Coordinated Reporting of Antibiotic Use and Resistance Project: How PCORNET Data Use Models can be leveraged for NHSN reporting

Carlos A. Q. Santos, MD, MPHS

Rush University Medical Center

Chicago, Illinois

RUSH

Big Picture

- Data warehoused by electronic health record
  - Can be used for research

test_name	organism	ANTIBIOTIC	sensitivity	SENSITIVITY_VALUE	SENSITIVITY_UNITS	result	result_desc
URINE CULTURE	MORGANELLA MORGANII	Gentamicin	Sensitive	<=1	mcg/mL	NULL	Morganella morganii 50,000-100,000 CFU/mL
URINE CULTURE	MORGANELLA MORGANII	Tobramycin	Sensitive	<=2	mcg/mL	NULL	Morganella morganii 50,000-100,000 CFU/mL
URINE CULTURE	MORGANELLA MORGANII	Ertapenem	Sensitive	<=0.5	mcg/mL	NULL	Morganella morganii 50,000-100,000 CFU/mL
URINE CULTURE	MORGANELLA MORGANII	Piperacillin/Tazobactam	Sensitive	<=8	mcg/mL	NULL	Morganella morganii 50,000-100,000 CFU/mL
URINE CULTURE	MORGANELLA MORGANII	Cefoxitin	Resistant	>16	mcg/mL	NULL	Morganella morganii 50,000-100,000 CFU/mL
URINE CULTURE	MORGANELLA MORGANII	Cefazolin	Resistant	>16	mcg/mL	NULL	Morganella morganii 50,000-100,000 CFU/mL
URINE CULTURE	MORGANELLA MORGANII	Amikacin	Sensitive	<=8	mcg/mL	NULL	Morganella morganii 50,000-100,000 CFU/mL
URINE CULTURE	MORGANELLA MORGANII	Amoxicillin/Clavulanic acid	Resistant	>16/8	mcg/mL	NULL	Morganella morganii 50,000-100,000 CFU/mL
URINE CULTURE	MORGANELLA MORGANII	Ceftriaxone	Sensitive	<=1	mcg/mL	NULL	Morganella morganii 50,000-100,000 CFU/mL
URINE CULTURE	MORGANELLA MORGANII	Meropenem	Sensitive	<=1	mcg/mL	NULL	Morganella morganii 50,000-100,000 CFU/mL
URINE CULTURE	MORGANELLA MORGANII	Cefepime	Sensitive	<=2	mcg/mL	NULL	Morganella morganii 50,000-100,000 CFU/mL
URINE CULTURE	MORGANELLA MORGANII	Levofloxacin	Sensitive	<=1	mcg/mL	NULL	Morganella morganii 50,000-100,000 CFU/mL
URINE CULTURE	MORGANELLA MORGANII	Nitrofurantoin	Resistant	>64	mcg/mL	NULL	Morganella morganii 50,000-100,000 CFU/mL
URINE CULTURE	MORGANELLA MORGANII	Trimethoprim/Sulfamethoxazole	Sensitive	<=0.5/9.5	mcg/mL	NULL	Morganella morganii 50,000-100,000 CFU/mL
SPUTUM OR LEUKENS CULTURE	ESCHERICHIA COLI	Tobramycin	Sensitive	<=4	mcg/mL	NULL	Escherichia coli Light
SPUTUM OR LEUKENS CULTURE	ESCHERICHIA COLI	Cefazolin	Sensitive	<=2	mcg/mL	NULL	Escherichia coli Light
SPUTUM OR LEUKENS CULTURE	ESCHERICHIA COLI	Ceftazidime	Sensitive	<=1	mcg/mL	NULL	Escherichia coli Light
SPUTUM OR LEUKENS CULTURE	ESCHERICHIA COLI	Ceftriaxone	Sensitive	<=1	mcg/mL	NULL	Escherichia coli Light
SPUTUM OR LEUKENS CULTURE	ESCHERICHIA COLI	Trimethoprim/Sulfamethoxazole	Sensitive	<=2/38	mcg/mL	NULL	Escherichia coli Light
SPUTUM OR LEUKENS CULTURE	ESCHERICHIA COLI	Cefepime	Sensitive	<=4	mcg/mL	NULL	Escherichia coli Light
SPUTUM OR LEUKENS CULTURE	ESCHERICHIA COLI	Amoxicillin/Clavulanic acid	Sensitive	<=8/4	mcg/mL	NULL	Escherichia coli Light
SPUTUM OR LEUKENS CULTURE	ESCHERICHIA COLI	Gentamicin	Sensitive	<=2	mcg/mL	NULL	Escherichia coli Light
SPUTUM OR LEUKENS CULTURE	ESCHERICHIA COLI	Levofloxacin	Sensitive	<=2	mcg/mL	NULL	Escherichia coli Light
SPUTUM OR LEUKENS CULTURE	ESCHERICHIA COLI	Piperacillin/Tazobactam	Sensitive	<=16	mcg/mL	NULL	Escherichia coli Light
SPUTUM OR LEUKENS CULTURE	ESCHERICHIA COLI	Meropenem	Sensitive	<=1	mcg/mL	NULL	Escherichia coli Light
SPUTUM OR LEUKENS CULTURE	ESCHERICHIA COLI	Amikacin	Sensitive	<=16	mcg/mL	NULL	Escherichia coli Light
SPUTUM OR LEUKENS CULTURE	ESCHERICHIA COLI	Ertapenem	Sensitive	<=0.5	mcg/mL	NULL	Escherichia coli Light
SPUTUM OR LEUKENS CULTURE	ESCHERICHIA COLI	Ampicillin	Sensitive	<=8	mcg/mL	NULL	Escherichia coli Light
SPUTUM OR LEUKENS CULTURE	METHICILLIN RESISTA...	Rifampin	Sensitive	<=1	mcg/mL	NULL	Methicillin Resistant Staphylococcus aureus ...
SPUTUM OR LEUKENS CULTURE	METHICILLIN RESISTA...	Cefazolin	Resistant	>4	mcg/mL	NULL	Methicillin Resistant Staphylococcus aureus ...
SPUTUM OR LEUKENS CULTURE	METHICILLIN RESISTA...	Penicillin	Resistant	>8	mcg/mL	NULL	Methicillin Resistant Staphylococcus aureus ...

RUSH

Big Picture

- Collaborations are important
  - More data, more generalizability

RUSH

Big Picture

- Clinical trials
  - Are not always feasible
  - Do not capture real-world events and real-world patients
  - Expensive
- Necessitates other forms of investigation to answer clinical questions
  - Pharmacoepidemiology
  - Comparative effectiveness studies

Objectives

- PCORnet Data Use Models
  - Extended to include ancillary tables for antibiotic use and microbiology data
- Ancillary tables for antibiotic use and microbiology data
  - Used for NHSN reporting
- Other uses for ancillary tables
  - Information for antimicrobial stewardship, infection control and research

PCORnet

RUSH

PCORnet

- National patient-centered clinical research network
- Funded by Patient-Centered Outcomes Research Institute (PCORI)
- Creates data infrastructure and policies to support efficient clinical research
- Data capture on over 100 million patients within five years

PCORnet

ADVANCE

Accelerating Data Value Across a National Community Health Center Network (ADVANCE)

Oregon Community Health Information Network (OCHIN)

ARCH Accessible Research Commons for Health

Accessible Research Commons for Health (ARCH)

Harvard University

CAPriCORN

Chicago Area Patient Centered Outcomes Research Network (CAPriCORN)

The Chicago Community Trust

GPC Greater Plains Collaborative

Greater Plains Collaborative (GPC)

University of Kansas Medical Center

PORTAL

Kaiser Permanente & Strategic Partners Patient Outcomes Research To Advance Learning (PORTAL) Network

Kaiser Foundation Research Institute

REACHnet Research Action for Health Network

Research Action for Health Network (REACHnet)

Louisiana Public Health Institute (LPHI)

mid-south clinical data research network

Mid-South CDRN

Vanderbilt University

PEDSnet A Pediatric Learning Health System

National PEDSnet: A Pediatric Learning Health System

The Children's Hospital of Philadelphia

NYC-CDRN New York City Clinical Data Research Network

New York City Clinical Data Research Network (NYC-CDRN)

Weill Medical College of Cornell University

OneFlorida Clinical Research Consortium

OneFlorida Clinical Data Research Network

University of Florida

LEARN . STUDY . TRANSLATE . DISSEMINATE LHSNet www.lhsnet.org

Patient-Centered Network of Learning Health Systems (LHSNet)

Mayo Clinic

pSCANNER

Patient-oriented SCAlable National Network for Effectiveness Research (pSCANNER)

University of California, San Diego (UCSD)

PaTH Network patient empowered research

PaTH: Towards a Learning Health System

University of Pittsburgh

RUSH

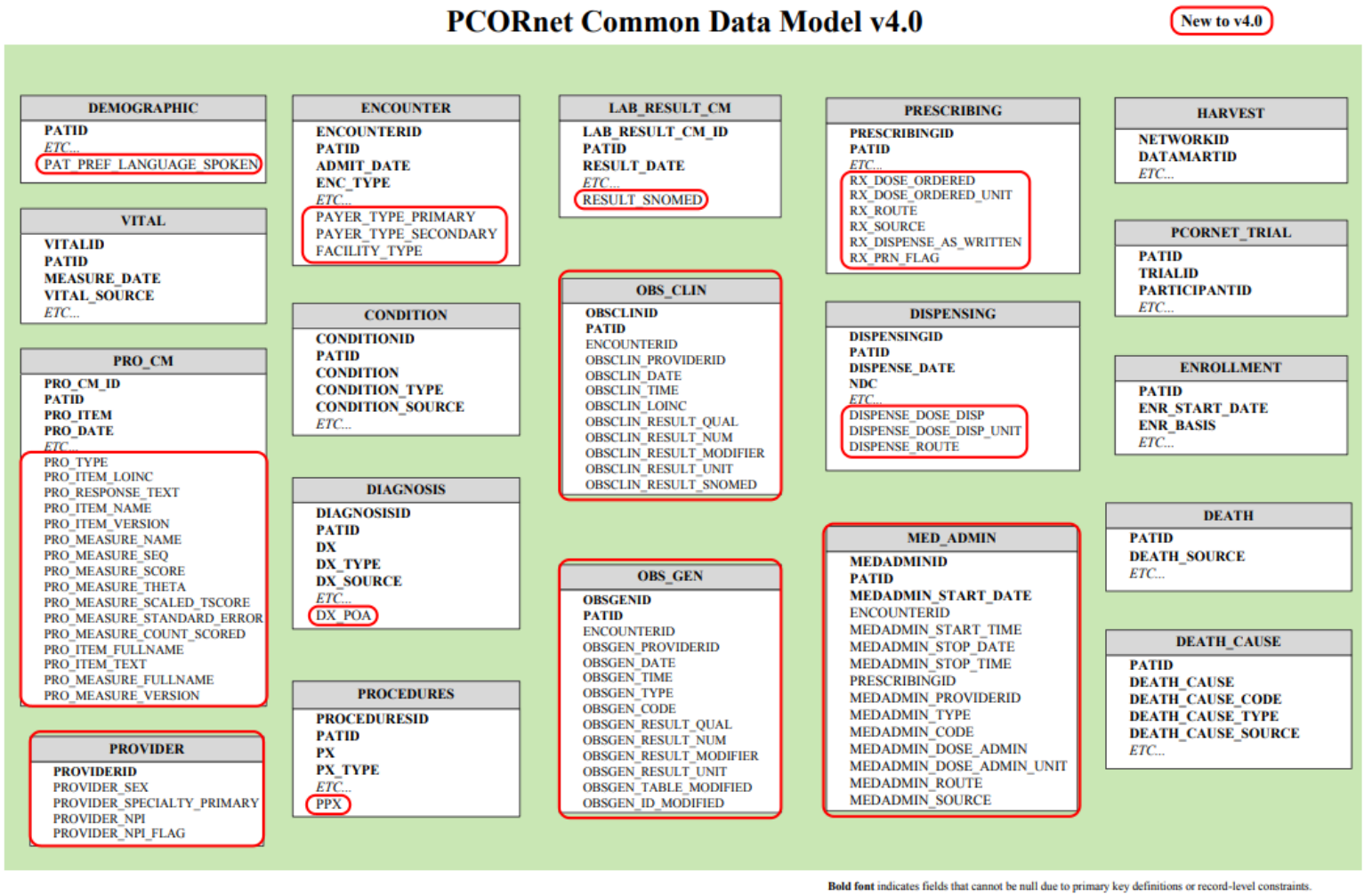
CAPriCORN

RUSH

PCORnet Common Data Model

- Way of organizing data into a standard structure
  - Each PCORnet partner maps data to the same consistent format
  - Enables more efficient responses to research related questions

PCORnet Common Data Model



RUSH

PCORnet Common Data Model

- DEMOGRAPHIC
  - Direct attributes of individual patients (sex, race)
- ENCOUNTER
  - Interactions between patients and providers within the context of healthcare delivery (admit date/time, facility location, discharge disposition)
- DIAGNOSIS
  - Results of diagnostic processes and medical coding within healthcare delivery

PCORnet Common Data Model

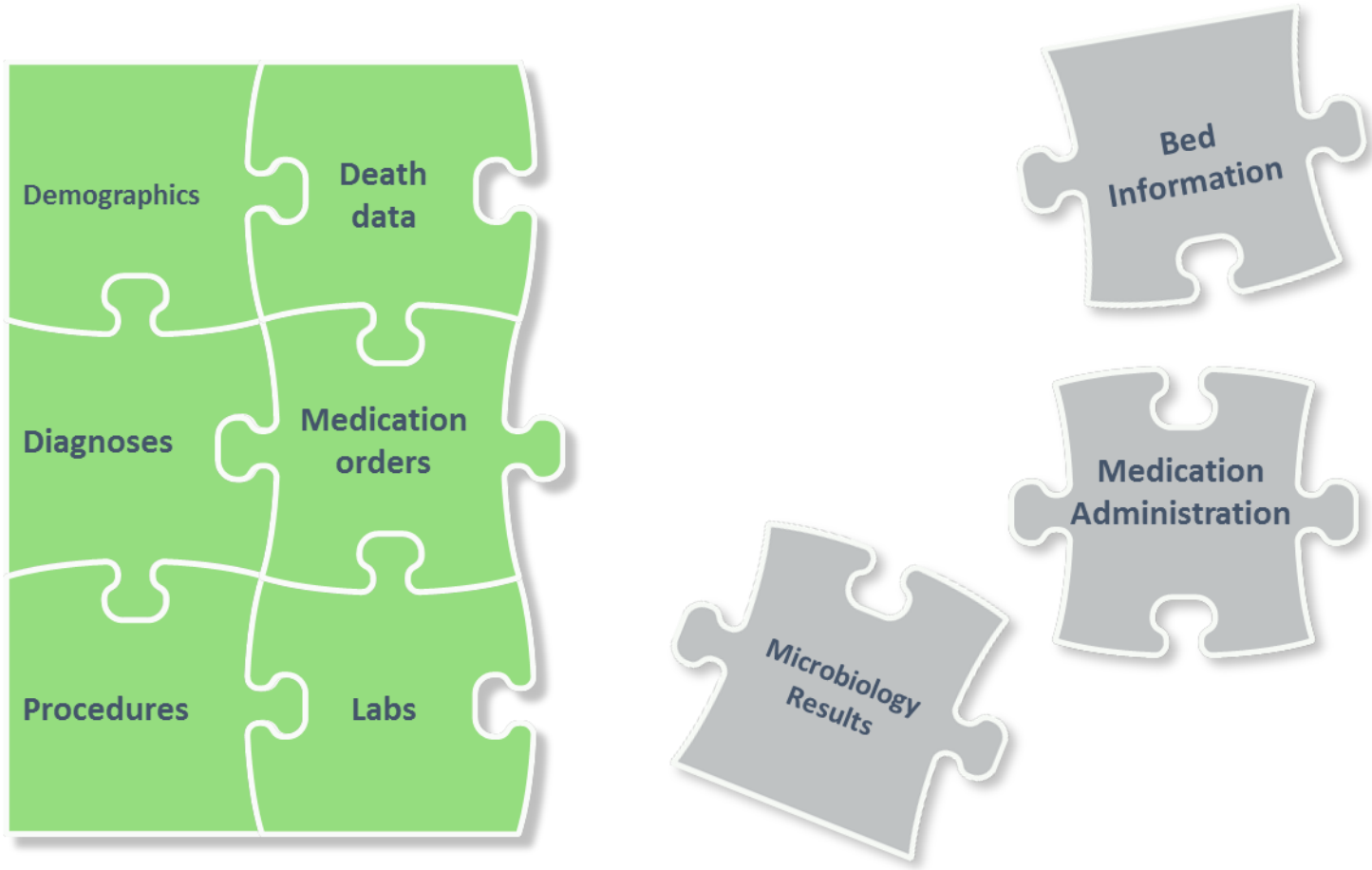
- PROCEDURES
  - Discrete interventions such as surgical procedures; also includes the date of the procedure
- VITAL
  - Vital signs (height, weight, diastolic blood pressure, systolic blood pressure, BMI)
- LAB RESULT CM
  - Measurements from blood and other body specimens; excludes microbiology

PCORnet Common Data Model

- DEATH
  - Reported mortality information
- DEATH_CAUSE
  - Individual causes associated with a reported death

http://pcornet.org/wp-content/uploads/2018/05/PCORnet-Common-Data-Model-v4-1-2018_05_15.pdf

PCORnet Common Data Model



RUSH

Ancillary Tables for Antimicrobial Use and Resistance

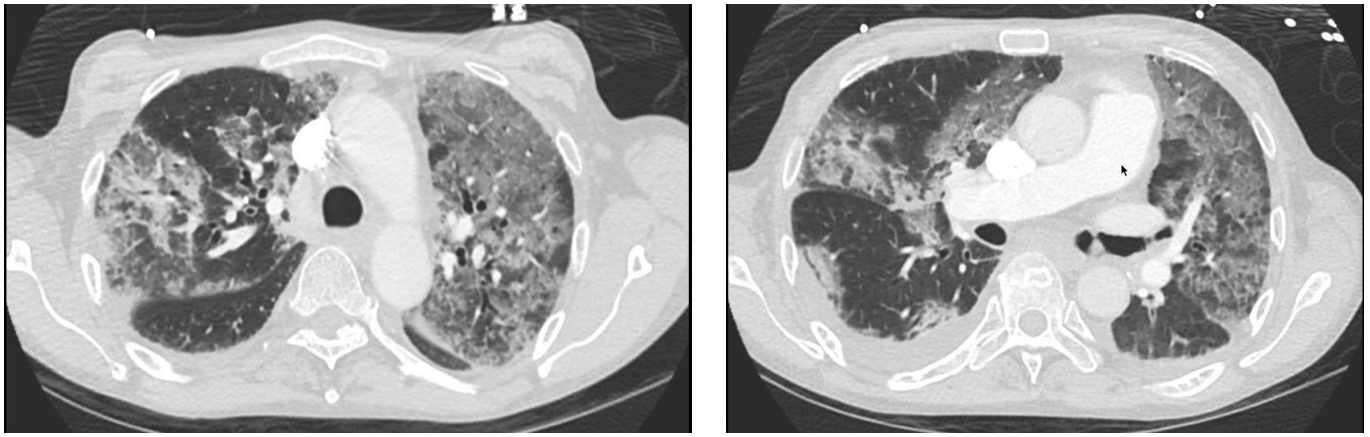
RUSH

Case

- 54 year-old male
- Primary sclerosing cholangitis and ESLD
- Admitted SICU in 4/10/17 for hyponatremia
  - MELD was 35, had been listed for liver transplant
- Underwent liver transplant on 4/12/17
  - Roux-en-Y reconstruction
  - Complicated by 10 liters of blood loss
  - SICU post-transplant, extubated 4/14/17

Case

- Developed fever to 101°F on 4/15/17
  - Accompanied by hypoxemia on the ventilator
  - CT chest: bilateral ground glass opacities



  - Started on Piperacillin-Tazobactam

RUSH

Case

- Developed fever to 104^{o}F on 4/18/17
  - Accompanied by hemodynamic instability
  - Changed to Meropenem
- Defervesced on 4/20/17
  - Extubated, transferred to surgical ward in 4/21/17
  - Stopped Meropenem on 4/23/17
- Discharged on 4/27/17

Case Metrics

- Present for 18 days in the hospital
  - 12 days in the SICU
  - 7 days in the surgical ward (1 day of overlap)
- Antimicrobials
  - 4 days of piperacillin-tazobactam
  - 6 days of meropenem
- Antimicrobial resistant bacteria
  - None isolated

Population-Level Metrics

- Admissions
- Days present
  - Facility
  - Patient care unit
- Antimicrobial use
- Antimicrobial resistance

Antimicrobial Use

- Widespread and often unnecessary use of antimicrobials
  - Key factor in the development of antimicrobial resistance
- Antimicrobial stewardship, important strategy
  - Monitor antimicrobial use to identify potentially inappropriate prescribing
  - Evaluate effectiveness of antimicrobial stewardship interventions

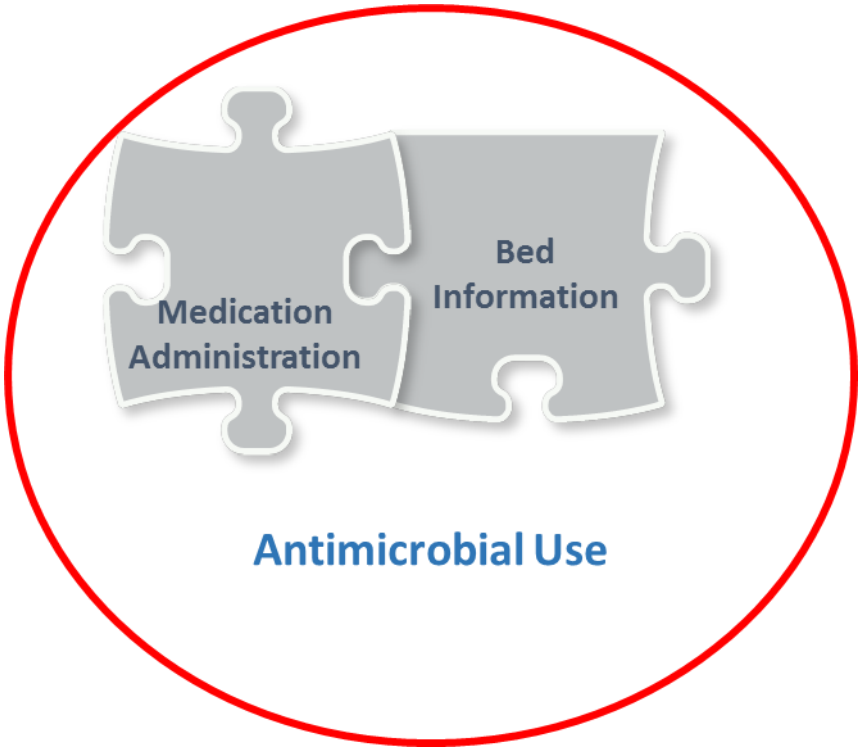
Antimicrobial Use

- National Healthcare Safety Network (NHSN)
  - Developed an antimicrobial use module to facilitate the measurement of antimicrobial usage
  - Facility-wide antimicrobial days per 1,000 days present
  - Facility-wide antimicrobial days per 100 admissions
  - Patient care unit antimicrobial days per 1,000 days present

Antimicrobial Use

- Uptake of the module has been limited
  - Challenges in electronically deriving measures of antimicrobial use
  - Complex and variable information technology systems
- Consequence
  - Poorly validated measures of antimicrobial use
  - Paucity of data available to public health agencies on antimicrobial use in hospitals nationwide

Antimicrobial Use



Genesis Project: PCORI, FDA, Reagan-Udall Foundation

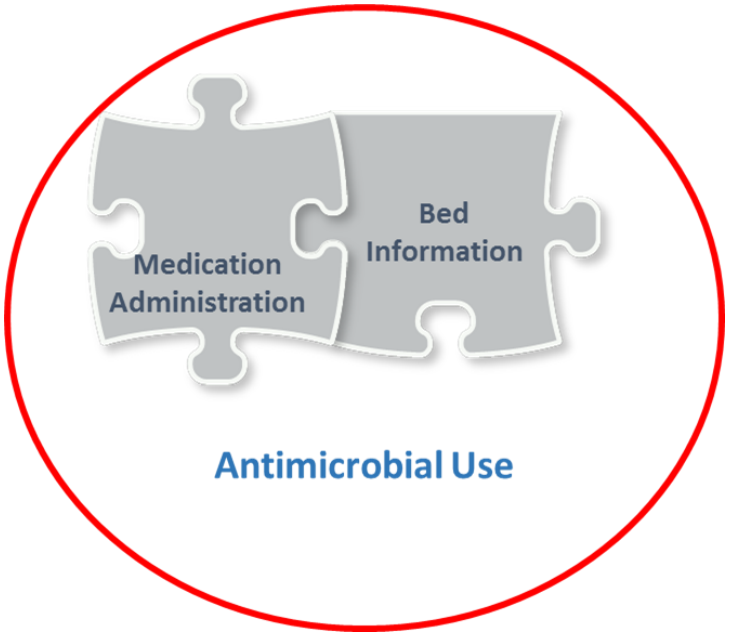
RUSH

Antimicrobial Use

- Developed a common data model
  - Generate NHSN antimicrobial use metrics
  - Open source, builds on PCORnet tables
  - Design and population of ancillary tables and queries
  - Developed across five large medical centers to ensure scalability

Bed Information Table

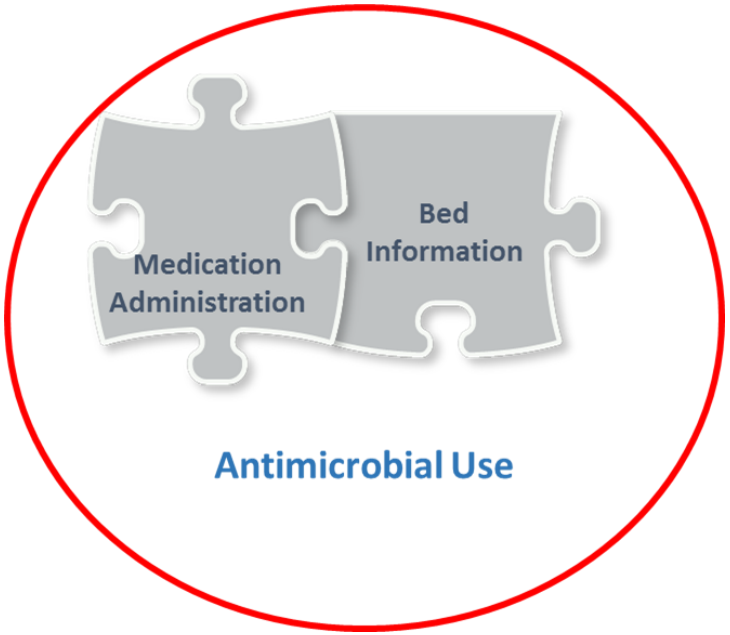
- Patient ID
- Encounter ID
- Unit information
  - NHSN unit type
- Bed code
- Start date/time
- End date/time



RUSH

Inpatient Drug Administration Table

- Patient ID
- Encounter ID
- Medication information
  - RXNORM ingredient code
  - Name, route, dose
  - Administration date/time
  - Administration location



RUSH

Query

```
---ANALYTICAL QUERIES----

create table ANTMappedInformation (value varchar(10), code varchar(10), displayName varchar(50), codeSystemName varchar(10), codeSystem varchar(30))

insert into ANTMappedInformation values ('620', 'AMAN', 'AMAN - Amantadine', 'RxNorm', '2.16.840.1.113883.6.88')
insert into ANTMappedInformation values ('641', 'AMK', 'AMK - Amikacin', 'RxNorm', '2.16.840.1.113883.6.88')
insert into ANTMappedInformation values ('723', 'AMOX', 'AMOX - Amoxicillin', 'RxNorm', '2.16.840.1.113883.6.88')
insert into ANTMappedInformation values ('19711', 'AMOXWC', 'AMOXWC - Amoxicillin with Clavulanate', 'RxNorm', '2.16.840.1.113883.6.88')
insert into ANTMappedInformation values ('733', 'AMP', 'AMP - Ampicillin', 'RxNorm', '2.16.840.1.113883.6.88')
insert into ANTMappedInformation values ('732', 'AMPH', 'AMPH - Amphotericin B', 'RxNorm', '2.16.840.1.113883.6.88')
insert into ANTMappedInformation values ('236594', 'AMPHOT', 'AMPHOT- Amphotericin B Liposomal', 'RxNorm', '2.16.840.1.113883.6.88')
insert into ANTMappedInformation values ('1009148', 'AMPIWS', 'AMPIWS - Ampicillin with Sulbactam', 'RxNorm', '2.16.840.1.113883.6.88')
insert into ANTMappedInformation values ('341018', 'ANID', 'ANID - Anidulafungin', 'RxNorm', '2.16.840.1.113883.6.88')
insert into ANTMappedInformation values ('18631', 'AZITH', 'AZITH - Azithromycin', 'RxNorm', '2.16.840.1.113883.6.88')
insert into ANTMappedInformation values ('1272', 'AZT', 'AZT - Aztreonam', 'RxNorm', '2.16.840.1.113883.6.88')
insert into ANTMappedInformation values ('140108', 'CASPO', 'CASPO - Caspofungin', 'RxNorm', '2.16.840.1.113883.6.88')
insert into ANTMappedInformation values ('2176', 'CEFAC', 'CEFAC - Cefaclor', 'RxNorm', '2.16.840.1.113883.6.88')
insert into ANTMappedInformation values ('2177', 'CEFAD', 'CEFAD - Cefadroxil', 'RxNorm', '2.16.840.1.113883.6.88')
insert into ANTMappedInformation values ('2180', 'CEFAZ', 'CEFAZ - Cefazolin', 'RxNorm', '2.16.840.1.113883.6.88')
insert into ANTMappedInformation values ('25037', 'CEFDIN', 'CEFDIN - Cefdinir', 'RxNorm', '2.16.840.1.113883.6.88')
insert into ANTMappedInformation values ('83682', 'CEFDIT', 'CEFDIT - Cefditoren', 'RxNorm', '2.16.840.1.113883.6.88')
insert into ANTMappedInformation values ('20481', 'CEFEP', 'CEFEP - Cefepime', 'RxNorm', '2.16.840.1.113883.6.88')
insert into ANTMappedInformation values ('25033', 'CEFIX', 'CEFIX - Cefixime', 'RxNorm', '2.16.840.1.113883.6.88')
insert into ANTMappedInformation values ('2186', 'CEFOT', 'CEFOT - Cefotaxime', 'RxNorm', '2.16.840.1.113883.6.88')
insert into ANTMappedInformation values ('2189', 'CEFOX', 'CEFOX - Cefoxitin', 'RxNorm', '2.16.840.1.113883.6.88')
insert into ANTMappedInformation values ('20489', 'CEFPO', 'CEFPO - Cefpodoxime', 'RxNorm', '2.16.840.1.113883.6.88')
insert into ANTMappedInformation values ('19552', 'CEFPRO', 'CEFPRO - Cefprozil', 'RxNorm', '2.16.840.1.113883.6.88')
insert into ANTMappedInformation values ('1040005', 'CEFTAR', 'CEFTAR - Ceftaroline', 'RxNorm', '2.16.840.1.113883.6.88')
insert into ANTMappedInformation values ('1820-0', 'CEFTAVI', 'CEFTAVI- Ceftazidime/Avibactam', 'cdcNHSN', '2.16.840.1.113883.6.277')
insert into ANTMappedInformation values ('2191', 'CEFTAZ', 'CEFTAZ - Ceftazidime', 'RxNorm', '2.16.840.1.113883.6.88')
insert into ANTMappedInformation values ('20492', 'CEFTIB', 'CEFTIB - Ceftibuten', 'RxNorm', '2.16.840.1.113883.6.88')
insert into ANTMappedInformation values ('2192', 'CEFTIZ', 'CEFTIZ - Ceftizoxime', 'RxNorm', '2.16.840.1.113883.6.88')
insert into ANTMappedInformation values ('1818-4', 'CEFTOTAZ', 'CEFTOTAZ- Ceftolozane/Tazobactam', 'cdcNHSN', '2.16.840.1.113883.6.277')
insert into ANTMappedInformation values ('2193', 'CEFTRX', 'CEFTRX - Ceftriaxone', 'RxNorm', '2.16.840.1.113883.6.88')
insert into ANTMappedInformation values ('2194', 'CEFUR', 'CEFUR - Cefuroxime', 'RxNorm', '2.16.840.1.113883.6.88')
insert into ANTMappedInformation values ('2231', 'CEPHLX', 'CEPHLX - Cephalexin', 'RxNorm', '2.16.840.1.113883.6.88')
insert into ANTMappedInformation values ('2348', 'CHLOR', 'CHLOR - Chloramphenicol', 'RxNorm', '2.16.840.1.113883.6.88')
insert into ANTMappedInformation values ('2551', 'CIPRO', 'CIPRO - Ciprofloxacin', 'RxNorm', '2.16.840.1.113883.6.88')
insert into ANTMappedInformation values ('21212', 'CLARTH', 'CLARTH - Clarithromycin', 'RxNorm', '2.16.840.1.113883.6.88')
insert into ANTMappedInformation values ('2582', 'CLIND', 'CLIND - Clindamycin', 'RxNorm', '2.16.840.1.113883.6.88')
insert into ANTMappedInformation values ('2708', 'COLIST', 'COLIST - Colistimethate', 'RxNorm', '2.16.840.1.113883.6.88')
insert into ANTMappedInformation values ('2187', 'CTET', 'CTET - Cefotetan', 'RxNorm', '2.16.840.1.113883.6.88')
insert into ANTMappedInformation values ('1815-0', 'DALBA', 'DALBA- Dalbavancin', 'cdcNHSN', '2.16.840.1.113883.6.277')
insert into ANTMappedInformation values ('22299', 'DAPTO', 'DAPTO - Daptomycin', 'RxNorm', '2.16.840.1.113883.6.88')
insert into ANTMappedInformation values ('3356', 'DICLOX', 'DICLOX - Dicloxacillin', 'RxNorm', '2.16.840.1.113883.6.88')
insert into ANTMappedInformation values ('119771', 'DORI', 'DORI - Doripenem', 'RxNorm', '2.16.840.1.113883.6.88')
insert into ANTMappedInformation values ('3640', 'DOXY', 'DOXY - Doxycycline', 'RxNorm', '2.16.840.1.113883.6.88')
insert into ANTMappedInformation values ('325642', 'ERTA', 'ERTA - Ertapenem', 'RxNorm', '2.16.840.1.113883.6.88')
insert into ANTMappedInformation values ('4053', 'ERYTH', 'ERYTH - Erythromycin', 'RxNorm', '2.16.840.1.113883.6.88')
```

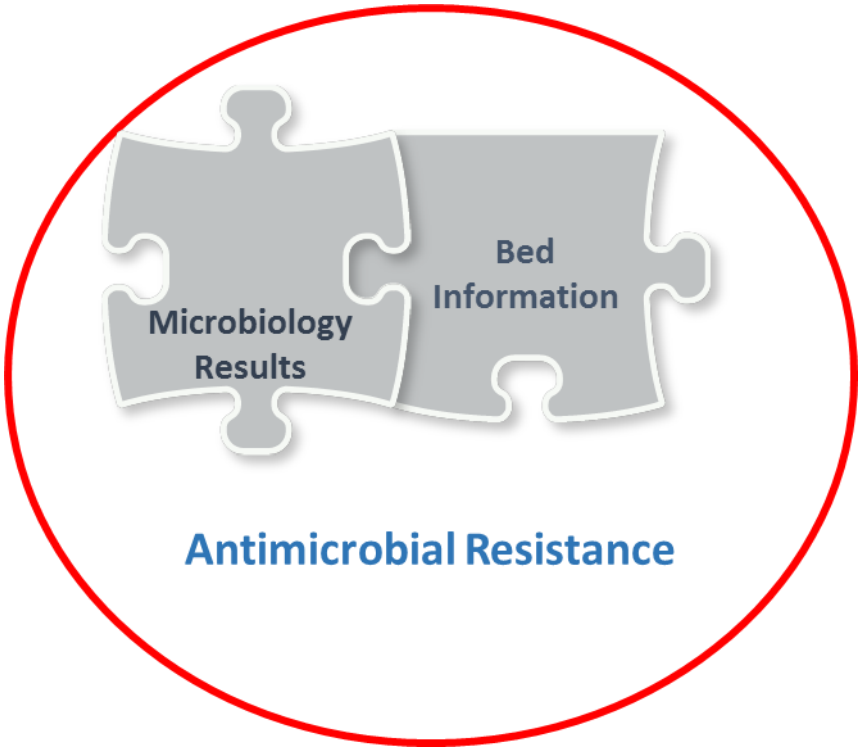
RUSH

Antimicrobial Use

YearMonth	Admissions
201702	2600

YearMonth	AntMapValue	AntMapCode	AntMapDisplayName	AntMapCodeSystemName	AntMapCodeSystem	PtPresentDays	TherapyDays
201702	620	AMAN	AMAN - Amantadine	RxNorm	2.16.840.1.113883.6.88	16340	132
201702	641	AMK	AMK - Amikacin	RxNorm	2.16.840.1.113883.6.88	16340	8
201702	723	AMOX	AMOX - Amoxicillin	RxNorm	2.16.840.1.113883.6.88	16340	308
201702	19711	AMOXWC	AMOXWC - Amoxicillin with Clavulanate	RxNorm	2.16.840.1.113883.6.88	16340	263
201702	733	AMP	AMP - Ampicillin	RxNorm	2.16.840.1.113883.6.88	16340	60
201702	1009148	AMPIWS	AMPIWS - Ampicillin with Sulbactam	RxNorm	2.16.840.1.113883.6.88	16340	146
201702	18631	AZITH	AZITH - Azithromycin	RxNorm	2.16.840.1.113883.6.88	16340	93
201702	1272	AZT	AZT - Aztreonam	RxNorm	2.16.840.1.113883.6.88	16340	13
201702	2177	CEFAD	CEFAD - Cefadroxil	RxNorm	2.16.840.1.113883.6.88	16340	43
201702	2180	CEFAZ	CEFAZ - Cefazolin	RxNorm	2.16.840.1.113883.6.88	16340	873
201702	25037	CEFDIN	CEFDIN - Cefdinir	RxNorm	2.16.840.1.113883.6.88	16340	15
201702	20481	CEFEP	CEFEP - Cefepime	RxNorm	2.16.840.1.113883.6.88	16340	471
201702	2189	CEFOX	CEFOX - Cefoxitin	RxNorm	2.16.840.1.113883.6.88	16340	46
201702	2191	CEFTAZ	CEFTAZ - Ceftazidime	RxNorm	2.16.840.1.113883.6.88	16340	3
201702	2193	CEFTRX	CEFTRX - Ceftriaxone	RxNorm	2.16.840.1.113883.6.88	16340	322
201702	2231	CEPHLX	CEPHLX - Cephalexin	RxNorm	2.16.840.1.113883.6.88	16340	89
201702	2551	CIPRO	CIPRO - Ciprofloxacin	RxNorm	2.16.840.1.113883.6.88	16340	10
201702	21212	CLARTH	CLARTH - Clarithromycin	RxNorm	2.16.840.1.113883.6.88	16340	18
201702	2582	CLIND	CLIND - Clindamycin	RxNorm	2.16.840.1.113883.6.88	16340	312
201702	22299	DAPTO	DAPTO - Daptomycin	RxNorm	2.16.840.1.113883.6.88	16340	38
201702	3640	DOXY	DOXY - Doxycycline	RxNorm	2.16.840.1.113883.6.88	16340	152
201702	325642	ERTA	ERTA - Ertapenem	RxNorm	2.16.840.1.113883.6.88	16340	49
201702	4053	ERYTH	ERYTH - Erythromycin	RxNorm	2.16.840.1.113883.6.88	16340	236

Antimicrobial Resistance



IDPH funded

RUSH

Antimicrobial Resistance

- National Healthcare Safety Network (NHSN)
  - Developed an antimicrobial resistance module to facilitate the measurement of antimicrobial resistance
- Denominators
  - Facility wide: admissions and patient days present
  - Unit level: number of isolates for the specific organism tested

Antimicrobial Resistance

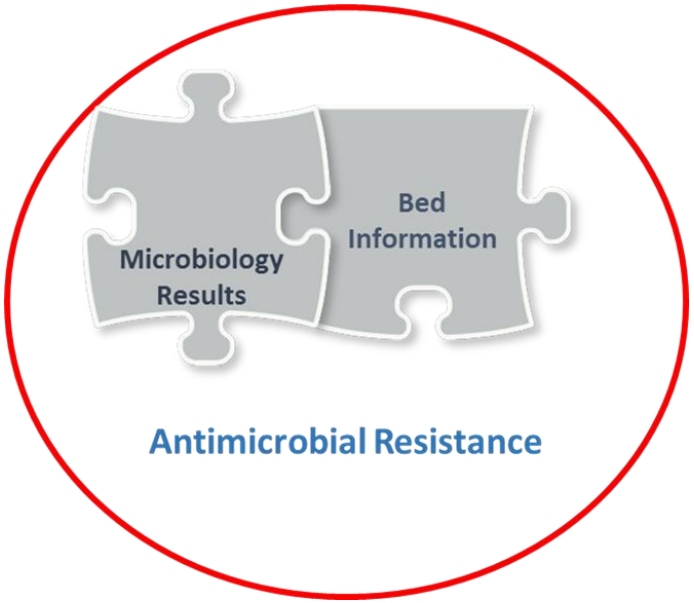
- Numerators
  - Eligible isolates that are antimicrobial resistant
    - *Acinetobacter*
    - *Candida*
    - *Citrobacter freundii*
    - *Enterobacter*
    - *Enterococcus*
    - *Escherichia coli*
    - Group B Streptococcus
    - *Klebsiella oxytoca*

Antimicrobial Resistance

- Numerators
  - Eligible isolates that are antimicrobial resistant
    - *Klebsiella pneumoniae*
    - *Morganella morganii*
    - *Proteus mirabilis*
    - *Pseudomonas aeruginosa*
    - *Serratia marcescens*
    - *Staphylococcus aureus*
    - *Stenotrophomonas maltophilia*
    - *Streptococcus pneumoniae*

Microbiology Test Table

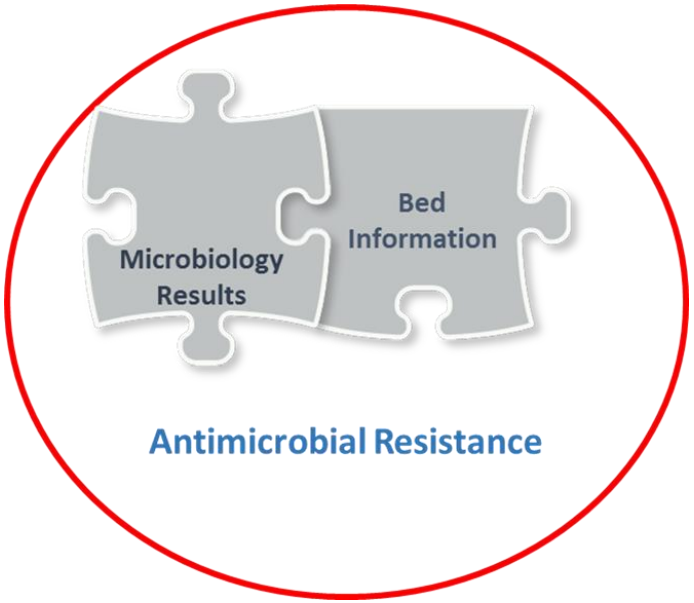
- Patient ID
- Encounter ID
- Order ID
- Test name
- Specimen source
- Collection date/time



RUSH

Microbiology Result Table

- Encounter ID
- Order ID
- Test name
- Organism
- Antibiotic susceptibility
- Other miscellaneous results



RUSH

Microbiology Result Table

test_name	organism	ANTIBIOTIC	sensitivity	SENSITIVITY_VALUE	SENSITIVITY_UNITS	result	result_desc
URINE CULTURE	MORGANELLA MORGANII	Gentamicin	Sensitive	<=1	mcg/mL	NULL	Morganella morganii 50,000-100,000 CFU/mL
URINE CULTURE	MORGANELLA MORGANII	Tobramycin	Sensitive	<=2	mcg/mL	NULL	Morganella morganii 50,000-100,000 CFU/mL
URINE CULTURE	MORGANELLA MORGANII	Ertapenem	Sensitive	<=0.5	mcg/mL	NULL	Morganella morganii 50,000-100,000 CFU/mL
URINE CULTURE	MORGANELLA MORGANII	Piperacillin/Tazobactam	Sensitive	<=8	mcg/mL	NULL	Morganella morganii 50,000-100,000 CFU/mL
URINE CULTURE	MORGANELLA MORGANII	Cefoxitin	Resistant	>16	mcg/mL	NULL	Morganella morganii 50,000-100,000 CFU/mL
URINE CULTURE	MORGANELLA MORGANII	Cefazolin	Resistant	>16	mcg/mL	NULL	Morganella morganii 50,000-100,000 CFU/mL
URINE CULTURE	MORGANELLA MORGANII	Amikacin	Sensitive	<=8	mcg/mL	NULL	Morganella morganii 50,000-100,000 CFU/mL
URINE CULTURE	MORGANELLA MORGANII	Amoxicillin/Clavulanic acid	Resistant	>16/8	mcg/mL	NULL	Morganella morganii 50,000-100,000 CFU/mL
URINE CULTURE	MORGANELLA MORGANII	Ceftriaxone	Sensitive	<=1	mcg/mL	NULL	Morganella morganii 50,000-100,000 CFU/mL
URINE CULTURE	MORGANELLA MORGANII	Meropenem	Sensitive	<=1	mcg/mL	NULL	Morganella morganii 50,000-100,000 CFU/mL
URINE CULTURE	MORGANELLA MORGANII	Cefepime	Sensitive	<=2	mcg/mL	NULL	Morganella morganii 50,000-100,000 CFU/mL
URINE CULTURE	MORGANELLA MORGANII	Levofloxacin	Sensitive	<=1	mcg/mL	NULL	Morganella morganii 50,000-100,000 CFU/mL
URINE CULTURE	MORGANELLA MORGANII	Nitrofurantoin	Resistant	>64	mcg/mL	NULL	Morganella morganii 50,000-100,000 CFU/mL
URINE CULTURE	MORGANELLA MORGANII	Trimethoprim/Sulfamethoxazole	Sensitive	<=0.5/9.5	mcg/mL	NULL	Morganella morganii 50,000-100,000 CFU/mL
SPUTUM OR LEUKENS CULTURE	ESCHERICHIA COLI	Tobramycin	Sensitive	<=4	mcg/mL	NULL	Escherichia coli Light
SPUTUM OR LEUKENS CULTURE	ESCHERICHIA COLI	Cefazolin	Sensitive	<=2	mcg/mL	NULL	Escherichia coli Light
SPUTUM OR LEUKENS CULTURE	ESCHERICHIA COLI	Ceftazidime	Sensitive	<=1	mcg/mL	NULL	Escherichia coli Light
SPUTUM OR LEUKENS CULTURE	ESCHERICHIA COLI	Ceftriaxone	Sensitive	<=1	mcg/mL	NULL	Escherichia coli Light
SPUTUM OR LEUKENS CULTURE	ESCHERICHIA COLI	Trimethoprim/Sulfamethoxazole	Sensitive	<=2/38	mcg/mL	NULL	Escherichia coli Light
SPUTUM OR LEUKENS CULTURE	ESCHERICHIA COLI	Cefepime	Sensitive	<=4	mcg/mL	NULL	Escherichia coli Light
SPUTUM OR LEUKENS CULTURE	ESCHERICHIA COLI	Amoxicillin/Clavulanic acid	Sensitive	<=8/4	mcg/mL	NULL	Escherichia coli Light
SPUTUM OR LEUKENS CULTURE	ESCHERICHIA COLI	Gentamicin	Sensitive	<=2	mcg/mL	NULL	Escherichia coli Light
SPUTUM OR LEUKENS CULTURE	ESCHERICHIA COLI	Levofloxacin	Sensitive	<=2	mcg/mL	NULL	Escherichia coli Light
SPUTUM OR LEUKENS CULTURE	ESCHERICHIA COLI	Piperacillin/Tazobactam	Sensitive	<=16	mcg/mL	NULL	Escherichia coli Light
SPUTUM OR LEUKENS CULTURE	ESCHERICHIA COLI	Meropenem	Sensitive	<=1	mcg/mL	NULL	Escherichia coli Light
SPUTUM OR LEUKENS CULTURE	ESCHERICHIA COLI	Amikacin	Sensitive	<=16	mcg/mL	NULL	Escherichia coli Light
SPUTUM OR LEUKENS CULTURE	ESCHERICHIA COLI	Ertapenem	Sensitive	<=0.5	mcg/mL	NULL	Escherichia coli Light
SPUTUM OR LEUKENS CULTURE	ESCHERICHIA COLI	Ampicillin	Sensitive	<=8	mcg/mL	NULL	Escherichia coli Light
SPUTUM OR LEUKENS CULTURE	METHICILLIN RESISTA...	Rifampin	Sensitive	<=1	mcg/mL	NULL	Methicillin Resistant Staphylococcus aureus ...
SPUTUM OR LEUKENS CULTURE	METHICILLIN RESISTA...	Cefazolin	Resistant	>4	mcg/mL	NULL	Methicillin Resistant Staphylococcus aureus ...
SPUTUM OR LEUKENS CULTURE	METHICILLIN RESISTA...	Penicillin	Resistant	>8	mcg/mL	NULL	Methicillin Resistant Staphylococcus aureus ...

RUSH

Using Large Observational Data for Research

RUSH

Case

- 60/M with end stage renal disease secondary to diabetes mellitus
- Underwent a deceased donor kidney transplant
- Anti-thymocyte globulin
- Tacrolimus, Mycophenolate and Prednisone
- The recipient is CMV seronegative
- The donor is CMV seronegative

Case

- What strategy would you recommend to prevent CMV disease?

A. None needed
B. Valganciclovir 900 mg PO QD x 6 months
C. Valganciclovir 900 mg PO QD x 3 months
D. Valacyclovir 2 g PO TID x 3 months
E. Ganciclovir 1 g PO TID x 3 months

Clin Transplant 2016: 30: 435–444 DOI: 10.1111/ctr.12706

Clinical Transplantation

Pharmacoepidemiology of cytomegalovirus prophylaxis in a large retrospective cohort of kidney transplant recipients with Medicare Part D coverage

Santos CAQ, Brennan DC, Saeed MJ, Fraser VJ, Olsen MA. Pharmacoepidemiology of cytomegalovirus prophylaxis in a large retrospective cohort of kidney transplant recipients with Medicare Part D coverage

Carlos A. Q. Santos[a], Daniel C. Brennan[b], Mohammed J. Saeed[c], Victoria J. Fraser[d] and Margaret A. Olsen[c,e]

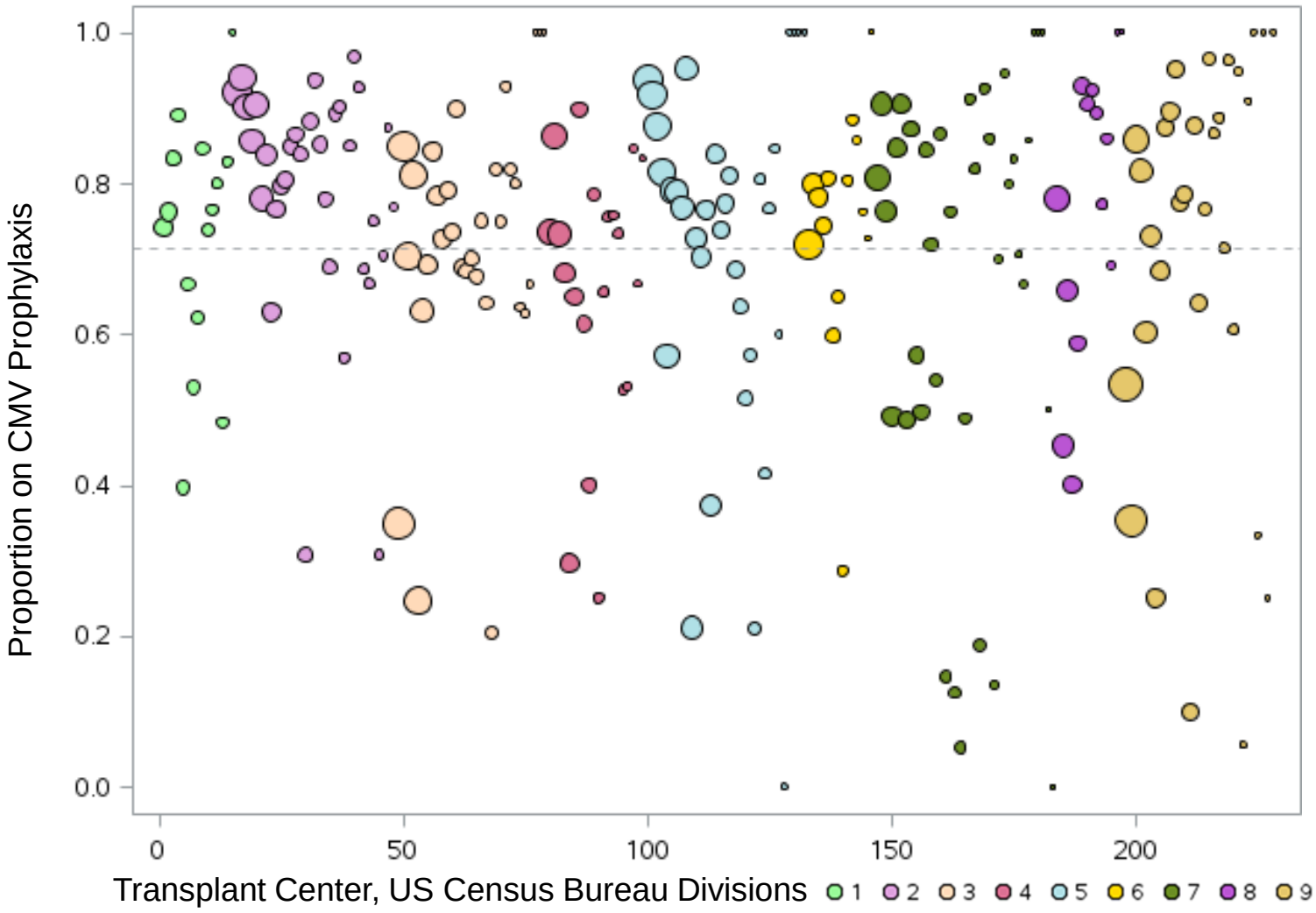
RUSH

Data Source

- United States Renal Database System (USRDS)
  - Core – demographic, insurance, death information
  - Transplant – information from United Network of Organ Sharing (UNOS)
  - Medicare
    - Institutional – inpatient and outpatient facility administrative claims
    - Physician/Supplier – outpatient physician administrative claims
    - Part D – medications prescribed in the outpatient setting

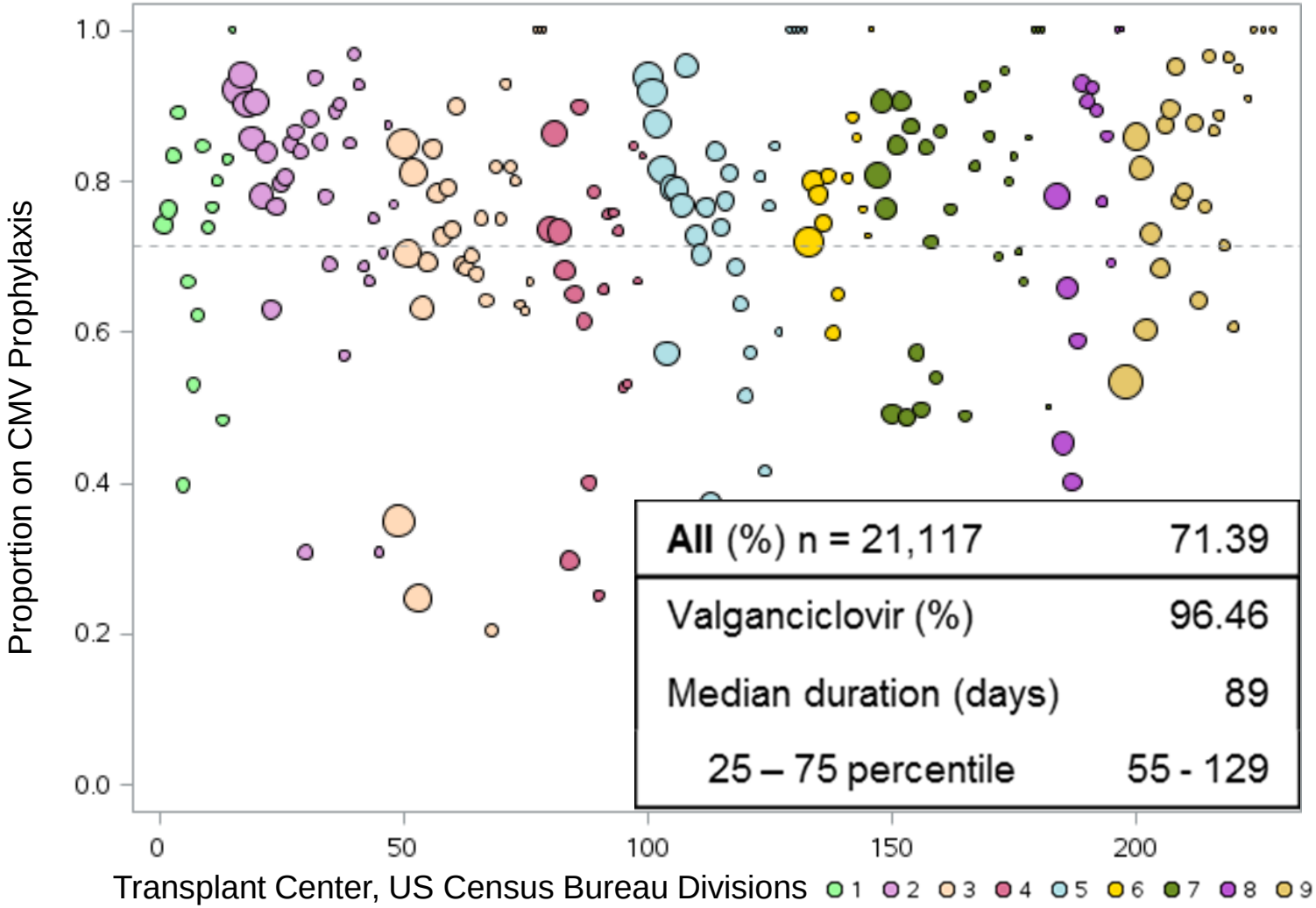
https://www.usrds.org/research.aspx

Proportion of kidney transplant recipients who were prescribed CMV prophylaxis stratified according to transplant center



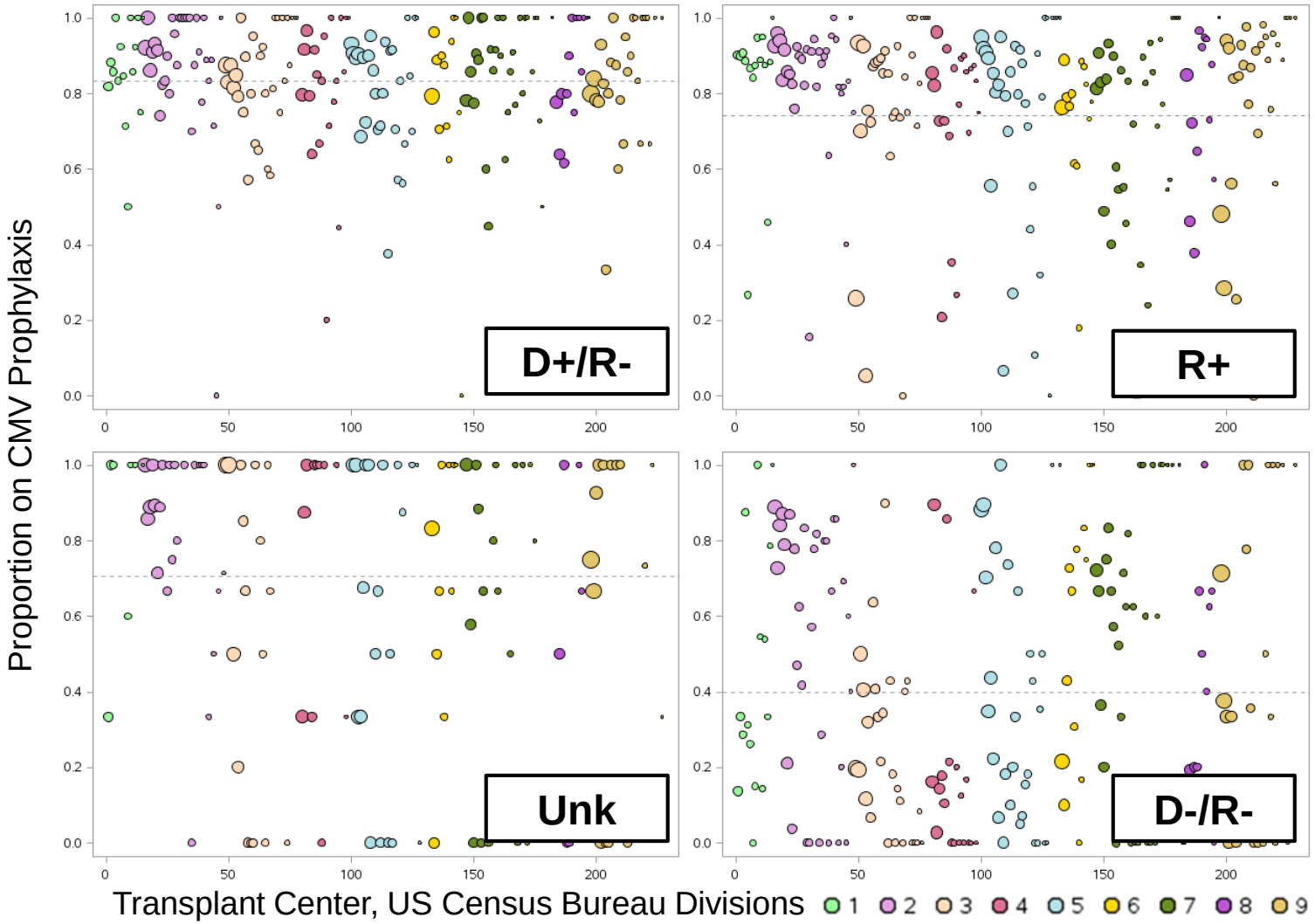
RUSH

Proportion of kidney transplant recipients who were prescribed CMV prophylaxis stratified according to transplant center



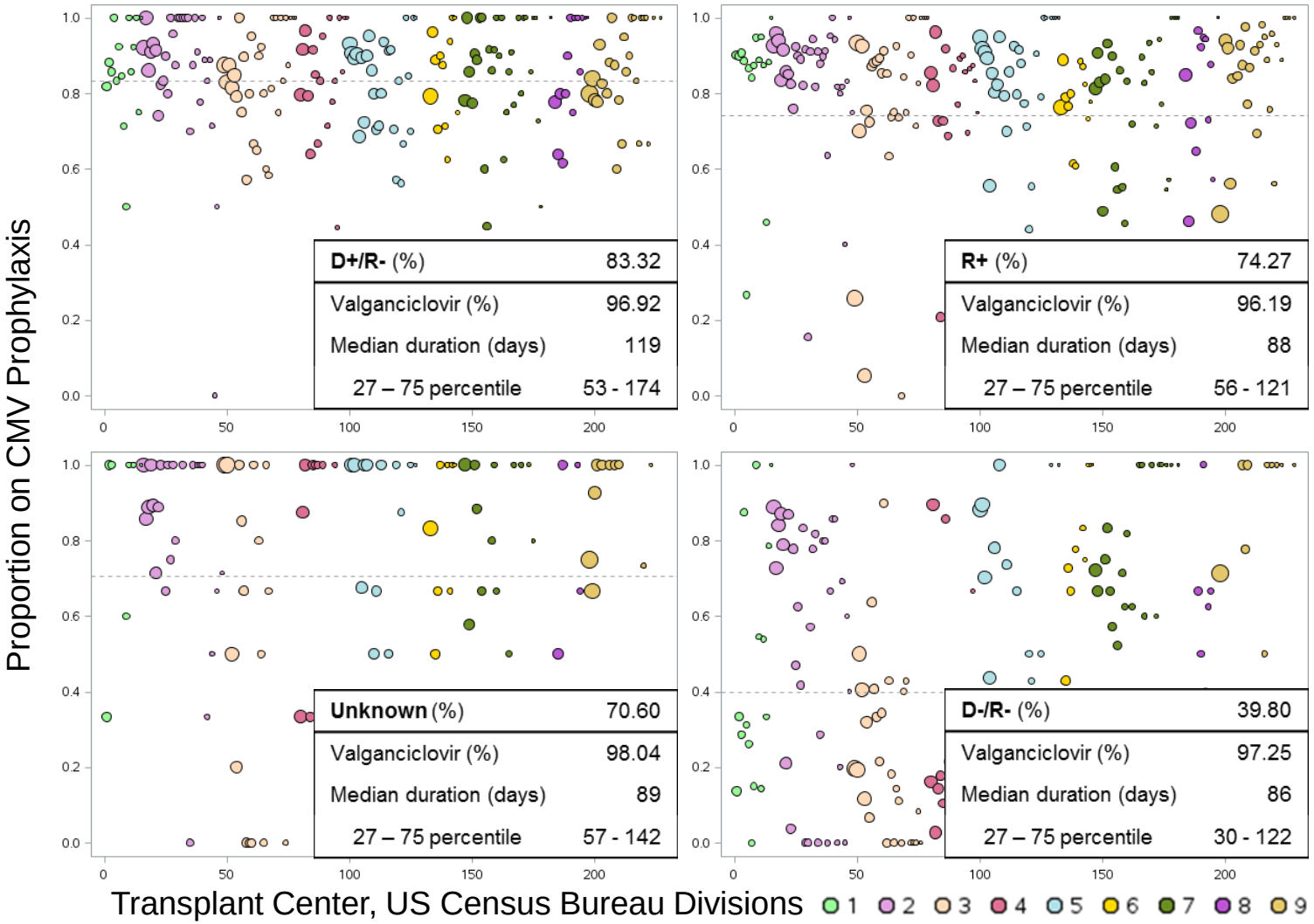
RUSH

Proportion of kidney transplant recipients who were prescribed CMV prophylaxis stratified according to transplant center



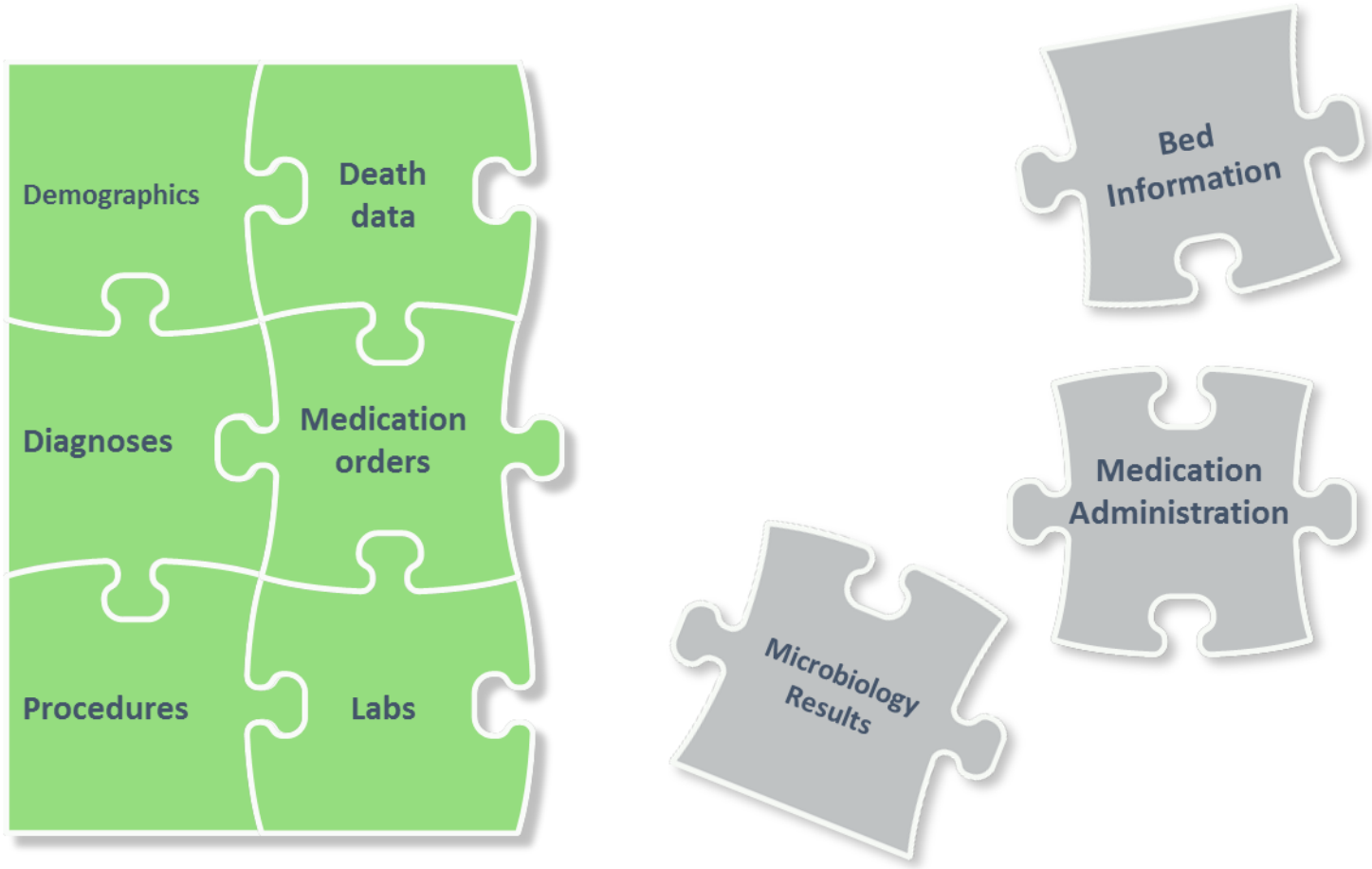
RUSH

Proportion of kidney transplant recipients who were prescribed CMV prophylaxis stratified according to transplant center



RUSH

Antimicrobial Use and Resistance



RUSH

Summary

- PCORnet data can be extended to include medication administration and microbiology information
- Queries can be developed to generate antimicrobial use and resistance metrics for NHSN reporting
- Data can be used to inform antimicrobial stewardship programs and perform research

Acknowledgments

- William Trick
- Helen Zhang
- Ekta Kishen

RUSH