



Northeastern

Antibiotic Stewardship from a Tragedy of the Commons Perspective

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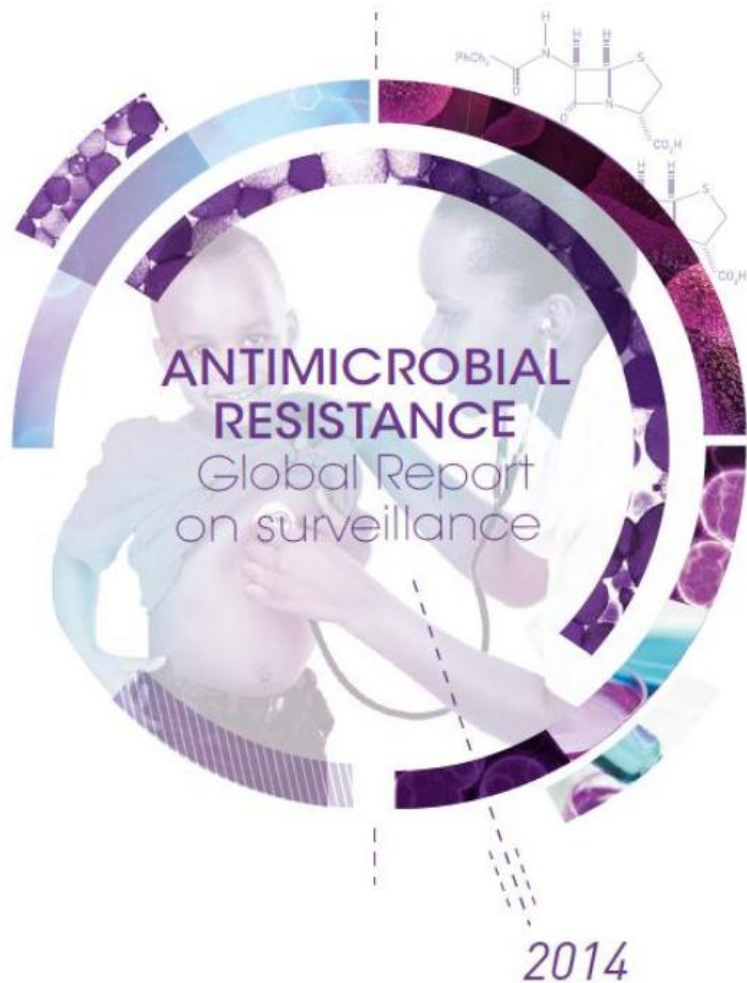
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Antibiotic Crisis



“A **post-antibiotic era**—in which common infections and minor injuries can kill—far from being an apocalyptic fantasy, is instead a very real possibility for the 21st Century.”

-WHO report, April 2014

Tragedy of the Commons

- Shared pasture
- Rational herder adds another cow
- All rational herders reach the same conclusion
- “Freedom in a commons brings ruin to us all”

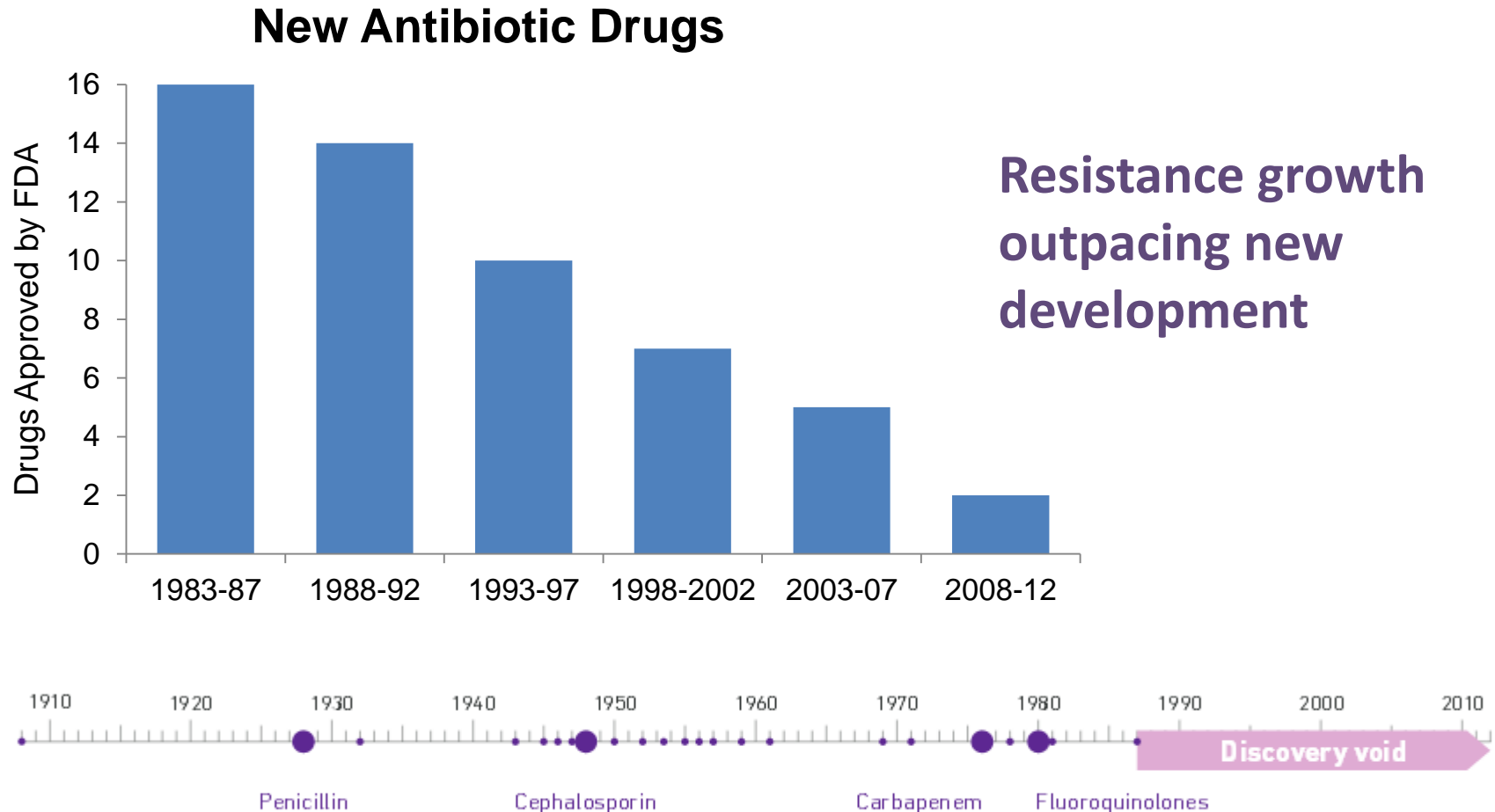


Antibiotic Resistance

- Share antibiotic benefits
- Incentive to prescribe vs. impact on resistance
- Short-term benefit outweighs long-term cost
- **30-50% of prescriptions inappropriate**

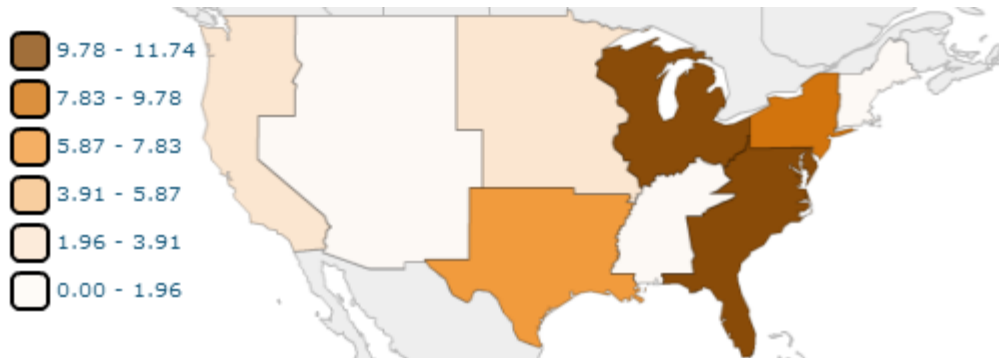


Antibiotic Development

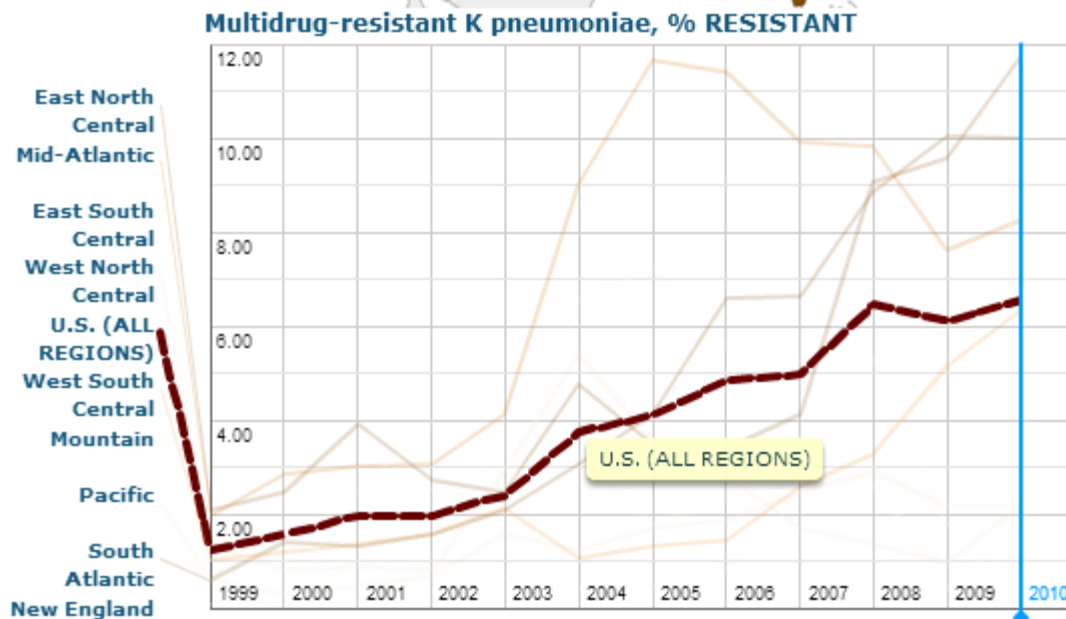


WHO claims no major new types of antibiotics in last 30 years

Regional Variation - Resistance

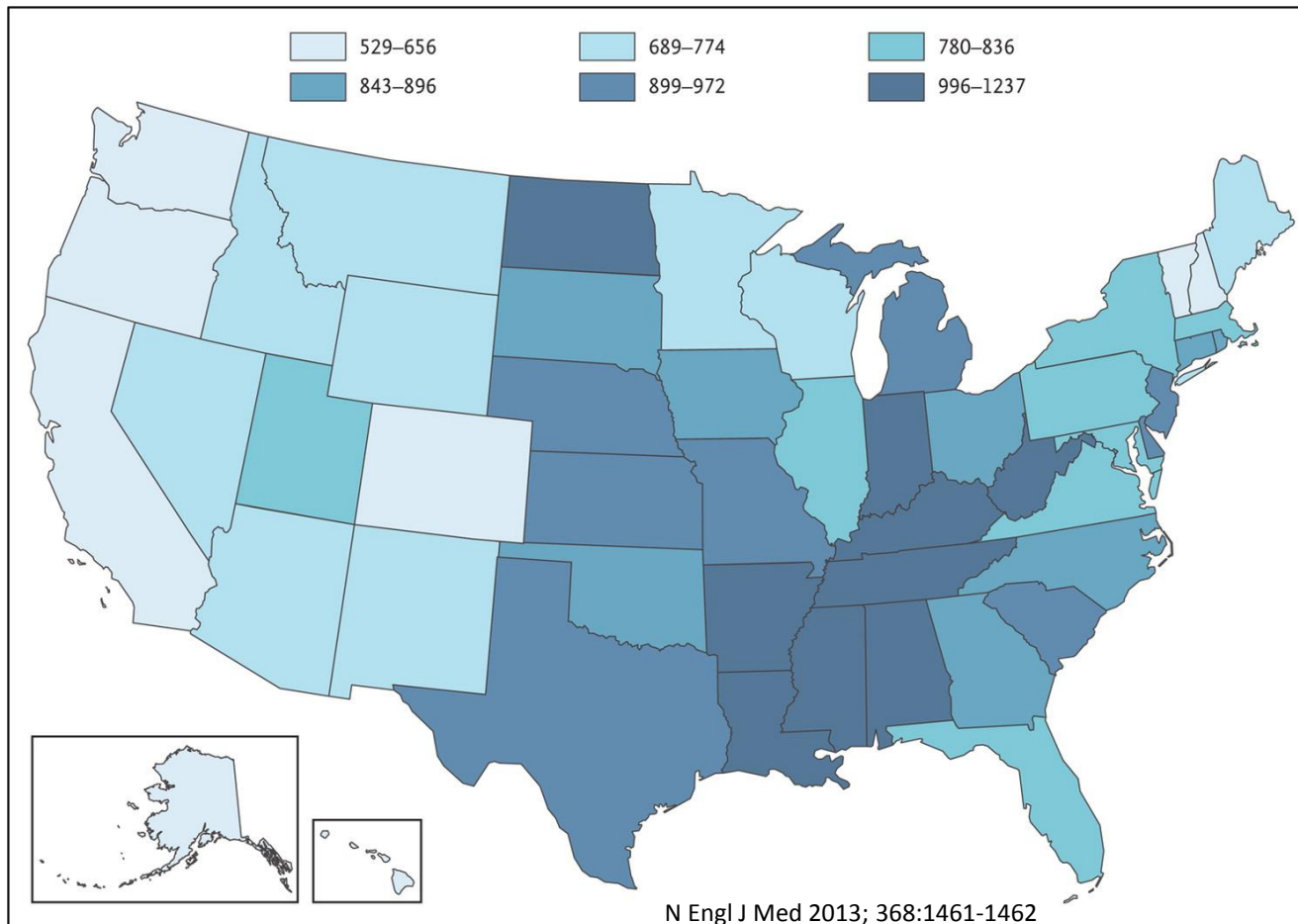


CDDEP
ResistanceMap



Regional Variation - Prescriptions

Antibiotic Prescriptions per 1000 Persons, 2010

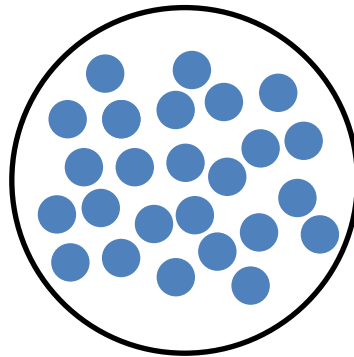


Incentive Variation

Smith, Levin, and Laxminarayan
PNAS 2005 102 (8) 3153-3158

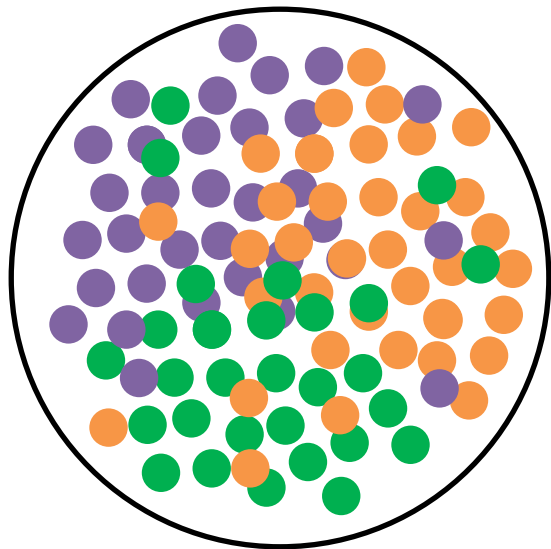
Rural

● Lone hospital



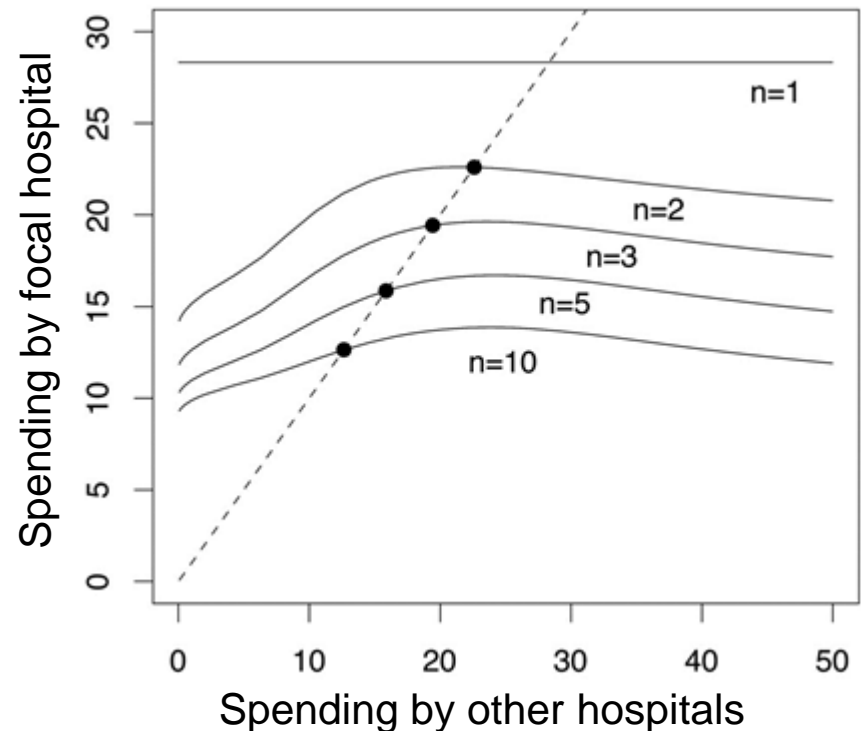
Urban

● Hospital A
● Hospital B
● Hospital C



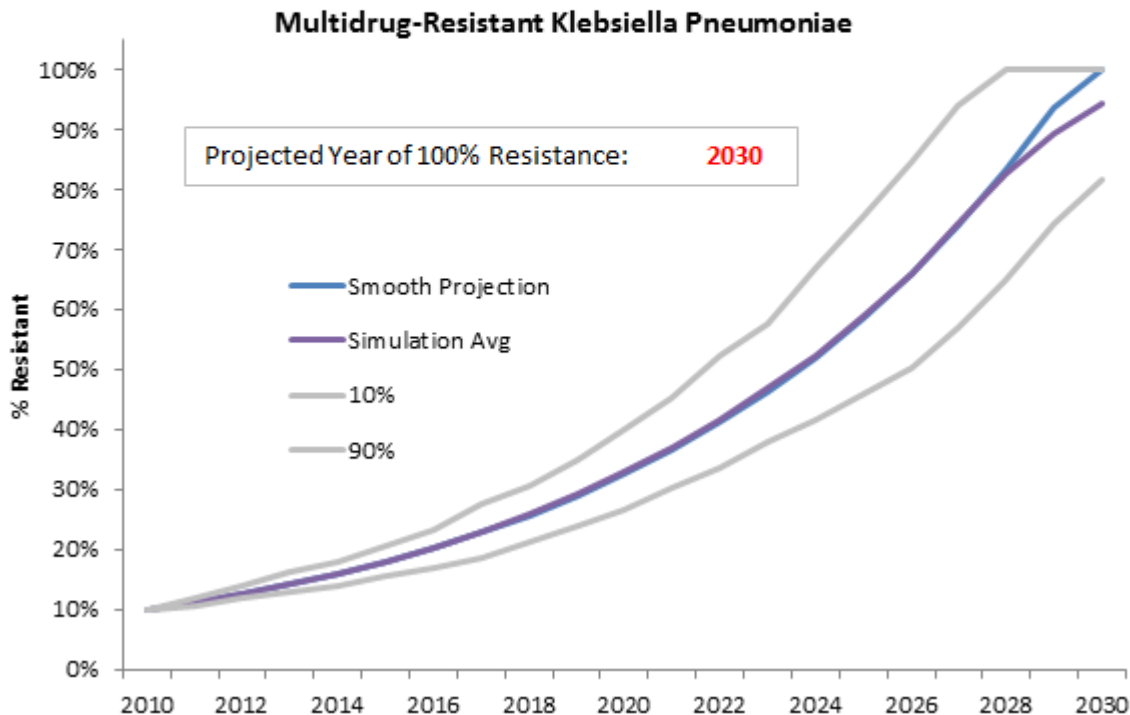
Conclusion:

Urban hospitals incentivized to spend less on infection control



Pilot Model

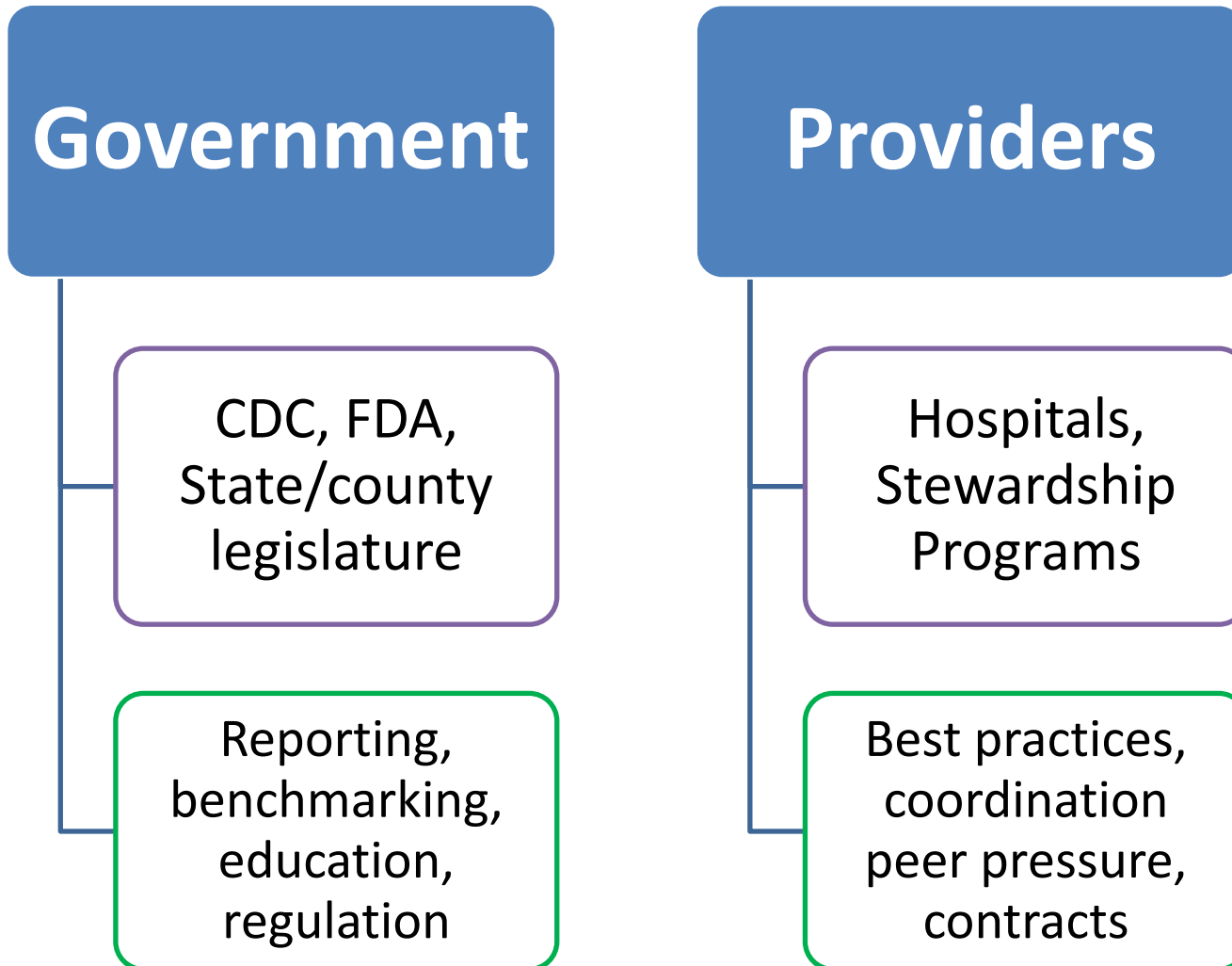
Provider/Region	Provider A	Stewardship Network	South Atlantic	USA
Transition Influence	0.7	0.1	0.1	0.1
Resistance Growth/Year	10%	15%	25%	15%
<input type="range"/>		Default	National Average	All 5% All 10% All 15% All 20% All 25%



Research questions:

- Spread of resistant infections in the community
- Provider/regional variation in stewardship efforts

Actions



Questions?
