

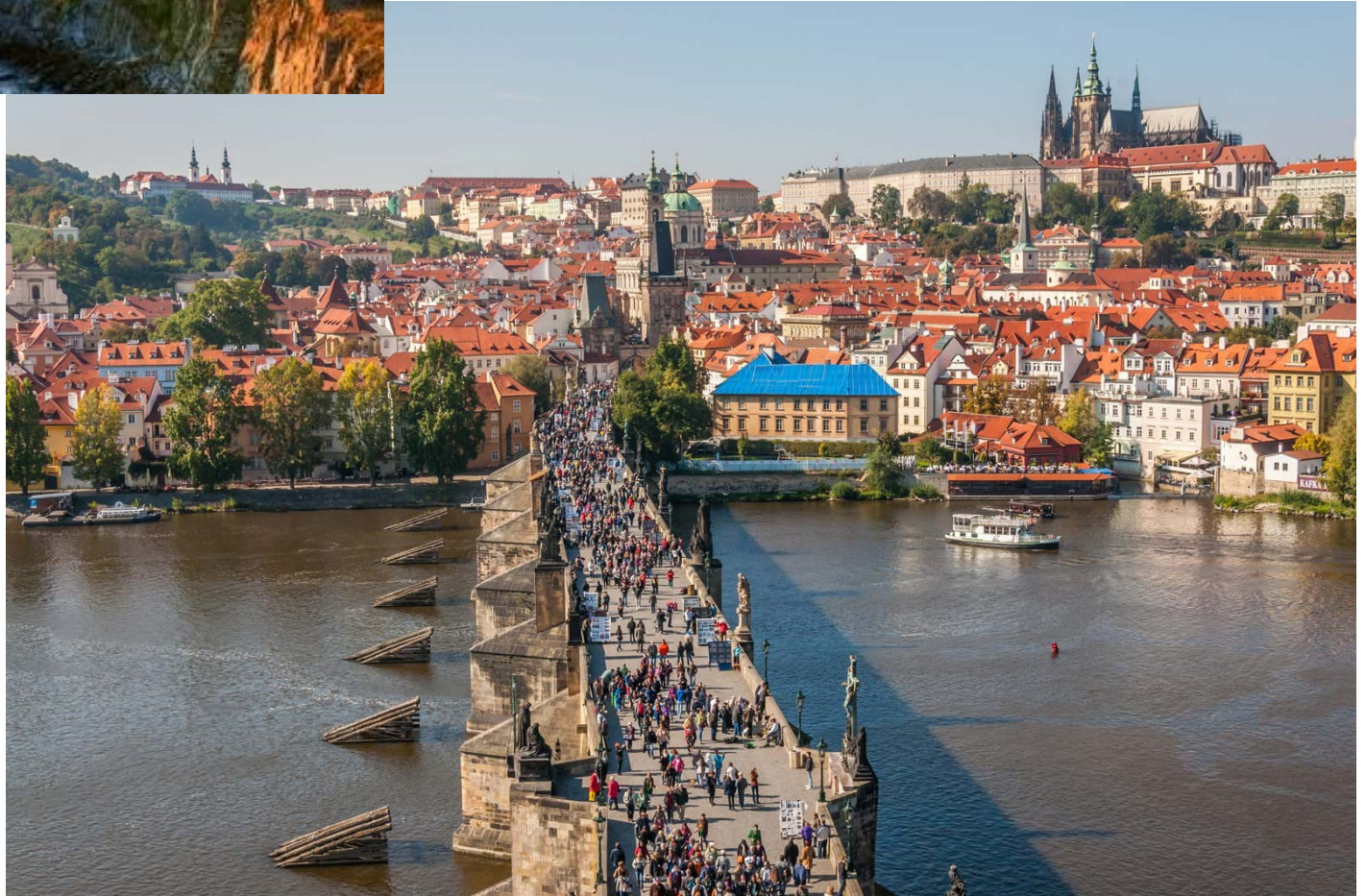
Antimicrobial stewardship



Petr Smejkal, M.D.
IKEM, PRAGUE
MAINE COAST MEMORIAL HOSPITAL, USA
MEDEVAC PROGRAM, CZECH REPUBLIC

PRAGUE, CZECH REPUBLIC

MAINE, U.S.A



70% ABX ARE USED FOR ANIMALS

30% RULE

30% OF HOSPITALIZED RECEIVE ANTIBIOTICS AT
ANY GIVEN TIME

30% PRESCRIBED INAPPROPRIATELY IN THE
COMMUNITY

30% SURGICAL PROPHYLAXIS INAPPROPRIATE

30% PHARMACY COST DUE TO ANTIMICROBIALS

30% PHARMACY COST COULD BE SAVED BY AMS

ANTIBIOTIC STEWARDSHIP

- **WHAT IS IT?** – systematic effort and coordinated interventions in hospitals or in outpatient settings leading to optimal use of antimicrobials – their **choice, dosing, way and length of administration.**
- **THE *RIGHT* DRUG AT THE *RIGHT* TIME VIA THE *RIGHT* ROUTE**

NEW RESISTANCE

- **GNB** – Carbapenems, etc
- **MRSA** – Vancomycin
- **N. gonorrhoeae** – Cefixime, FQ
- **Influenza** – Oseltamivir
- **M. tuberculosis** – Rif, INH
- **Malaria** – Artemisinin
- **Cholera** – ESBL, FQ

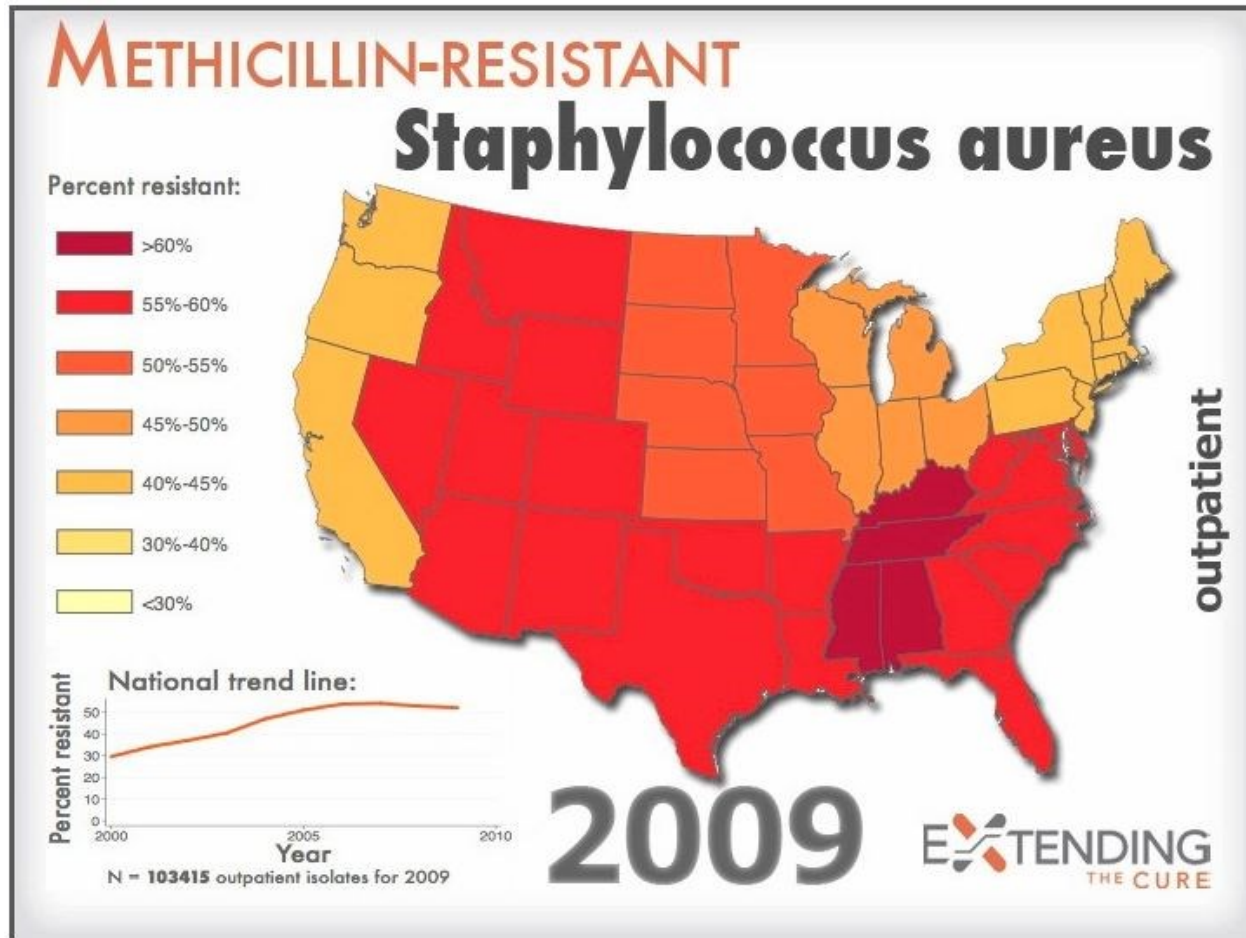
MOST COMMON RESISTANT BACTERIA

- **E**nterococcus
- **S**taph. aureus
- **K**lebsiella
- **A**cinetobacter
- **P**seudomonas
- **E**nterobacter

PRINCIPALS OF OPTIMUM ANTIBIOTIC USE

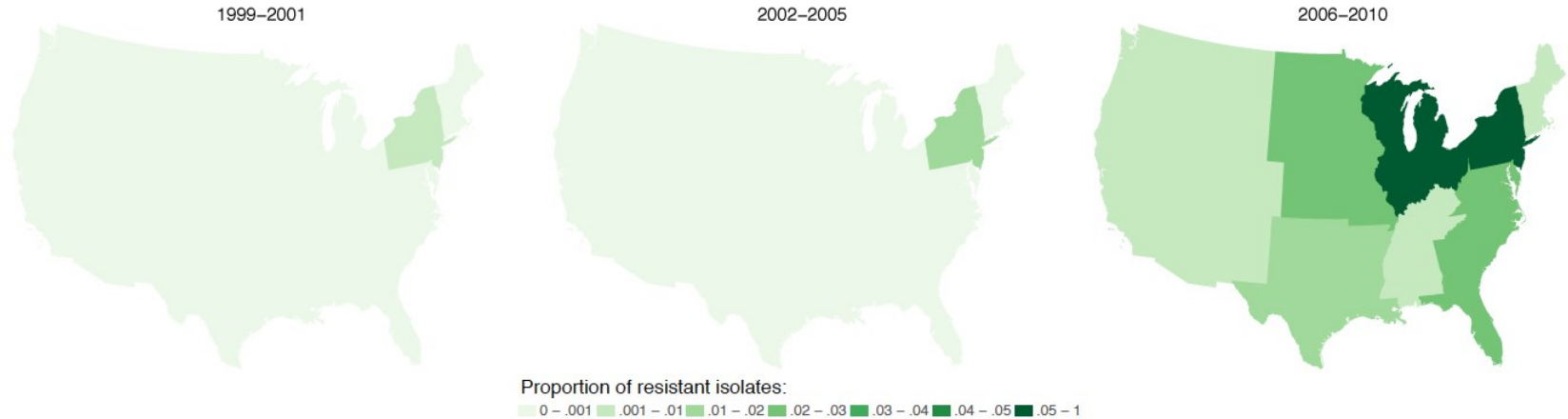
- **In the U.S. JCAHO mandatory enforcement of antibiotic stewardship programs in ALL HOSPITALS**
- **Primary goal is the increase of sensitivity to used antibiotics and decrease of resistance**

MRSA - USA...

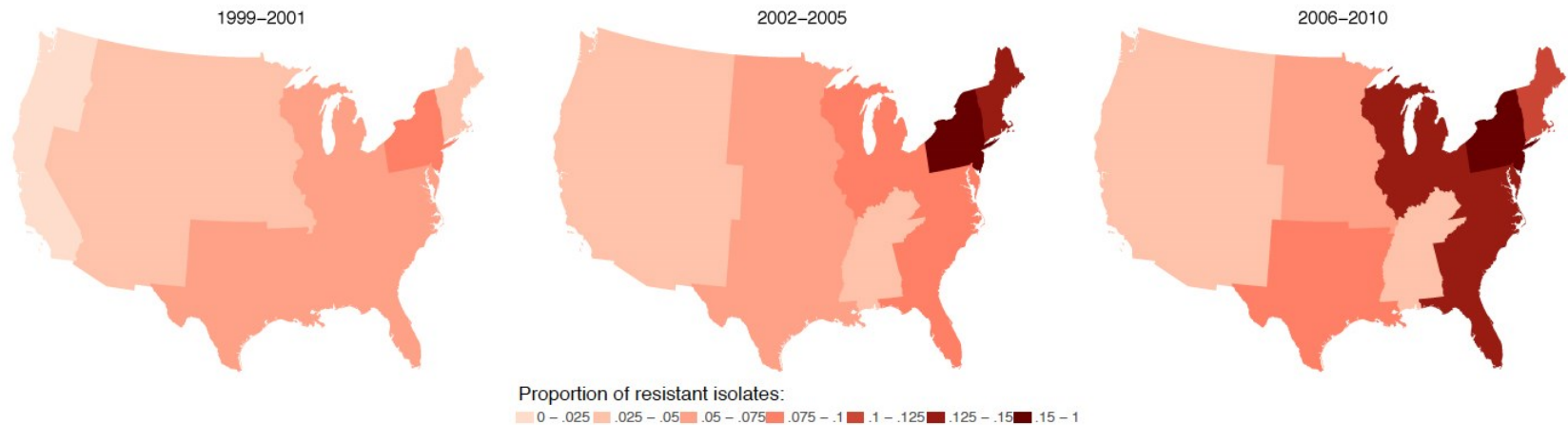


Carbapenem and 3rd. gen. cephalosporin resistance among *K. pneumoniae* highest along the East Coast, but present in all regions of the country

Carbapenem



3rd Gen. Cephalosporins

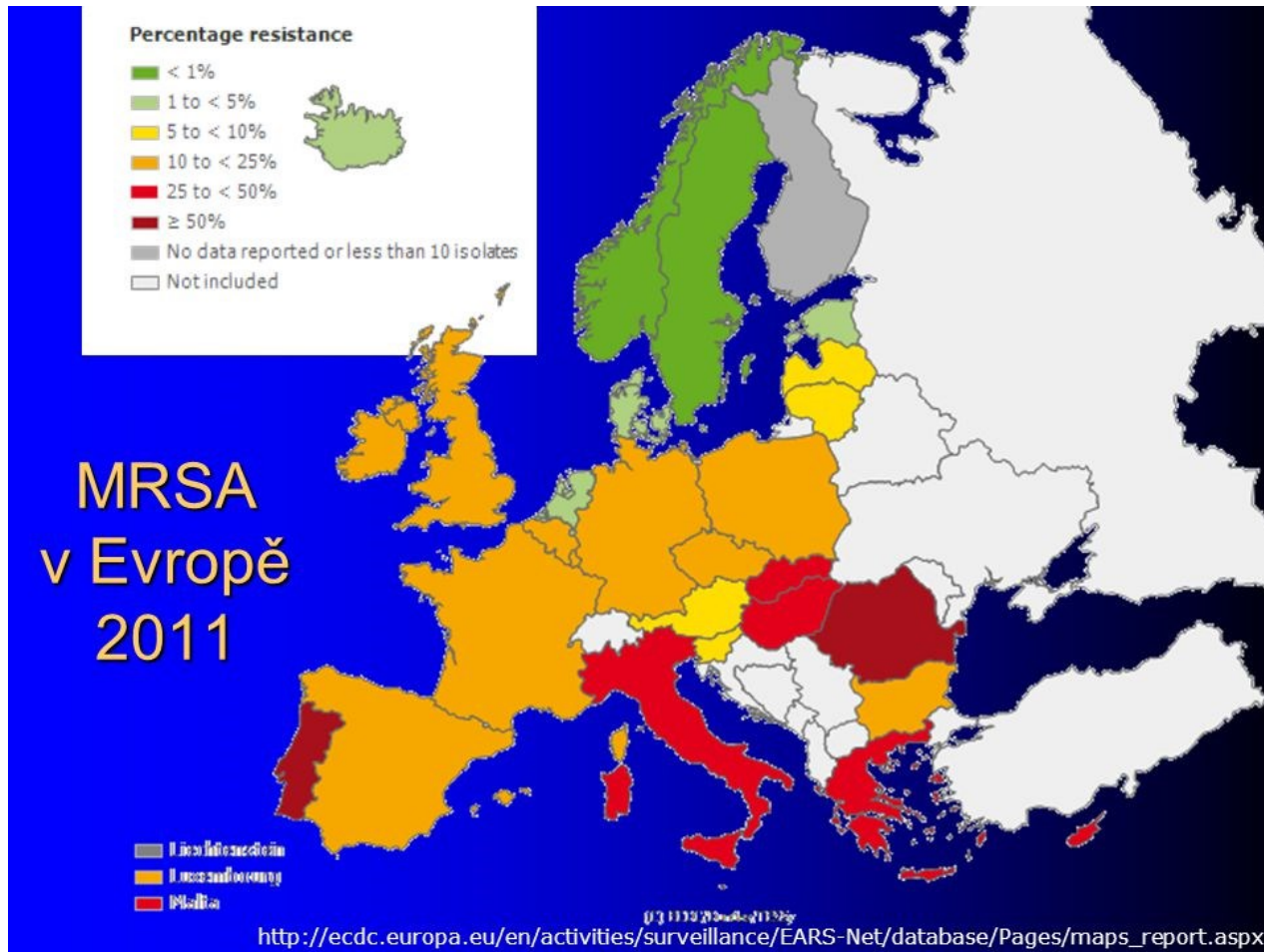


Note: Data for 2010 available through July.

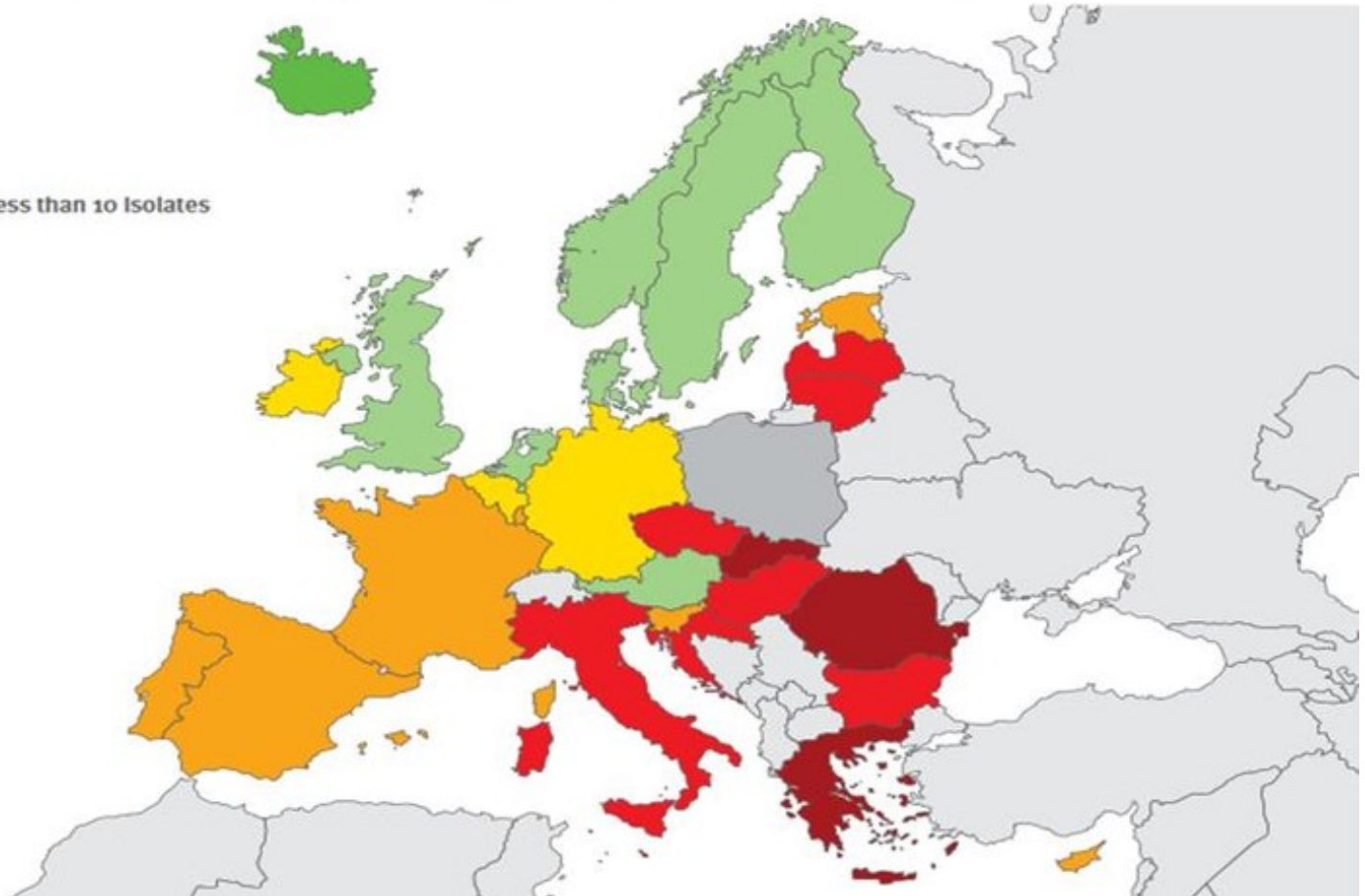
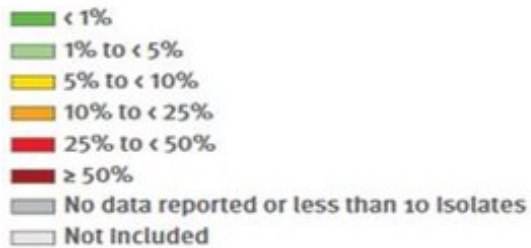
Data source: Braykov NB, Eber MR, Klein EY, Morgan DJ, Laxminarayan R. Trends in Resistance to Carbapenems and Third- Generation Cephalosporins among Clinical Isolates of *Klebsiella pneumoniae* in the United States, 1999-2010. *Infect Control and Hospital Epidemiology*. 2013; 34(3)



MRSA - EUROPE 2011



KLEBSIELLA - RESISTANCE TO CEPHALOSPORINS- EUROPE 2015



E. coli resistance to cephalosporins 2005 and 2012 (ESBL *E. Coli*)

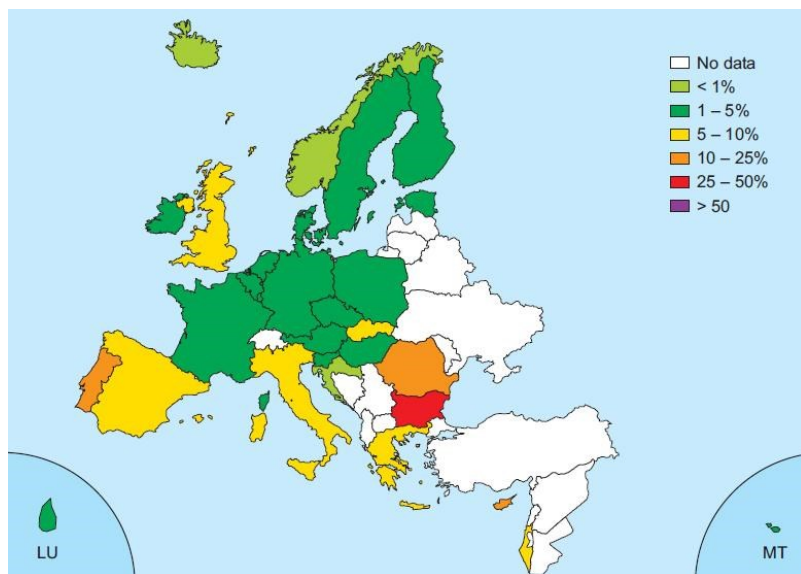
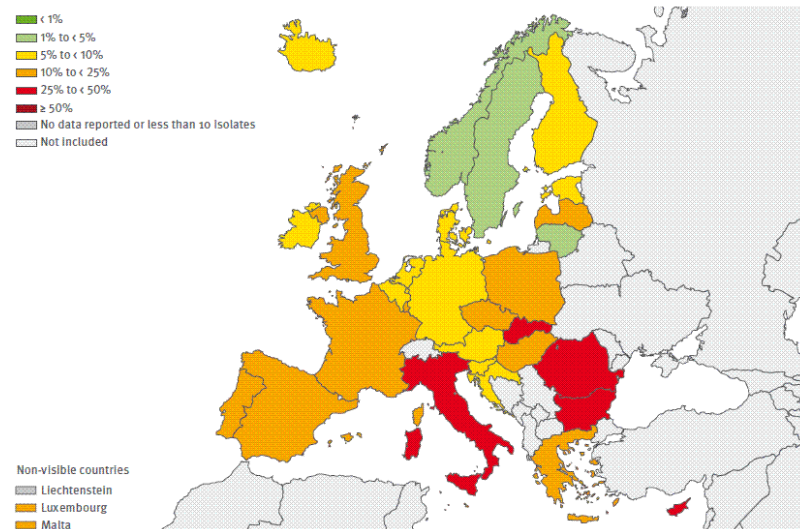


Figure 3.1. *Escherichia coli*. Percentage (%) of invasive isolates with resistance to third-generation cephalosporins by country, EU/EEA countries, 2012



I. ANTIBIOTIC STEWARDSHIP - POINTS

- **1. OPTIMAL EMPIRIC THERAPY (INITIATING)** - i.e. SEPSIS “**NO TIME TO BE ELEGANT**”. IT IS BASED ON ANTIBIOGRAMS
- **2. ANTIBIOTIC TIME-OUT (TAILORING)**
- **3. CHANGE FROM I.V. TO P.O. AS SON AS POSSIBLE. OPAT USE IF NOT POSSIBLE**

ANTIBIOTIC STEWARDSHIP

- **4. PHARMACOKINETICS - OPTIMAL DOSING**
- **5. THE SHORTEST DURATION OF THERAPY
(GUIDELINES, **MARKERS – PROCALCITONIN**
etc.)**
- **6. INFORMATION TECHNOLOGY**

ANTIBIOTIC STEWARDSHIP

- **7. PREAUTHORIZATION**
- **8. SCREENING – WHERE AND WHEN (ICU - HOW OFTEN?)**
- **9. AUDIT AND FEEDBACK – ROUNDS**

ANTIBIOTIC STEWARDSHIP

- **10. CLINICAL PROTOCOLS SPECIFIC TO EACH PARTICULAR HOSPITAL**
- **11. ALERGY TESTING TO ANTIBIOTICS**
- **12. EDUCATION**

II. WHO IS RESPONSIBLE FOR ALL THIS?

- INFECTION CONTROL COMMITTEE AND M.I.C.
- MICROBIOLOGY
- INFECTIOUS DISEASE
- EPIDEMIOLOGY
- CLINICAL PHARMACOLOGIST

MIKROBIOLOGY

- **ANTIBIOGRAM - EVERY YEAR**
- **USE NEW AND FAST DIAGNOSTIC METHODS (PCR, MALDI-TOF)**
- **CULTURES BEFORE EVERY
ANTIBIOTIC ADMINISTRATION**

ANTIBIOGRAM

COMMENTS

Enterococci:

Ampicillin (or amoxicillin) is the drug of choice for treating urinary tract infections caused by enterococci. Alternative agents include nitrofurantoin, tetracycline, or fluoroquinolones. Blood/CSF enterococci isolates are sent to reference lab for sensitivities. Beta lactamase performed at MCMH.

Haemophilus influenzae (38 isolates):

32% Beta lactamase positive

68% Beta lactamase negative

A beta lactamase positive result infers ampicillin resistance. Drugs that may be used empirically for treating beta lactamase positive strains:

1. Amoxicillin/clavulanate
2. Cephalosporins
3. Trimethoprim/sulfamethoxazole

Streptococcus pneumoniae (21 isolates):

0% high level resistance to penicillin

0% intermediate resistance to penicillin

100% susceptible to penicillin

100% susceptible to ceftriaxone (8 isolates)

100% susceptible to vancomycin (6 isolates)

Pneumococci susceptible to penicillin can be considered susceptible to ampicillin and third generation cephalosporins (i.e. ceftriaxone).

High dose intravenous penicillin or ampicillin is often effective in treating pneumococcal pneumonia caused by strains with "intermediate" resistance to penicillin.

Maine Coast Regional Health Facilities

MAINE COAST MEMORIAL HOSPITAL

50 Union Street, Ellsworth, Maine 04605

(207) 664-5311

Microbiology 664-5329 Pharmacy 664-5470



Antibiotic Sensitivity Report

January - December 2015

References: The Medical Letter and The Sanford Guide to Antimicrobial Therapy

Recommendations based on formulary and cost effectiveness.

Maine Coast Memorial Hospital Ellsworth, Maine

GRAM POSITIVE

Antibiotic Susceptibility, January through December 2015

GRAM POSITIVE		PERCENT SUSCEPTIBLE	
FORM	ANTIBIOTIC	Staph aureus	Staph coagulase negative
IV PO	AMPICILLIN IV AMOXICILLIN PO	Not Tested	Not Tested
IV PO	CEFZOLIN (ANCEF) CEPHALEXIN (KEFLEX)	84	47
IV PO	CLINDAMYCIN	83	75
IV	GENTAMICIN	100	95
IV PO	LEVOFLOXACIN	79	32
IV PO	OXACILLIN DICLOXACILLIN	64	47
PO	TETRACYCLINE	97	85
IV PO	TRIMETH / SULFA 160 mg / 800 mg	98	51
IV	VANCOMYCIN	100	100
PO	**VANCOMYCIN ORAL	NA	NA
TOTAL ISOLATES TESTED		289	59

**Clostridium difficile only
 • Preferred treatment: Metronidazole 500 mg PO q8h x 10 days
 • Vancomycin 125 mg PO q6h x 10 days if metronidazole failure or no improvement within 3 days, pregnancy, or as initial therapy for severe disease
 NA = not appropriate

Maine Coast Memorial Hospital Ellsworth, Maine

GRAM NEGATIVE

Antibiotic Susceptibility, January through December 2015

GRAM NEGATIVE (SPUTUM, BLOOD, SYSTEMIC)		PERCENT SUSCEPTIBLE										
FORM	ANTIBIOTIC	Klebsiella pneumoniae	E. coli	Enterobacter cloacae	Pseudomonas	Pseudomonas aeruginosa	Morganella morganii	Serratia marcescens	Klebsiella oxytoca	Chryseobacterium indologenes	Enterobacter	Enterobacter
IV/PO	AMPICILLIN / AMOXICILLIN	0	62	NT	88	NA	0	NT	0	NT	NT	NT
IV	Cefepime (MAXIPIME)	97	95	100	95	96	100	100	100	100	100	100
IV	CEFTAZIDIME (FORTAZ)	97	95	74	96	90	100	100	100	90	87	87
IV	CEFTRIAZONE (ROCEPHIN)	97	96	84	96	NA	100	100	100	90	80	87
IV/PO	LEVOFLOXACIN	98	83	87	85	88	86	100	100	95	95	96
IV	GENTAMICIN	98	96	94	93	97	93	100	100	95	100	100
IV	MEROPENEM	100	100	100	82	97	93	NT	100	100	100	100
PO	NITROFURANTOIN (NOT for Elderly or CrCl < 60ml/min)	41	97	39	0	0	0	0	92	95	0	0
IV	PIPERACILLINTAZO / (ZOSYN)	98	98	91	100	100	100	NT	92	95	87	87
IV	AMPICILLIN/SULBACTAM	89	69	NT	93	0	0	NT	69	NT	NT	NT
IV/PO	TRIMETH / SULFA (BACTRIM)	96	84	74	77	NA	71	100	97	100	100	100
TOTAL ISOLATES TESTED		175	1075	31	84	68	14	10	39	20	23	23

NA = not appropriate; NT = not tested

Please refer to back for comments about this report

I. D. SPECIALIST

- HAS PATIENT CONTACT
- ICC COMMITTEE MEMBER
- MAKES GUIDELINES (sepsis, pneumonia, uti, S. aureus bacteremia, surgical prophylaxis)
- COLONIZATION vs INFECTION DIFFERENTIATION
- EVIDENCE-BASED MEDICINE

EPIDEMIOLOGIST

- **GOOD ISOLATION PRACTICE (CDI, MDRO, MRSA)**
- **Surveillance**
- **DATA**

CLINICAL PHARMACIST

- **RENAL DOSING - AMINOGLYKOSIDES, VANKOMYCIN**
- **DRUG-DRUG INTERACTIONS**
- **PROLONGED INFUSIONS OF CEPHALOSPORINS, CARBAPENEMS, AMPICILLIN-SULBACTAM, PIP-TZ, VAN**

- **ALLERGY TESTING**
- **ALLERGY – WHAT IS AND WHAT IS NOT - DESENSITIZATION PROTOCOLS**



COMMON ABX MISTAKES

- **ASYMPTOMATIC BACTERIURIA TREATMENT**
- **COLONIZATION TREATMENT**
- **TOO LONG THERAPY**
- **NO FOREIGN MATERIAL REMOVAL**
- **BAD DOSING**

III. OUTCOME MEASURES

- **HOSPITALIZATION TIME**
- **No of PATIENTS WITH MDRO INFECTIONS**
- **CDI INCIDENCE**
- **MORTALITY ON CERTAIN INFECTIONS**
- **ANTIBIOTIC CONSUMPTION MEASUREMENT**
- **ANTIBIOGRAM**

CONSUMPTION MEASUREMENT

- DDD (defined daily dose)
- DOT (days of therapy)



“PATIENT AUDIT”

- **CULTURES BEFORE ANTIBIOTICS - TAKEN?**
- **GOOD EMPIRIC THERAPY - STARTED?**
- **GOOD DOSE GIVEN?**
- **48 HRS TIME OUT - DONE?**
- **DEESCALATION/TAILORING - DONE?**
- **I.V. TO P.O. - DONE?**
- **SHORTEST LENGTH OF THERAPY USED?**

IV. ANTIFUNGAL STEWARDSHIP

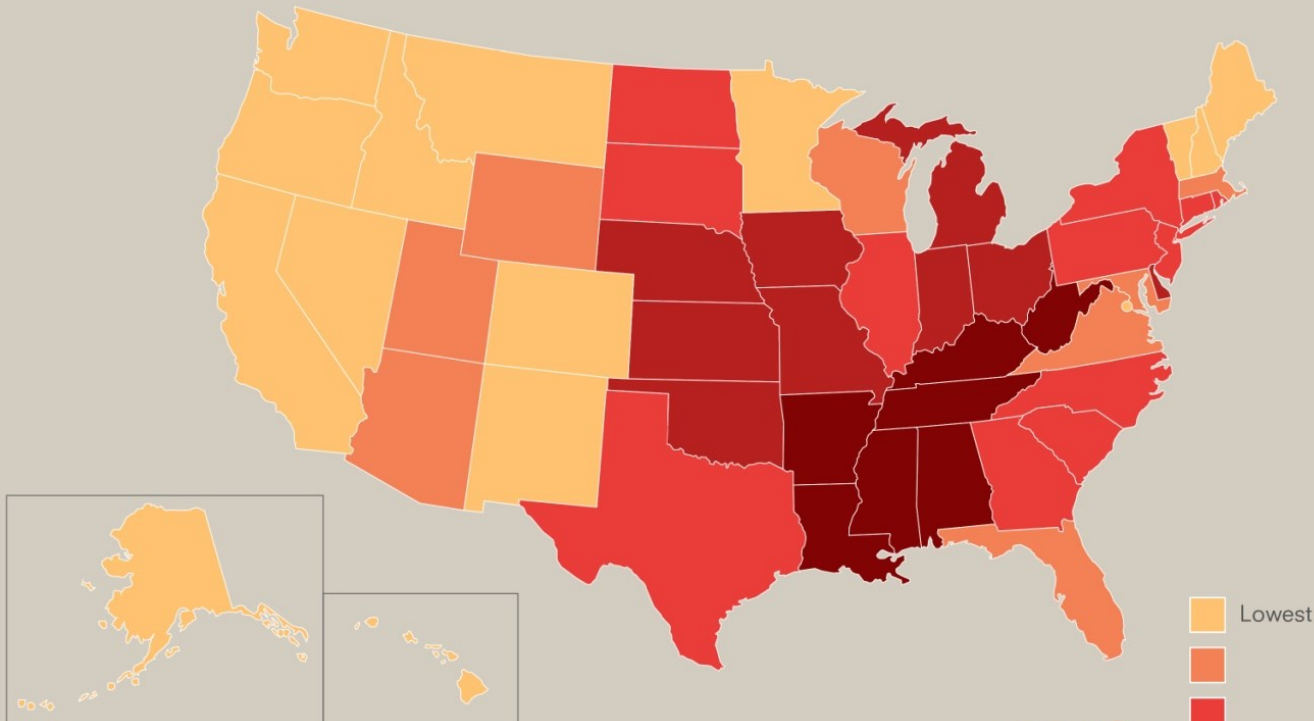
- BLOOD CULTURES
- FUNGAL ANTIGENS
- **Candida – Mannan-Ag**
- **Aspergillus- Galactomannan**
- **Beta-D-glucan**

V. ANTIBIOTIC STEWARDSHIP IN THE COMMUNITY

- SINUSITIS AND ACUTE PHARYNGITIS ETC.

Community Antibiotic Prescribing Rates by State (2013/2014)*

50% of all antibiotics prescribed in U.S. health provider offices are either unnecessary or inappropriate



*Antibiotic prescriptions per 1000 persons
Prescribing data from 2014; population data from 2013

'TAKE HOME MESSAGE'

- **COOPERATION**
- **EVERY HOSPITAL IS DIFFERENT**
- **MANAGEMENT SUPPORT IS VITAL**



**KEEP
CALM**

AND DO

**Antimicrobial
Stewardship**

