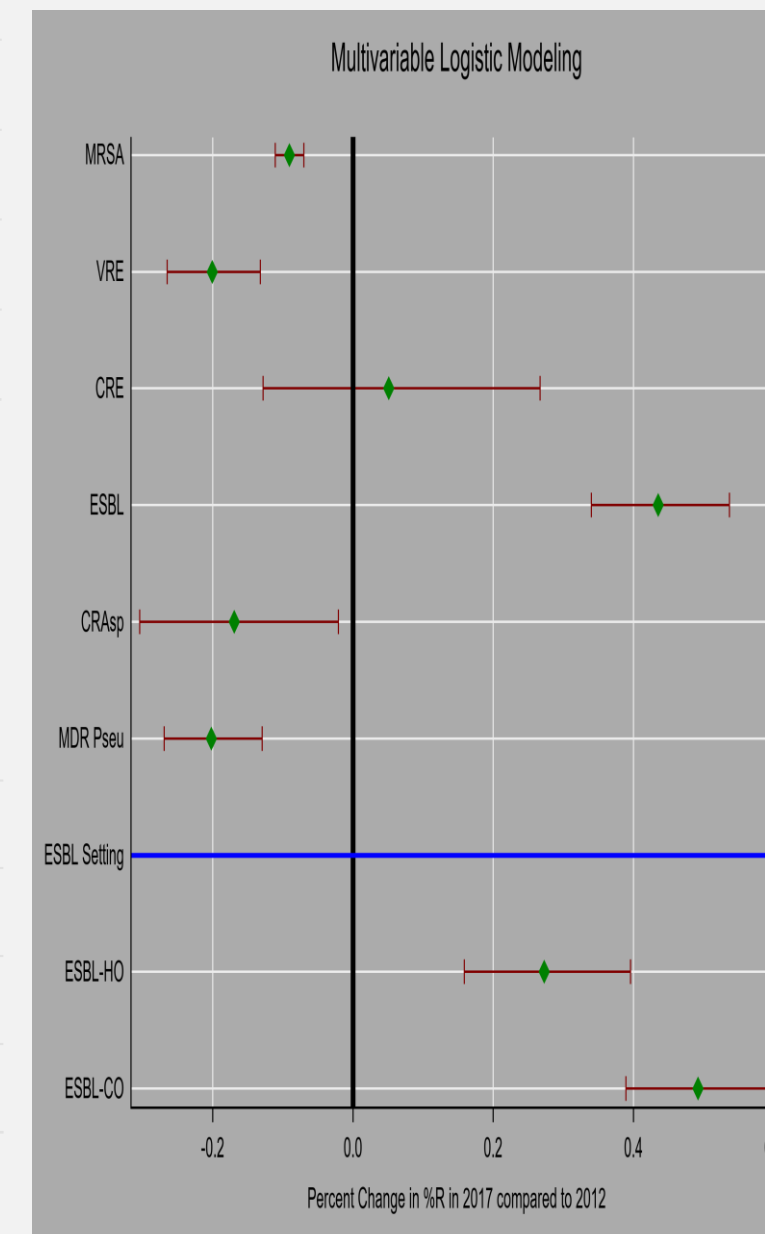
National Estimates of Percent Resistance (%R)



National Estimates of ESBL Percent Resistance (%R) by Onset



Changes in Percent Resistance from 2012-2017 by Organism Type



## Results

- From 2012-2017, overall 890 hospitals contributed data representing over 20% of U.S. hospital hospitalizations
- Between 2012-2017, significant annual decreases in %R were observed for MRSA, VRE, CRAsp, and MDR Pseudomonas
- CRE %R did not change
- Overall ESBL %R increased by 44% (CO=49% increase, HO=27% increase)

## Conclusions

- Reductions in %R indicate that prevention efforts are having a disproportionate effect on resistant strains and is consistent with implementation that has been largely focused in health care settings
- However, %R remains unacceptably high for all pathogens
- % of Enterobacteriaceae expressing an ESBL phenotype has increased, most prominently among CO infections
- Continued focus on currently recommended intervention strategies as well as new ones for community onset infections is needed

### \* Definitions:

- MRSA - % methicillin resistance among *Staphylococcus aureus*
- VRE - % vancomycin resistance among *Enterococcus spp.*
- CRE - % carbapenem resistance among *Enterobacteriaceae (E. coli, Klebsiella spp., and Enterobacter spp.)*
- ESBL - % extended-spectrum cephalosporin resistance suggestive of extended-spectrum  $\beta$ -lactamase (ESBL) production in *Enterobacteriaceae (E. coli, Klebsiella spp.)*
- CRAsp - % carbapenem resistance among *Acinetobacter spp.*
- MDR Pseudomonas - % multidrug resistance among *Pseudomonas aeruginosa*

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