

## Antibiotic Stewardship in a Health System

Focus on the Small, Community Hospitals

2nd Annual Houston Antimicrobial Stewardship Symposium  
Crowne Plaza Houston Near Reliant  
Houston, TX - March 24, 2016

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## What is a healthcare system?

- “ **Hospital Network:** a network or group of hospitals that work together to coordinate and deliver a broad spectrum of services to their community.
- “ **Healthcare System:** 2 or more hospitals owned, sponsored, or contract managed by a central organization.




## Disclosures

- “ Much of the work presented today was funded by:
  - The Joint Commission and Pfizer Independent Grants for Learning and Change
- “ No other disclosures




## Largest Hospital Systems - 2015

Nonprofit	For Profit
1. Ascension Health (St. Louis) — 75	1. Community Health Systems (Brentwood, Tenn.) — 188
2. Trinity Health (Livonia, Mich.) — 44	2. Hospital Corporation of America (Nashville, Tenn.) — 166
3. Catholic Health Initiatives (Denver) — 39	3. Tenet Healthcare (Dallas) — 74
4. Kaiser Permanente (Oakland, Calif.) — 37	4. LifePoint Health (Brentwood, Tenn.) — 56*
5. Adventist Health System (Winter Park, Fla.) — 35	5. Prime Healthcare Services (Ontario, Calif.) — 32
5. Dignity Health (San Francisco) — 35	6. Universal Health Services (King of Prussia, Pa.) — 28
6. Sutter Health (Sacramento) — 26	7. IASIS Healthcare (Franklin, Tenn.) — 18
6. Providence Health and Services (Seattle) — 26	8. Ardent Health Services (Nashville, Tenn.) — 12
7. CHRISTUS Health (Irving, Texas) — 20	9. Capella Healthcare (Franklin, Tenn.) — 9
8. Banner Health (Phoenix) — 19	9. Steward Health Care System (Boston) — 9
8. Baylor Scott & White Health (Dallas) — 19	10. National Surgical Hospitals (Chicago) — 8
9. Mercy Health (Cincinnati) — 17	
9. UPMC (Pittsburgh) — 17	
9. SSM Health Care (St. Louis) — 17	
9. Intermountain Health Care (Salt Lake City) — 17	
10. New York-Presbyterian Healthcare System (New York City) — 15	
10. Adventist Health (Roseville, Calif.) — 16	

American Hospital Director — 2015




## Outline

- I. Stewardship in Healthcare Systems
- II. Intermountain Healthcare
- III. Demonstration of Stewardship within a healthcare network
  - Inpatient model
- IV. Future Directions

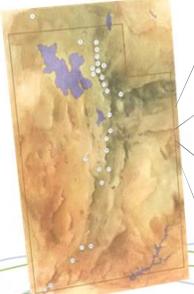



## AS in Health Care Networks

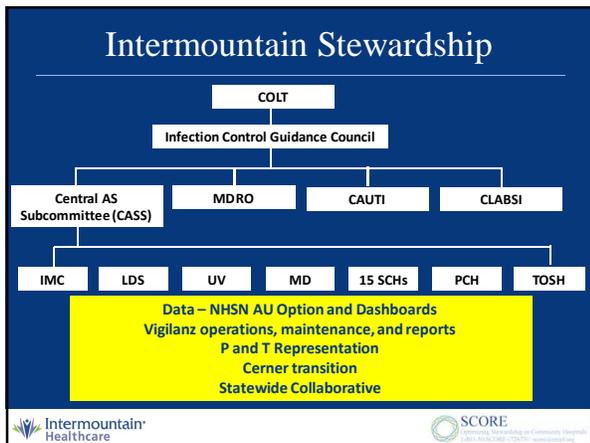
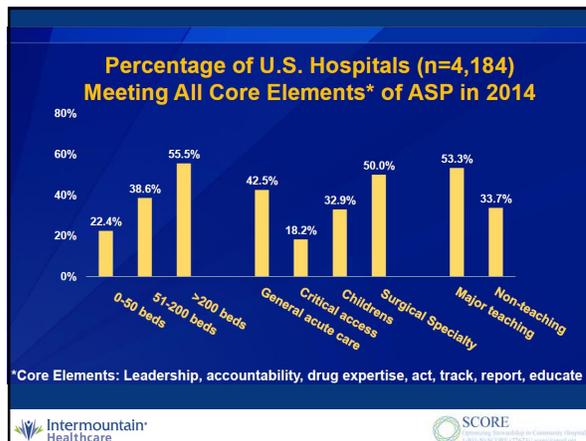
Strengths / Opportunities	Weakness / Challenges
<ul style="list-style-type: none"> <li>“ Leveraging technology                             <ul style="list-style-type: none"> <li>· Vigilanz</li> </ul> </li> <li>“ Shared resources                             <ul style="list-style-type: none"> <li>· Microbiology laboratory</li> <li>· Medical writers / education</li> <li>· EHR</li> </ul> </li> <li>“ Data                             <ul style="list-style-type: none"> <li>· Dashboards</li> </ul> </li> <li>“ Consistency / standards                             <ul style="list-style-type: none"> <li>· Messaging</li> </ul> </li> <li>“ Centralized P and T committee</li> <li>“ Platform for outcomes research</li> <li>“ Collaboration</li> <li>“ Support and mentorship</li> </ul>	<ul style="list-style-type: none"> <li>“ Chain of command</li> <li>“ Slow</li> <li>“ Engagement</li> <li>“ Identifying culture</li> <li>“ Communication</li> <li>“ Accountability (easy to hide)</li> <li>“ Maintain gains</li> </ul>




### Intermountain Healthcare Highly-Integrated Health System



- Hospitals**
  - Since 1975
  - 22 hospitals
  - 2,784 licensed beds
- SelectHealth**
  - Since 1983
  - Health plans
  - 700,000+ members
- Medical Group**
  - Since 1994
  - 1,200 employed physicians
  - 558 advanced practice clinicians
- Clinical Programs**
  - Since 1997
  - 10 key service lines



### Scope - Impact

**2012 United State Non-federal Hospitals**  
 4999 Registered Hospitals

72.4% (3,619) have < 200 beds

Many / most of these are without stewardship programs

All included in National Action Plan / Joint Commission / CMS

Very few studies of stewardship in these settings

AHA Statistics  
<http://www.aha.org/research/rc/stat-studies/index.shtml>

Hospital	Staffed Bed Count
Intermountain Medical Center	472
Utah Valley	375
McKay-Dee	300
Primary Children's	289
Dixie Regional	245
LDS	243
Logan Regional	128
American Fork	89
Riverton	88
Alta View	66
Valley View	48
Park City Medical Center	30
Cassia Regional	25
Sevier Valley	24
Drem Community	18
Bear River Valley	16
Heber Valley	16
Delta Community	15
Garfield Memorial	14
Sanpete Valley	13
Fillmore Community	7

**Large Urban Hospitals**

- ASP focused
- Formal ID consultation available

**Small Community Hospitals**

- 15 Hospitals
- 597 Beds / 700 licensed
- 25% of IHC Beds
- No formal ASPs
- No Infectious Diseases MD support

### Need and Potential of Antimicrobial Stewardship in Community Hospitals

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### Hospital Antimicrobial Stewardship in the Nonuniversity Setting

Kavita K. Trivedi, MD<sup>1,\*</sup>, Kristi Kuper, PharmD, BCPS<sup>2</sup>

Antimicrobial Stewardship Programs in Community Hospitals: The Evidence Base and Case Studies

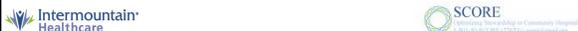
Day RD, et al. Open Forum Infect Dis. 2015 May 12;2(2)  
 Bartlett JM, et al. Am J Health Syst Pharm. 2014 Jun 17;71(11)  
 Van P, et al. Am J Health Syst Pharm. 2012 Jul 1;69(13)  
 Stoney DG, et al. Antimicrob Resist Infect Control. 2012 Oct 5;1(1)

Christopher A. Dale<sup>1</sup> and Elizabeth S. Boddie Ashby<sup>2</sup>  
<sup>1</sup>Medical Section on Infectious Diseases, Wake Forest University School of Medicine, Winston-Salem, North Carolina, and <sup>2</sup>Department of Pharmacy, University of Rochester Medical Center, Rochester, New York

## SCORE Study

Stewardship in Community Hospitals Optimizing Outcomes and Resources

Define an antibiotic stewardship strategy for Intermountain's smaller hospitals that optimizes outcomes while maximizing resources



### Distribution of Floor Types in SCH

Hospital	Licensed Beds	2013 Total BD	2013 Med/Surg BD	2013 ICU BD	2013 Peds BD	2013 Other BD
Logan	146	44174	13976 (32%)	3351 (8%)	4619 (10%)	22228 (50%)
Riverton	97	33319	8082 (24%)	802 (2%)	3000 (10%)	21435 (64%)
American Fork	89	27491	11363 (41%)	1895 (7%)	4677 (17%)	9556 (35%)
Alta View	71	23448	8913 (38%)	933 (4%)		13602 (58%)
Valley View	48	11642	7765 (67%)	1531 (13%)		2346 (20%)
Drem	24	10118	6091 (60%)			4027 (40%)
Casta	25	8764	5338 (61%)	1472 (17%)		1954 (22%)
Park City	30	7312	6045 (83%)	408 (6%)		859 (12%)
Sevier	42	4800	3892 (81%)			908 (19%)
Heber	19	2976	2561 (86%)			415 (14%)
Sangate	18	2162	1824 (84%)			338 (16%)
Fillmore	19	1959	1959 (100%)			
Stear River	16	1899	1576 (83%)			323 (17%)
Garfield	14	1505	1505 (100%)			
Delta	18	1275	1275 (100%)			



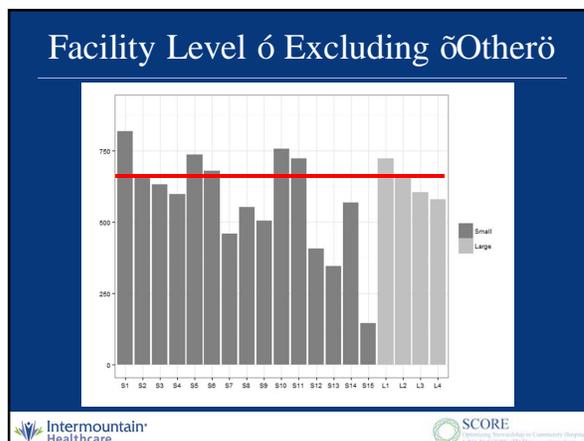
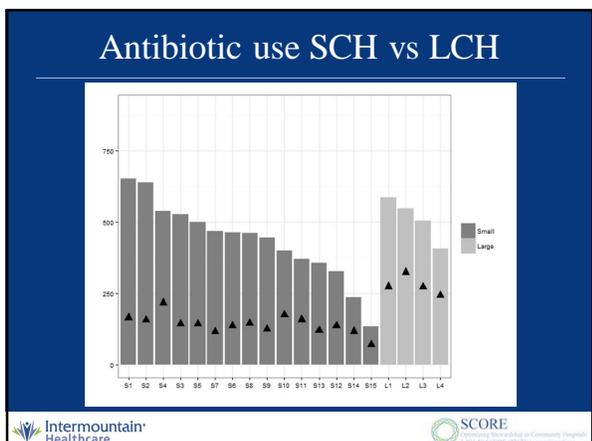
### Data

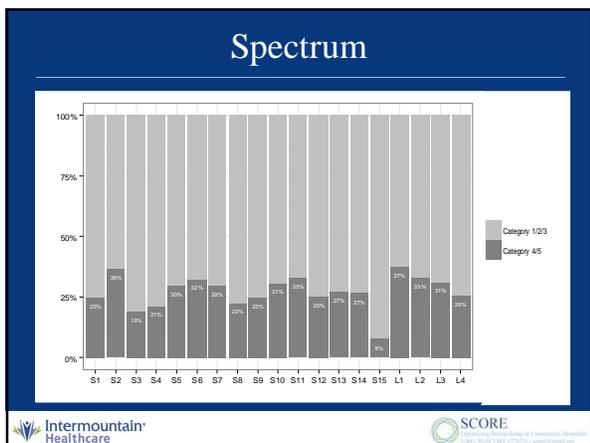
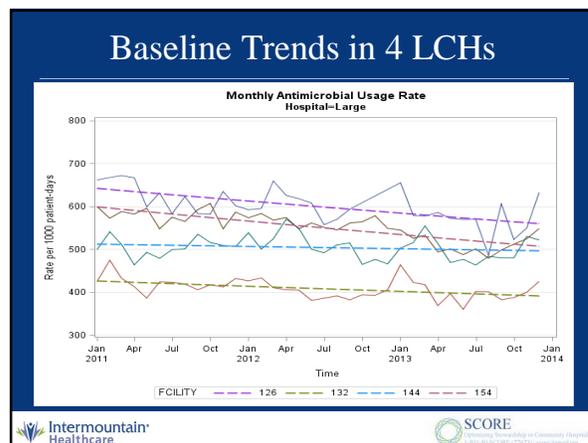
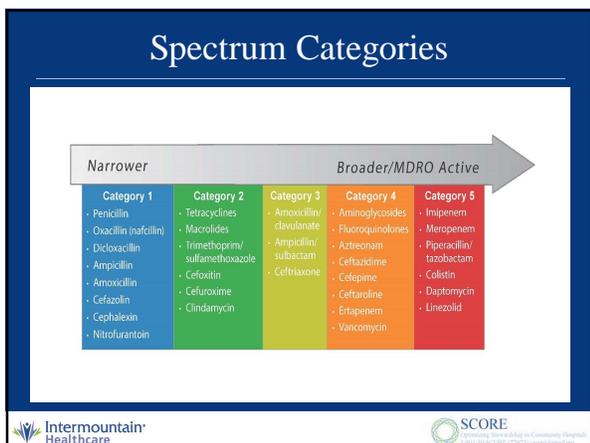
- ~ CDC NHSN AU Option
  - ~ Expanded reporting from 5 → 21 hospitals
  - ~ Back populated CDCs database from 2011 to present
  - ~ Data pulled from Intermountain EDW
  - ~ DOT / 1000 PD (US standard)
  - ~ Monthly upload
- ~ Administrative data pulled from EDW



### Usage by floor type

Antibiotic Categories	Antibiotic Days of Therapy per 1000 Patient Days (95 % Confidence Interval) Coefficient of Variation			
	Intensive Care Unit	Medical/Surgical Unit	Pediatric Unit	Other Unit
Category 1 (narrow)	96 (92,100) 0.26	173 (171, 175) 0.52	238 (233, 243) 0.33	42 (41, 43) 0.64
Category 2	132 (128, 136) 0.31	100 (99, 101) 0.37	30 (28, 32) 0.62	11.1 (10.7, 11.5) 1.49
Category 3	134 (130, 138) 0.29	109 (108, 110) 0.47	71 (68, 74) 0.60	3.9 (3.6, 4.2) 0.82
Category 4	262 (256, 268) 0.22	153 (151, 155) 0.44	148 (144, 152) 0.67	16.1 (15.6, 16.6) 1.29
Category 5 (broad / MDRO)	198 (193, 203) 0.35	64 (63, 65) 0.42	10 (9, 11) 0.78	0.6 (0.5, 0.7) 2.49
Overall Antibiotic Use (all antibiotics)	893 (882, 904) 0.16	627 (624, 630) 0.43	503 (495, 511) 0.19	74 (73, 75) 0.72

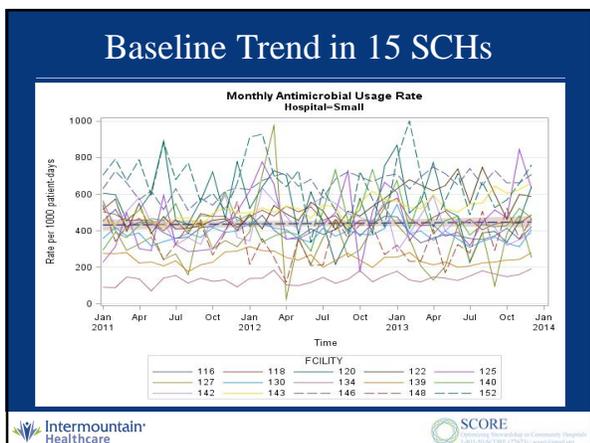


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Intermountain Healthcare | SCORE

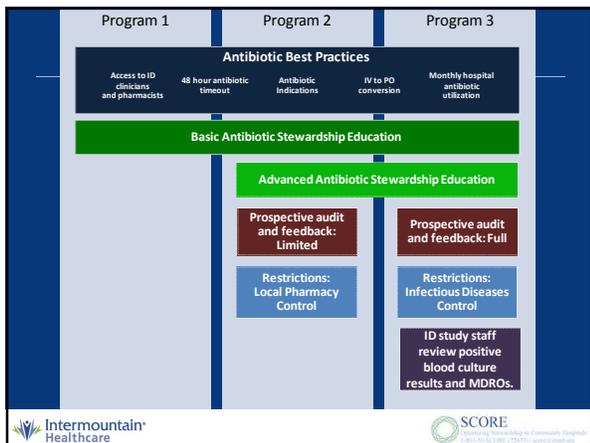


### SCORE

Stewardship in Community Hospitals Optimizing Outcomes and Resources

- Cluster Randomized Controlled Trial
- 15 Hospitals
- 3 Antimicrobial Stewardship Program Types
  - Program 1 = 5 hospitals
  - Program 2 = 5 hospitals
  - Program 3 = 5 hospitals

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### Antibiotic Indications

Quick Reference Guide for Hospital Pharmacists

This quick reference guide describes the purpose, process, and requirements for including indications in HELP1 for every antimicrobial prescription. All antibiotics, antifungals, and antivirals are in the scope of these procedures; this card focuses on antibiotics.

**The goal**

To ensure that antibiotics are prescribed correctly. Ask yourself, is this...

- The RIGHT patient — Does the patient have an infection or need antibiotics based on an upcoming procedure?
- The RIGHT drug — Which antibiotic is most appropriate?
- The RIGHT dose — What dose is most appropriate?
- The RIGHT route — IV, oral, switch from IV to oral?
- The RIGHT duration — 3 days, 7 days, 6 weeks?

**Key Point:** Knowing why the patient is receiving an antibiotic will enable you to assist the prescriber in providing the RIGHT care to the patient.

Handwritten note: Metronidazole 500mg PO TID x 10 days for C difficile infection. Dittell

## Antibiotic Best Practices

- IV to PO Conversion
- Antibiotic Indications
- 48 Hour Antibiotic Timeout+
- Monthly Antibiotic Report
- Access to ID Consultation: 1-801-50-SCORE

Date: 08/29/2013 07:00  
To: Dr. Sydnor

Mrs. Buckel in room T907 has been on vancomycin and piperacillin-tazobactam for 48 hours. This patient has allergies to no antibiotics, and appears to tolerate other oral therapies.

The following microbiology data are available:  
Negative cultures to date

The CDC recommends re-evaluating antibiotic therapy at this time based on new data and the current clinical picture.

Yes, I have acknowledged this patient's current regimen, and plan to tailor their antibiotics.

Yes, I have acknowledged this patient's current regimen, and wish to continue the current regimen.

Please return to pharmacy at the time of discharge.

### IV to PO Conversion

Quick Reference Guide for Hospital Pharmacists

This quick reference guide describes the purpose, process, and inclusion/exclusion criteria for converting antibiotics from IV to PO.

**What is IV to PO conversion?**

IV to PO conversion is a process of reviewing all patients on select IV antibiotics daily, assessing each patient's eligibility for conversion to PO, and recommending conversion to the prescribing doctor.

**Key Point:** You'll review patients on IV antibiotics daily to assess eligibility for conversion.

**Why should I perform IV to PO conversions?**

Reason 1: It has many benefits for the patient and the hospital.

- Improved patient comfort and mobility
- Reduced exposure to nosocomial pathogens through the IV site
- Decreased risk of phlebitis
- Reduced preparation and administration time for pharmacy and nursing
- Lower costs (longer stay, IV tubing, vials, IV pump)
- Decreased length of stay

**Key Point:** IV to PO conversions benefit both the patient and the healthcare facility. In addition, being a nurse in place to identify eligible patients can optimize CMS requirement.

Reason 2: It's an upcoming CMS requirement.

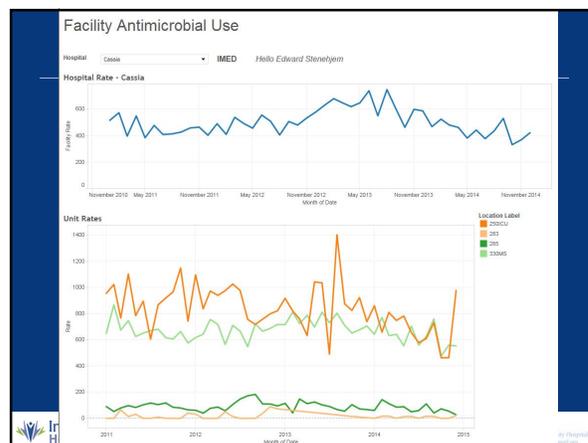
**CMS staff requirements:**

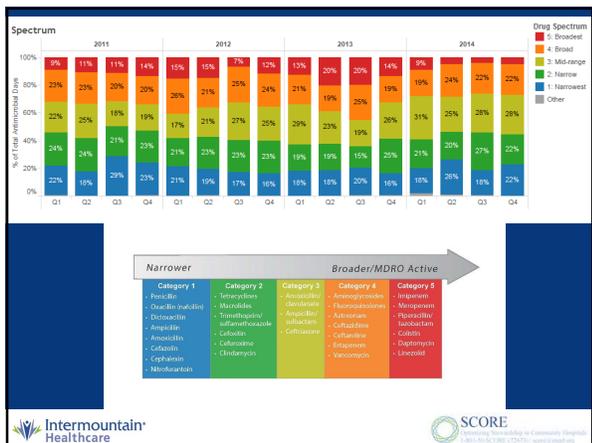
- C.A. Facility has a multidisciplinary process in place to review antimicrobial utilization, hospital antimicrobial systems, and antimicrobial agents in the formulary and then to evaluate the process to be adopted.
- C.A. System and place to present clinicians to use appropriate antimicrobial agents (e.g., computerized physician order entry, computerized susceptibility reports, information from drug pharmacists, formulary reviewers, evidence based guidelines and recommendations).
- C.A. Antibiotic orders include an indication for use.
- C.A. There is a mechanism in place to prompt clinicians to review antibiotic course of therapy after 72 hours of treatment.
- C.A. The facility has a process in place to identify patients currently receiving intravenous antibiotics who might be eligible to receive oral antibiotic treatment.

**What medications are eligible for IV to PO conversion?**

- Azithromycin
- Cephalexin
- Clindamycin
- Doxycycline
- Fluoroquinolones
- Levofloxacin
- Linezolid
- Moxifloxacin
- Mupirocin
- Sulfamethoxazole/trimethoprim

**Key Point:** Antibiotic Stewardship Committee identified these oral options as eligible for IV to PO conversion.





## Restrictions of Programs 2 and 3

- ~ Daptomycin, linezolid, ceftaroline
- ~ Meropenem, tigecycline
- ~ Amphotericin, voriconazole, posaconazole, micafungin

**Restrictions of Programs 2 and 3**

**Linezolid/Meropenem:**

- Acceptable uses:**
  - Severe gram-positive infections and therapy of infection in patients with a penicillin allergy (penicillin with a beta-lactamase inhibitor).
  - Severe gram-negative infections in patients with a penicillin allergy (penicillin with a beta-lactamase inhibitor).
  - Severe gram-positive infections in patients with a penicillin allergy (penicillin with a beta-lactamase inhibitor).
  - Severe gram-negative infections in patients with a penicillin allergy (penicillin with a beta-lactamase inhibitor).
- Unacceptable uses:**
  - Severe gram-positive infections in patients with a penicillin allergy (penicillin with a beta-lactamase inhibitor).
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**Ceftaroline:**

- Acceptable uses:**
  - Severe gram-positive infections in patients with a penicillin allergy (penicillin with a beta-lactamase inhibitor).
  - Severe gram-negative infections in patients with a penicillin allergy (penicillin with a beta-lactamase inhibitor).
- Unacceptable uses:**
  - Severe gram-positive infections in patients with a penicillin allergy (penicillin with a beta-lactamase inhibitor).
  - Severe gram-negative infections in patients with a penicillin allergy (penicillin with a beta-lactamase inhibitor).

**Tigecycline:**

- Acceptable uses:**
  - Severe gram-positive infections in patients with a penicillin allergy (penicillin with a beta-lactamase inhibitor).
  - Severe gram-negative infections in patients with a penicillin allergy (penicillin with a beta-lactamase inhibitor).
- Unacceptable uses:**
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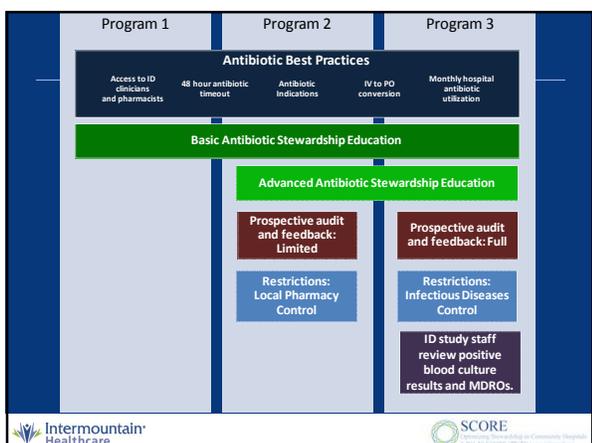
## Access to Infectious Diseases Physicians and Pharmacists

**(801) 50-SCORE**

- ~ Adults and Pediatrics
- ~ Physician and pharmacist options
- ~ 24 hours a day / 7 days a week
  - . Adults: SCORE attending
  - . Pediatrics: Attending/fellow on call at PCMC

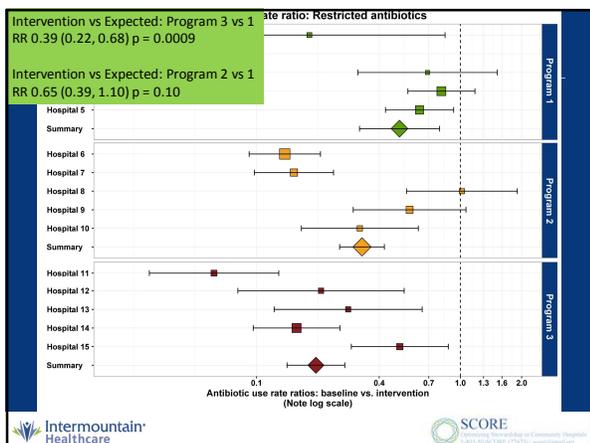
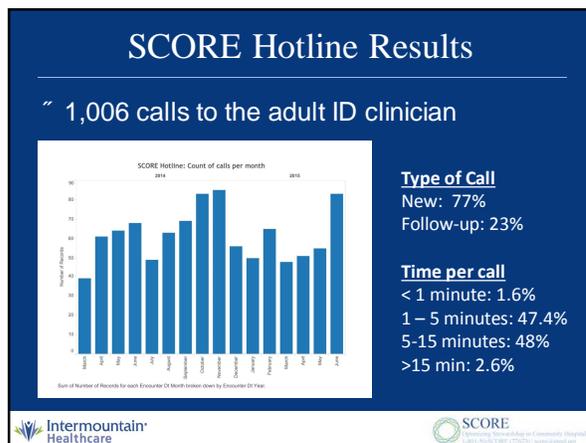
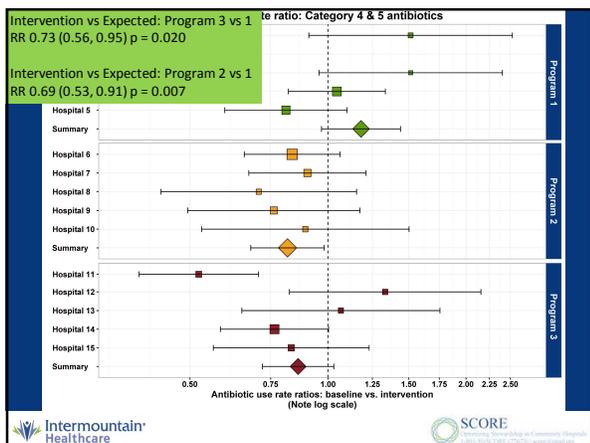
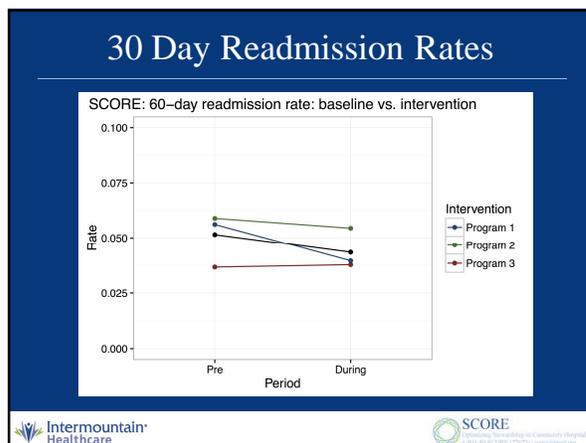
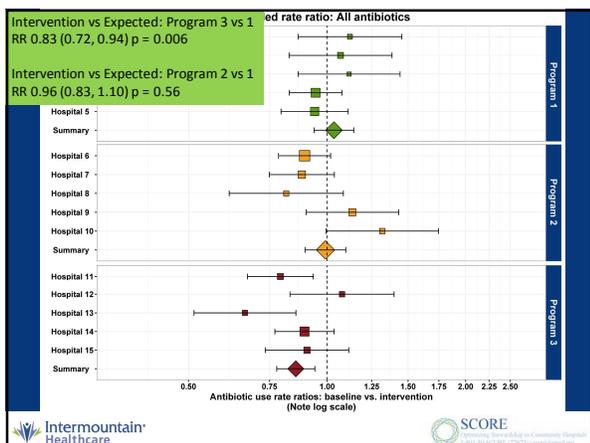
## Program 3

- ~ More PAF evaluation
- ~ ID controlled restrictions
- ~ Infectious diseases involvement
  - . Positive blood cultures
  - . *S. aureus* bacteremia
  - . CNS infections
  - . MDRO review
  - . Home IV antibiotic therapy review



## Results

- ~ Primary Analyses
  - . DOT/1000PD
    - ~ All drugs
    - ~ Category 4/5 drugs
    - ~ Restricted drugs
- ~ Secondary Analyses
  - . SCORE hotline utilization
  - . 30 day readmission, mortality
  - . Change in MDRO
    - ~ MRSA, ESBL, FQ res E. coli, C. diff



### SCORE Hotline Results

	Total Calls	% of Total	Patient Days / Year	calls / 1000 BD
Hospital 1	156	15.5%	6453	24.17
Hospital 2	475	47.2%	21906	21.64
Hospital 3	33	3.3%	1959	16.85
Hospital 4	45	4.5%	3892	11.56
Hospital 5	124	12.3%	11884	10.43
Hospital 6	48	4.8%	6810	7.05
Hospital 7	56	5.6%	9846	5.69
Hospital 8	10	1.0%	1824	5.48
Hospital 9	12	1.2%	2561	4.69
Hospital 10	23	2.3%	9296	2.47
Hospital 11	3	0.3%	1275	2.35
Hospital 12	2	0.2%	1576	1.27
Hospital 13	5	0.5%	6001	0.82
Hospital 14	1	0.1%	1505	0.66
Hospital 15	2	0.2%	17935	0.11
Program 1	66	6.6%	36,953	1.79
Program 2	579	57.5%	38,368	15.09
Program 3	350	34.8%	29,532	11.85

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## SCORE Highlights

- “ The self referral
- “ Can I send you a picture?+
  - . Worms in stool/skin
  - . I/(my patient) has this rash
- “ I have a Mormon missionary here fromõ +
- “ 0 y/o with pseudomonas PJI andõ .+
- “ can pronounce this organismõ +




## Conclusions

- “ Antimicrobial use in SCH is comparable to larger facilities
  - . Stewardship is needed
- “ Stewardship is feasible and can improve antimicrobial use
- “ ID clinician access is needed in SCHs




## 2am Call from Park City






## Areas under active investigation

- “ Is DOT/1000PD a quality metric?
  - . Does this process measure predict our outcome measures?
  - . Does it inversely correlate with antibiotic prescribing appropriateness?
- “ How do we measure antibiotic prescribing appropriateness?
- “ Why did hospitals within groups perform so differently?




## Value Add

- “ *S. aureus* bacteremia
- “ Acute viral infections
  - . CMV, VZV, HSV, HIV, Rabies, etc.
- “ CNS evaluations
- “ Asymptomatic bacteremia
- “ Bacteremias
- “ Diagnostic testing and interpretation




## What's Next

- “ How do we continue to improve the infectious diseases care in small, community hospitals?
- “ Maintaining the gains




## TeleHealth Program

Intermountain Leadership

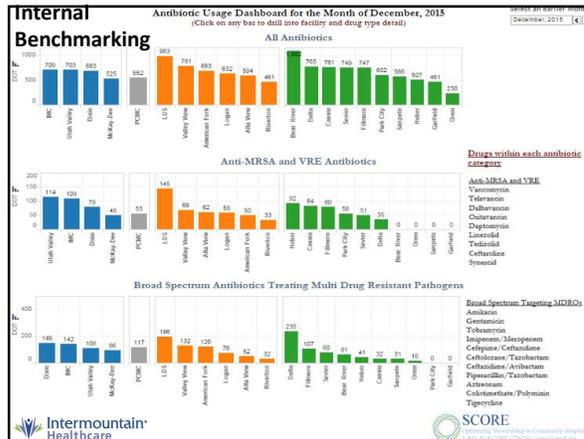
**Clinician Consulting**

**Remote Patient Monitoring**

**Direct Patient Consults**

Business
Clinical
Compliance
Finance
Legal
Operations

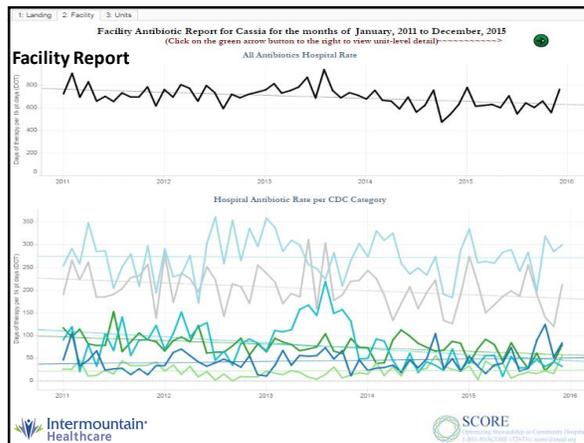
Technology Platform: Fixed, Mobile, Devices, Data



## Clinician Consulting

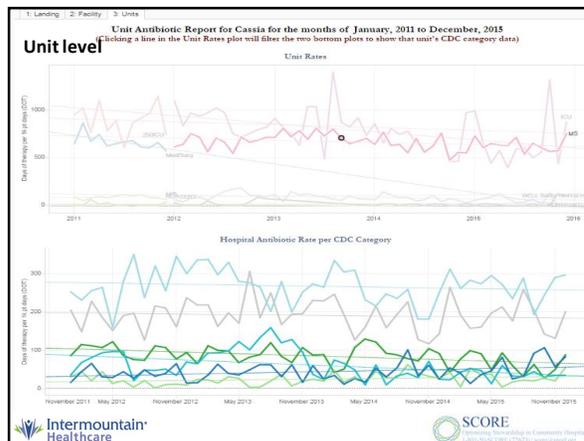
- ~ **ED Crisis Care**  
 >200 consultations
- ~ **Critical Care**  
 45% reduced mortality rate
- ~ **Education**  
 Nutrition, diabetes, pharmacy...
- ~ **Infectious Diseases**  
 Antibiotic stewardship

- ~ **Newborn Critical Care**  
 25% reduced transfers
- ~ **Pediatrics**  
 Trauma + 18 specialties
- ~ **Stroke**  
 17% tPA administration
- ~ **~15 additional pilots**



## TeleHealth Infectious Diseases Program

- ~ Provide antibiotic stewardship **support** to all hospitals without ID trained stewardship providers (17 hospitals)
  - Vigilanz, ID PharmD
- ~ Provide ID consultation to Intermountain facilities that lack ID services (15 hospitals + outpatient clinics)
  - 2 Infectious Diseases Physicians
- ~ Provide ID phone consultation to Intermountain providers
  - Maintenance of SCORE Hotline
- ~ Target go live date: Summer 2016 Pilot



## AS in Health Care Networks

Strengths / Opportunities	Weakness / Challenges
<ul style="list-style-type: none"> <li>~ Leveraging technology                             <ul style="list-style-type: none"> <li>. Vigilanz</li> </ul> </li> <li>~ Shared resources                             <ul style="list-style-type: none"> <li>. Microbiology laboratory</li> <li>. Medical writers / education</li> <li>. EHR</li> </ul> </li> <li>~ Data                             <ul style="list-style-type: none"> <li>. Dashboards</li> </ul> </li> <li>~ Consistency / standards                             <ul style="list-style-type: none"> <li>. Messaging</li> </ul> </li> <li>~ Centralized P and T committee</li> <li>~ Platform for outcomes research</li> <li>~ Collaboration</li> <li>~ Support and mentorship</li> </ul>	<ul style="list-style-type: none"> <li>~ Chain of command</li> <li>~ Slow</li> <li>~ Engagement</li> <li>~ Identifying culture</li> <li>~ Communication</li> <li>~ Accountability (easy to hide)</li> <li>~ Maintain gains</li> </ul>




## Acknowledgements

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**All the providers in the SCHs!**




## Thank You

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