Antibiotic Stewardship from a Tragedy of the Commons Perspective

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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

New Antibiotic Drugs

Drugs Approved by FDA

- 16
- 14
- 12
- 10
- 8
- 6
- 4
- 2
- 0


Resistance growth outpacing new development

WHO claims no major new types of antibiotics in last 30 years
Regional Variation - Resistance

Multidrug-resistant K pneumoniae, % RESISTANT

U.S. (ALL REGIONS)
Regional Variation - Prescriptions

Antibiotic Prescriptions per 1000 Persons, 2010

Incentive Variation

Conclusion:
Urban hospitals incentivized to spend less on infection control

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

Rural
- Lone hospital

Urban
- Hospital A
- Hospital B
- Hospital C

Plot: Spending by focal hospital vs. Spending by other hospitals

Legend:
- n=1
- n=2
- n=3
- n=5
- n=10
Pilot Model

Research questions:
- Spread of resistant infections in the community
- Provider/regional variation in stewardship efforts
Actions

Government
- CDC, FDA, State/county legislature
- Reporting, benchmarking, education, regulation

Providers
- Hospitals, Stewardship Programs
- Best practices, coordination, peer pressure, contracts
Questions?