

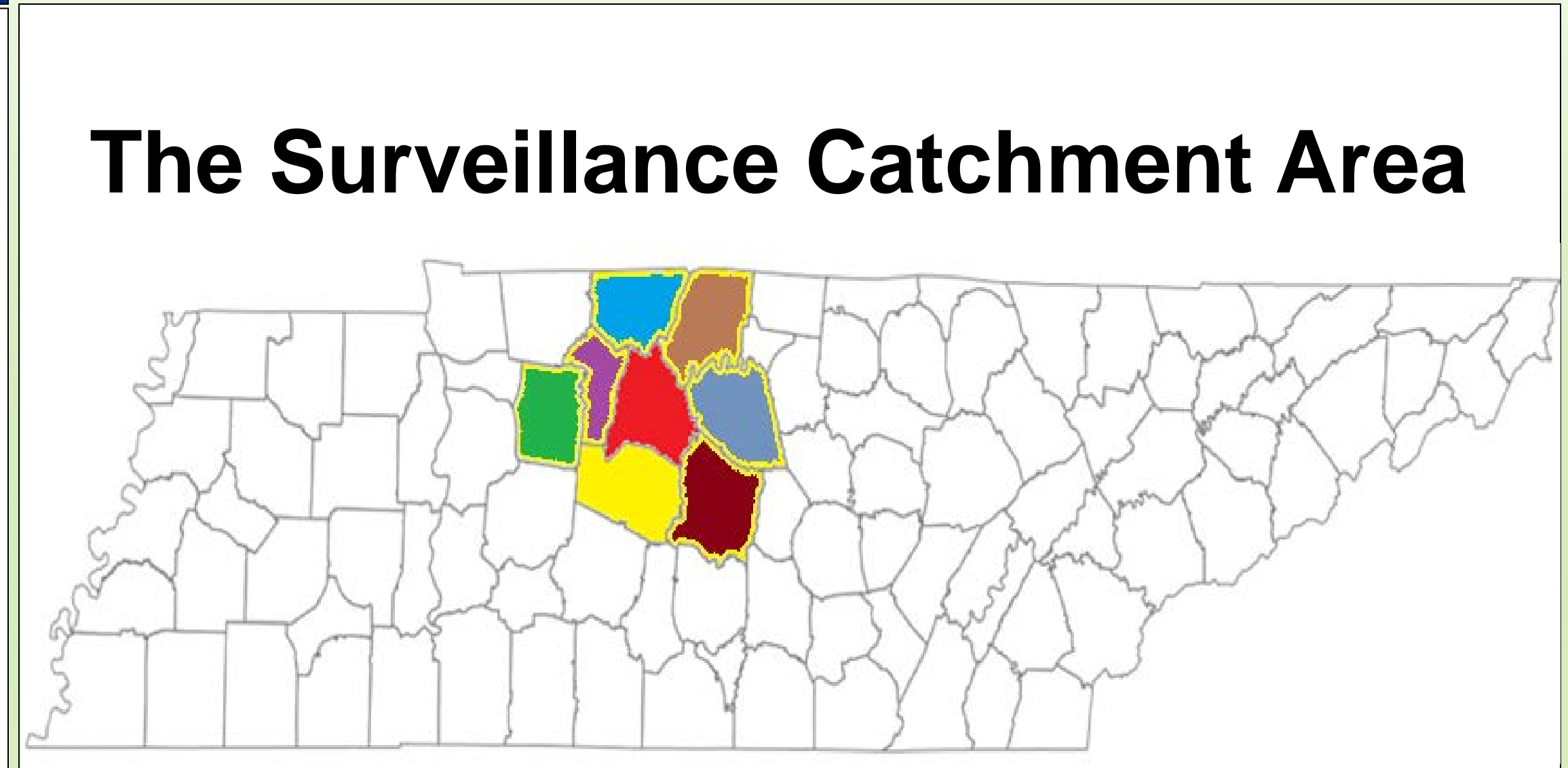
Background

- Carbapenem-resistant Enterobacteriales (CRE) and carbapenem-resistant *Acinetobacter* (CRA) organisms are important antimicrobial resistant threats.
- Multi-drug resistant Gram-negative bacilli have increased in prevalence in long-term care facilities (LTCF) and acute care facilities over the past several years.
- In Tennessee, CRE is reportable statewide and CRA is reportable from the EIP surveillance area
- Tennessee participates in Multidrug-Resistant Gram-Negative Bacilli Surveillance Initiative (MuGSI) since 2014 as part of the CDC's Emerging Infection Program (EIP).

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Methods



- A population-based surveillance was conducted targeting selected CRE organisms (*E. coli*, *Klebsiella pneumoniae*, *Klebsiella oxytoca*, *Klebsiella aerogenes* and *Enterobacter cloacae* complex), and carbapenem-resistant *Acinetobacter Baumannii* complex (CRAB) identified from urine or normally sterile sites from the residents of the catchment area.
- CRE and CRA susceptibility reports were obtained from laboratories, antibiotic testing instrument queries, electronic lab report (ELR) and faxed paper reports from the treating facilities.
- A case report form developed by the CDC was used to collect risk factors, demographic, and epidemiologic data from the medical record for the first CRE or CRAB case, or a subsequent report of cases ≥30 days after the last report.
- The data analysis was done using SAS software version 9.4 (Cary, NC, USA).

Results

Table 1: Comparison of Identified Risk Factors by Pathogen Types, 2014-2020, Tennessee.

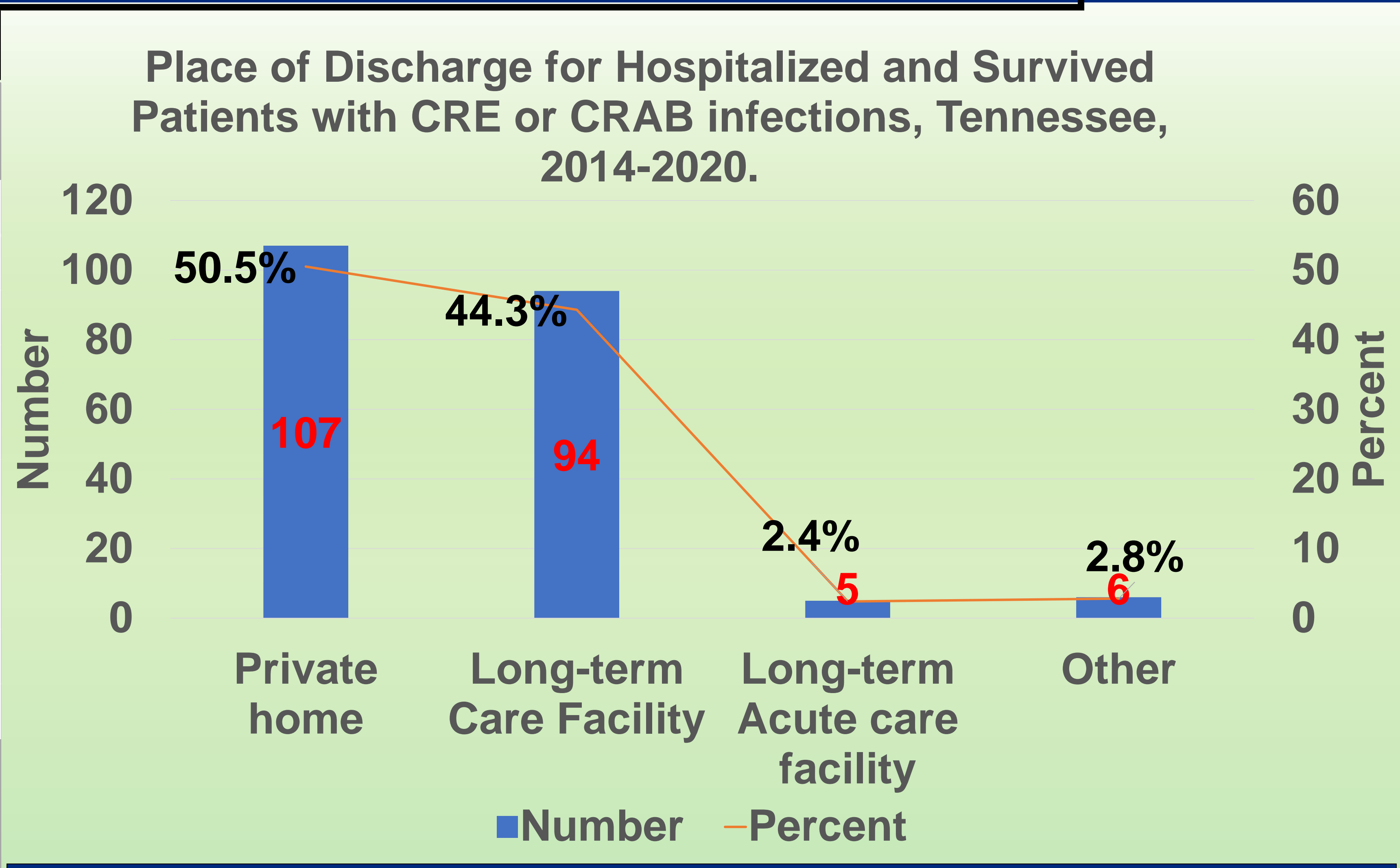
Risk Factors	CRE	CRAB	P-value
Male	30.3%	70.7%	<0.001
Mean Age in years	64.7	60.2	0.027
Specimen collected 3 or more days after hospital admission	19.9%	34.5%	0.061
Hospitalized on the day or in 29 days after specimen collection	46.1%	67.1%	0.002
Healthcare associated	65.9%	87.8%	<0.001
Normally Sterile site	6.6%	24.4%	<0.001
Died within one month of specimen collection	4.1%	14.6%	0.001

Table 2: Frequently Reported Underlying Conditions among CRE and CRAB patients, 2014-2020, Tennessee.

Underlying Conditions	CRE	CRAB	P-Value
Diabetes	38.2%	47.6%	0.113
Chronic pulmonary disease	26.2%	30.5%	0.426
Urinary tract abnormalities/problems	22.1%	40.2%	<0.001
Obesity	20.6%	23.2%	0.604
Congestive heart failure	18.1%	22.0%	0.412
Decubitus/pressure ulcer	13.7%	42.7%	<0.001
Malignancy, Solid organ	13.7%	6.1%	0.056
Chronic kidney disease	11.2%	15.9%	0.237

Table 3: Adjusted Odds Ratios of the Underlying Conditions among Patients with CRAB Infection Compared to those with CRE, Tennessee, 2014-2020.

Underlying Conditions	Odds ratio	95% Confidence Interval	P-value
Male	5.5	3.1-9.7	<0.001
Urinary Tract Abnormality	1.4	0.8-2.5	0.292
Decubitus Ulcer	5.0	2.8-8.9	<0.001
Age in Years	0.99	0.98-1.0	0.2418



Conclusions

Patient with CRAB infections have significantly higher rate of exposure to healthcare settings, hospitalization and death compared to CRE. CRAB also causes more invasive infections compared to CRE. There is an opportunity to reduce hospital onset infections as 20% of CRE and 34% of CRAB infections had onset 3 days after hospitalization. Strengthening infection control beyond the acute facilities is crucial as larger proportion of hospitalized patients are discharged to nursing homes or private homes. Decubitus ulcer is also an important underlying condition for patients infected with CRAB. Patients with impaired skins in acute care as well as in long-term care facilities are at increased risk of infection with drug resistant organisms that may result in adverse health outcome. The observed higher number of CRAB infections among men after adjusting to other relevant covariates warrants further study to explain the findings.

Acknowledgment

We thank all laboratories and health care facilities that participate in this surveillance providing valuable information.