# Antimicrobial Resistance in *Salmonella* Serotype Typhimurium, R-Type ACSSuT, is Associated with Bacteremia: NARMS 1996-2000

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The emerging problem of resistance in *Salmonella*

- Antimicrobial resistance in salmonella is increasing

- The recent increase in *S.* Typhimurium is caused by the spread of multidrug resistant DT104 R-type ACSSuT

Proportion of S. Typhimurium Resistant to ≥ 1 antimicrobials from CDC national studies
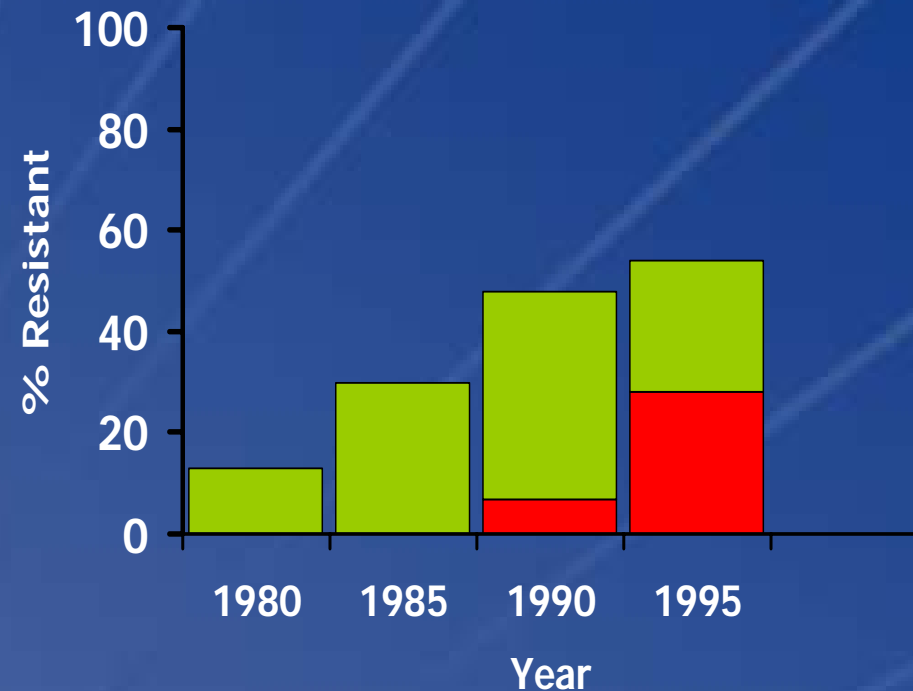
Human health consequences:

- Treatment failures

- Increased transmission

- Increased virulence ?

Increased virulence

- Hospitalizations
- Invasiveness
- Mortality rate

Increased invasiveness

Is resistance associated with an increased risk of blood stream infection ?

Methods

- The study is based on data collected by the National Antimicrobial Resistance Monitoring System (NARMS) for enteric bacteria

- 17 public health laboratories forward every 10th non-Typhi *Salmonella* to the CDC for susceptibility testing

- Standard panel of antimicrobials, broth microdilution, NCCLS standards

- Large, unbiased sample 1996-2000

National Antimicrobial Resistance Monitoring System (NARMS)
40% of US population

January 1, 2001

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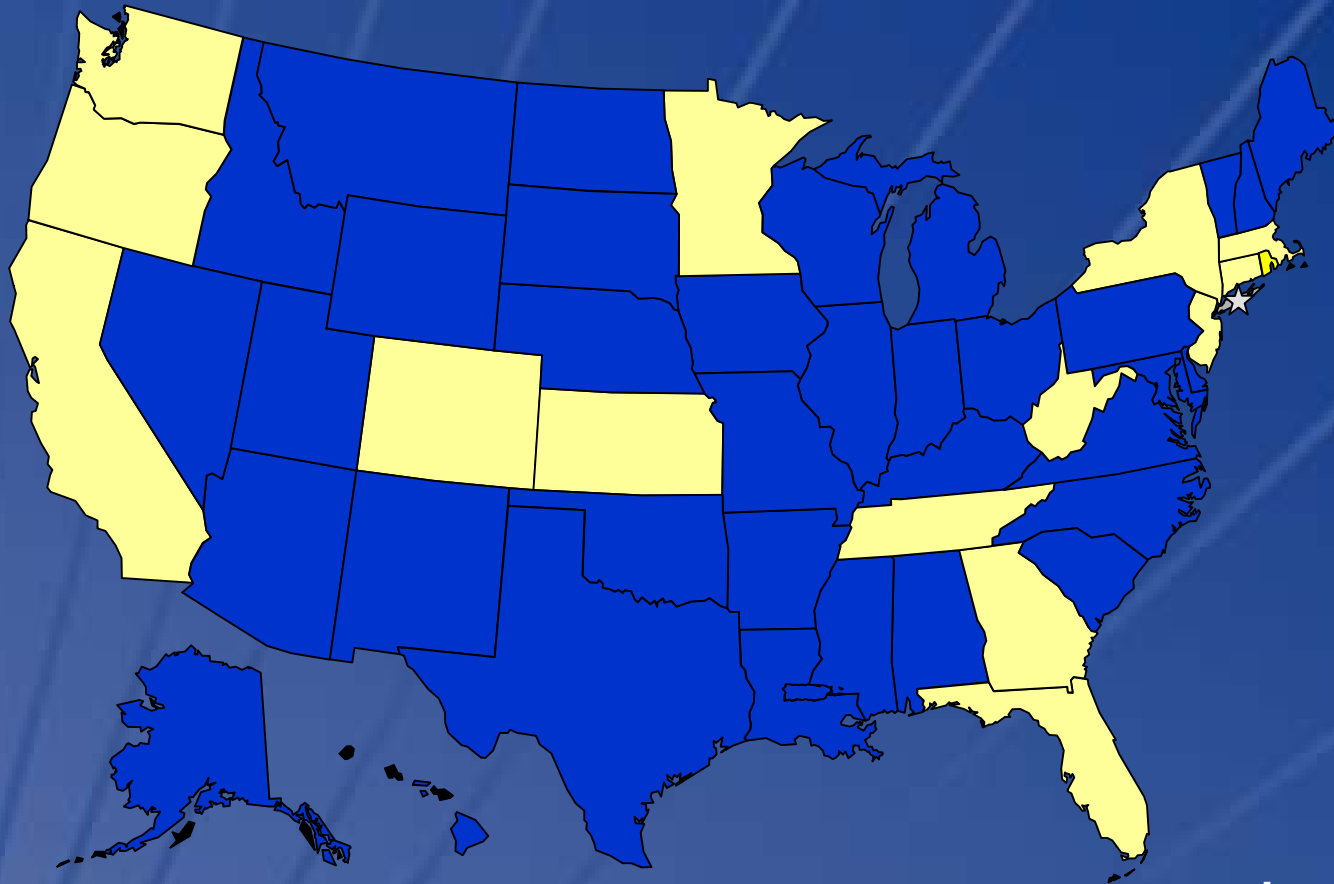
Top five non-Typhi *Salmonella* serotypes, NARMS 1996-2000:

	Total	*Percent:*	
		Resistant	Blood
Typhimurium	1,513	54%	5%
Enteritidis	1,394	20%	8%
Heidelberg	387	39%	13%
Newport	381	18%	1%
Javiana	180	3%	3%
Other	2,326	22%	6%

Proportion of *S.* Typhimurium from blood (n=1,368)
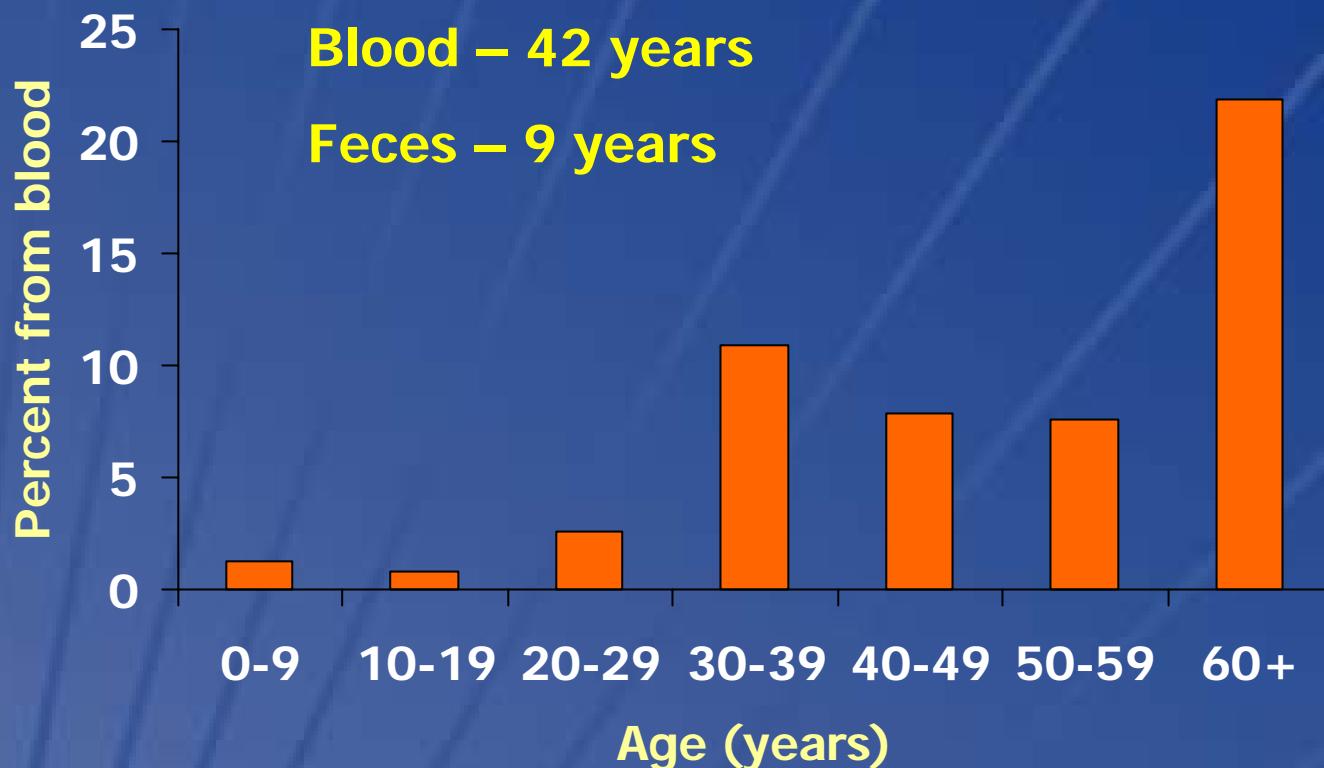
Percent of isolates from blood:

Resistant (N=818)	Pan-susceptible (N=695)	Odds Ratio*	95% CI
53 (6%)	21 (3%)	2.1	(1.2-3.8)

*multivariate odds ratio, adjusting for age

What about DT104 ?

- 54% (818) *S.* Typhimurium isolates were resistant to ≥ 1 antimicrobial

- 56% (462) were R-type ACSSuT

- Limited and inclusive data regarding morbidity and mortality associated with DT104

Percent of isolates from blood:

R-type ACSSuT (N=462)	Pan-susceptible (N=695)	Odds Ratio*	95% CI
34 (7%)	21 (3%)	2.5	(1.3-4.6)

*multivariate odds ratio, adjusting for age

Conclusion

Antimicrobial resistance in *S.* Typhimurium, particularly R-type ACSSuT, is associated with an increased risk of bacteremia.

Implications

As salmonella become more resistant, virulence increases

- More hospitalizations
- More complications
- More deaths
- Increasing costs

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Further implications

- Drug-resistance in non-typhoidal salmonella is largely a consequence of antimicrobials used in food animals

- Limit the use of antimicrobials in the food production

- Mitigate the spread of resistant salmonella in food chain