Adherence to Intraoperative Antibiotic Administration Guidelines across MPOG institutions

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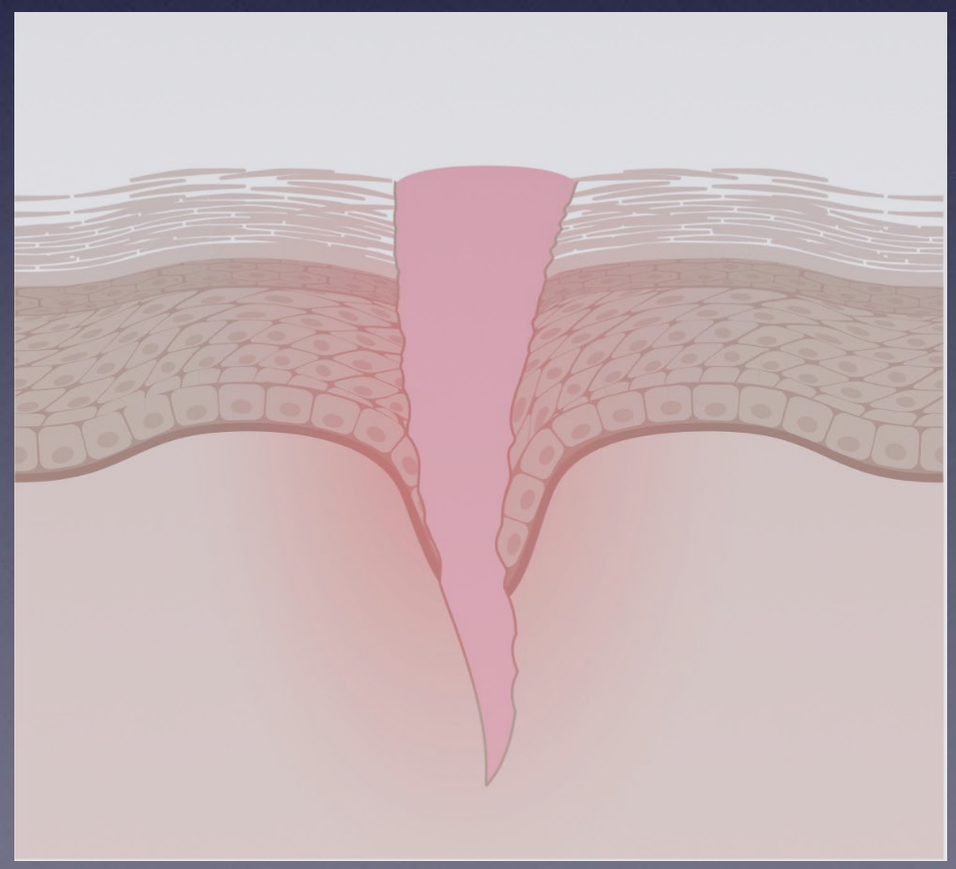
Surgical Site Infections (SSI)

SSI are the leading cause of health care infections in surgical patients[1].

Accounts for about 1.6 billion in health care related costs[2].

Estimated incidence[3]: 2-5%

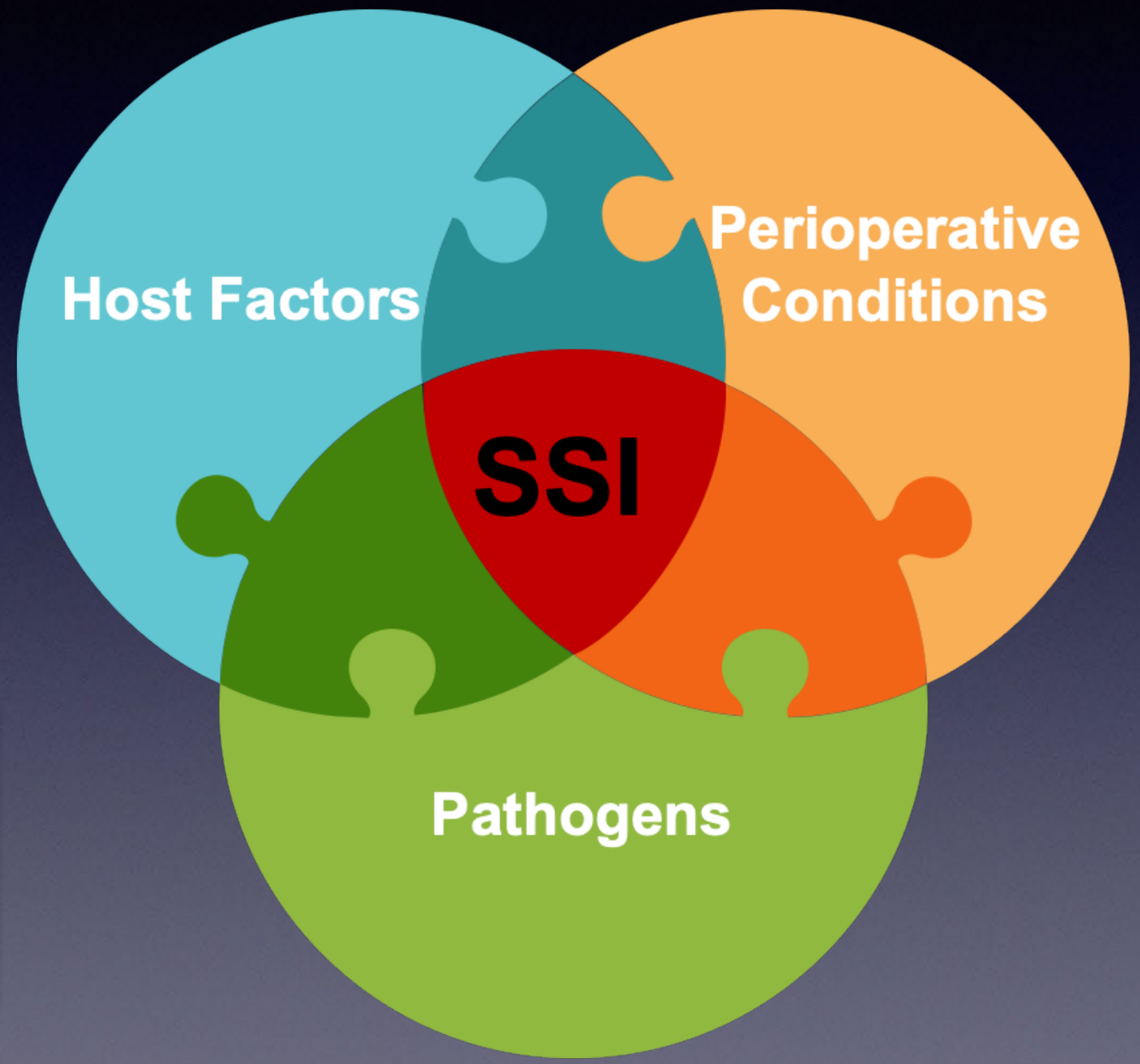


1. Anderson DJ et al. Infect Control Hosp Epidemiol. 2014;35(6):605-27.
2. Bratzler DW et al. Clin Infect Dis 2004;38:1706-15
3. de Lissovoy G et al. Am J Infect Control 2009;37:387-97.

Surgical Site Infections (SSI)

Host factors

Demographics
Comorbid conditions
Pre –existing conditions
Host Defense



Perioperative Conditions

Surgical Characteristics
Urgency
Duration
Decontamination
Perioperative Antibiotics
Temperature Control
Glycemic Control
Others

Pathogens

Virulence
Inoculum
Type

JAMA Surgery | Special Communication

Centers for Disease Control and Prevention Guideline for the Prevention of Surgical Site Infection, 2017

Sandra I. Berríos-Torres, MD; Craig A. Umscheid, MD, MSCE; Dale W. Bratzler, DO, MPH; Brian Leas, MA, MS; Erin C. Stone, MA; Rachel R. Kelz, MD, MSCE; Caroline E. Reinke, MD, MSHP; Sherry Morgan, RN, MLS, PhD; Joseph S. Solomkin, MD; John E. Mazuski, MD, PhD; E. Patchen Dellinger, MD; Kamal M. F. Itani, MD; Elie F. Berbari, MD; John Segreti, MD; Javad Parvizi, MD; Joan Blanchard, MSS, BSN, RN, CNOR, CIC; George Allen, PhD, CIC, CNOR; Jan A. J. W. Kluytmans, MD; Rodney Donlan, PhD; William P. Schecter, MD; for the Healthcare Infection Control Practices Advisory Committee

JAMA Surg. 2017;152(8):784-791. doi:10.1001/jamasurg.2017.0904
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Parenteral Antimicrobial Prophylaxis

1A.1. Administer preoperative antimicrobial agents only when indicated based on published clinical practice guidelines and timed such that a bactericidal concentration of the agents is established in the serum and tissues when the incision is made. (Category IB–strong recommendation; accepted practice.)

Antimicrobial Prophylaxis Guidelines

ASHP REPORT

Clinical practice guidelines for antimicrobial prophylaxis in surgery

DALE W. BRATZLER, E. PATCHEN DELLINGER, KEITH M. OLSEN, TRISH M. PERL, PAUL G. AUWAERTER, MAUREEN K. BOLON, DOUGLAS N. FISH, LENA M. NAPOLITANO, ROBERT G. SAWYER, DOUGLAS SLAIN, JAMES P. STEINBERG, AND ROBERT A. WEINSTEIN

Am J Health-Syst Pharm. 2013; 70:195-283

Aims and Objectives

To determine the prevalence of non-adherence to guideline based Intraoperative antibiotic administration.

To explore factors associated with guideline based antibiotic non adherence in this cohort.

Methods

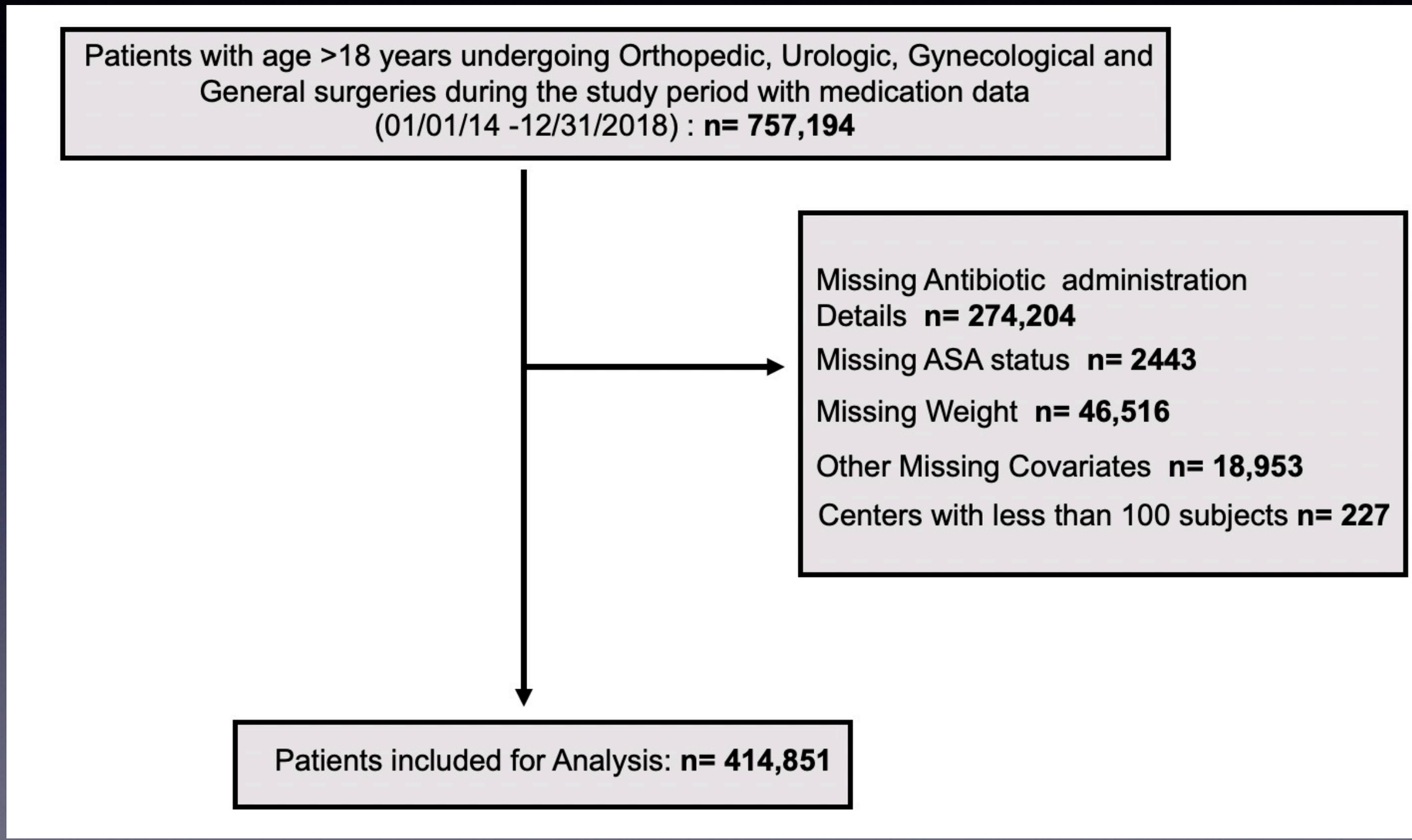
MPOG registry data from 31 centers between the dates of 01/01/2014 and 12/31/2018 was extracted to estimate the adherence to four guideline metrics (timing prior to incision, choice, dosing, redosing) for antibiotic administration.

Inclusion Criteria: Patients 18 years of age or older who underwent non-cardiac surgery involving skin incision.

Exclusion Criteria:

American Society of Anesthesiologists score (ASA) 6, missing documentation for weight, antibiotic dose, or time of administration.

Consort Figure



Results

Antibiotic adherence for each individual metric, stratified by overall adherence.

Metric	All patients n	Guideline Adherent n (%)	Guideline Non-Adherent n (%)
Overall	414,851	266,047 (64.13%)	148,804 (35.87%)
Choice of antibiotic	414,851	333,338 (80.35%)	81,513 (19.65%)
Weight based dose adjustment	414,851	343,835 (82.88%)	71,016 (17.12%)
Time of first dose	414,851	412,523 (99.44%)	2,328 (0.56%)
Time of redosing[a]	68,776	50,334 (73.19%)	18,442 (26.81%)

[a] Only surgical cases with a duration of surgery greater than antibiotic redosing interval were included to calculate adherence to redosing guidance.

Results

Baseline demographic and clinical characteristics stratified by overall adherence to antibiotic administration recommendations per the IDSA guidelines.

Variable	All patients N = 414,851	Overall guideline adherent N = 266,047	Overall guideline non-adherent N = 148,804	p-Value
Age, Mean (± SD)	57.5 (15.7)	57.6 (15.7)	57.4 (15.8)	<0.001
Female, n (%)	214,960	139,203 (64.8%)	75,757 (35.2%)	<0.001
BMI, Mean (± SD)	29.2 (7.0)	29.4 (6.8)	29.0 (7.3)	<0.001
Hispanic ethnicity	4,872	2861 (58.7%)	2011 (41.3%)	<0.001
Race				<0.001
Black	42,416	27714 (65.3%)	14702 (34.7%)	
Others	18,200	12201 (67.0%)	5999 (33.0%)	
Unknown	59,015	39799 (67.4%)	19216 (32.6%)	
White	295,220	186333 (63.1%)	108887 (36.9%)	
Surgical Specialty				<0.001
General Surgery	186,711	99985 (53.6%)	86726 (46.4%)	
Gynecology	41,832	30340 (72.5%)	11492 (27.5%)	
Orthopedics	120,015	97224 (81.0%)	22791 (19.0%)	
Urology	66,293	38498 (58.1%)	27795 (41.9%)	
Duration of surgery, Median (IQR)	182.0 (125.0 – 261.0)	183.0 (130.0 – 253.0)	180.0 (115.0 – 281.0)	0.005
ASA class				<0.001
1	24,736	16369 (66.2%)	8367 (33.8%)	
2	180,336	120594 (66.9%)	59742 (33.1%)	
3	193,926	119783 (61.8%)	74143 (38.2%)	
4	15,514	9117 (58.8%)	6397 (41.2%)	
5	339	184 (54.3%)	155 (45.7%)	
Blood products given, n (%)	13,547	7620 (56.2%)	5927 (43.8%)	<0.001
Vasopressor infusion use, n (%)	74,094	52979 (71.5%)	21115 (28.5%)	<0.001
Supervision				<0.001
CRNA	240,433	145134 (60.4%)	95299 (39.6%)	
Combination*	28,833	17711 (61.4%)	11122 (38.6%)	
Resident	105,243	75358 (71.6%)	29885 (28.4%)	
Solo	40,342	27844 (69.0%)	12498 (31.0%)	
Off-hours Cases#, n (%)	16,212	9691 (59.8%)	6521 (40.2%)	<0.001
Year of Surgery				<0.001
2014	63,053	33458 (53.1%)	29595 (46.9%)	
2015	86,761	52846 (60.9%)	33915 (39.1%)	
2016	100,325	65620 (65.4%)	34705 (34.6%)	
2017	117,377	80907 (68.9%)	36470 (31.1%)	
2018	47,335	33216 (70.2%)	14119 (29.8%)	
Emergency case				<0.001
Emergency	12,950	7444 (57.5%)	5506 (42.5%)	
Non-Emergency	401,901	258603 (64.3%)	143298 (35.7%)	

* Combination: Cases involving 2 of the following: solo anesthesiologist, CRNA with anesthesiologist, resident with anesthesiologist. # Cases starting between 5:00PM and 6:30AM

Results

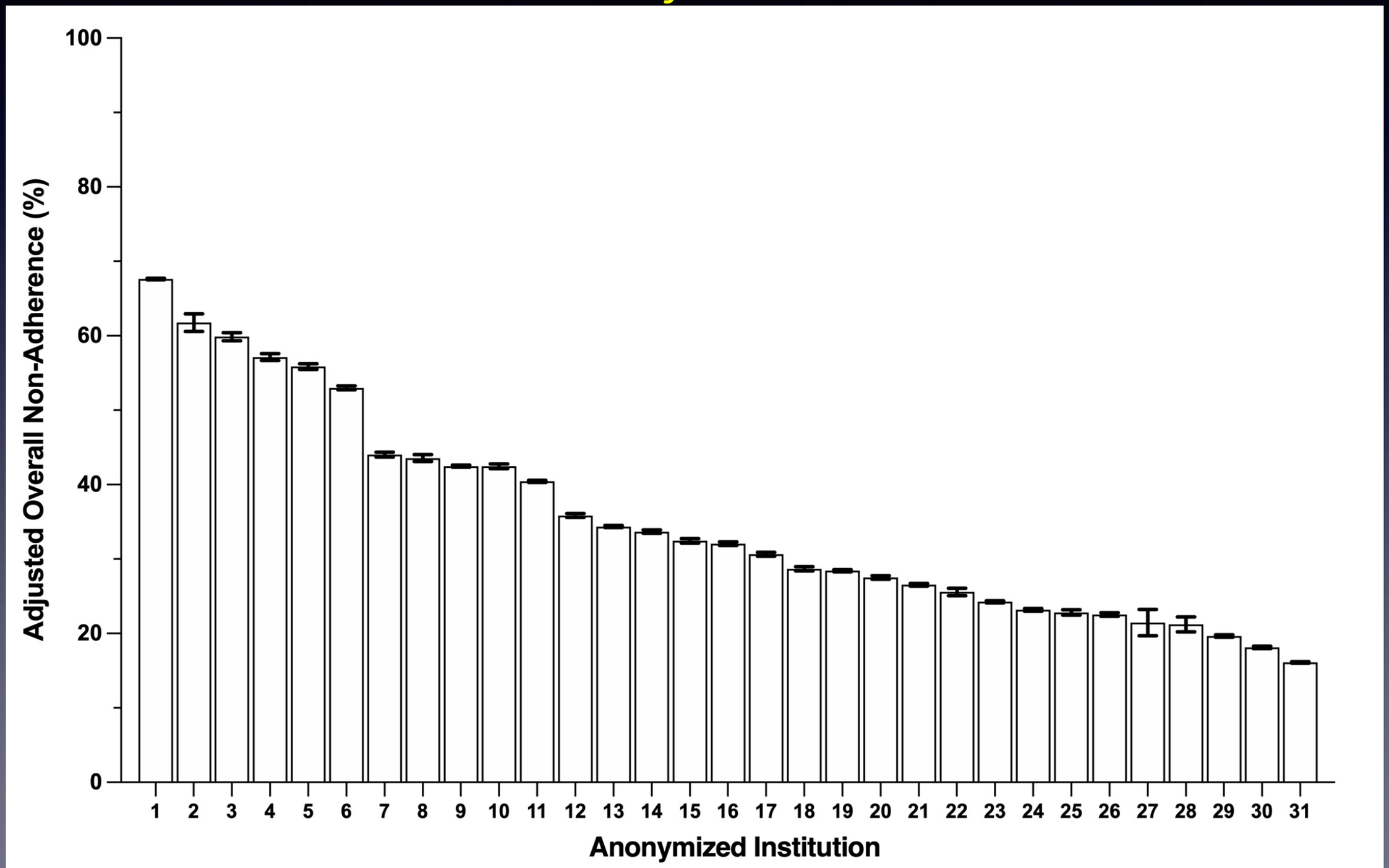
Multivariable analysis estimating the association of patient-level factors associated with overall guideline non-adherent antibiotic administration.

Variable	Odds Ratio (95% CI)	p-Value
Age (years)	0.99 (0.99 to 1.00)	0.002
Gender, Male vs Female	0.95 (0.93 to 0.96)	<0.001
BMI	0.99 (0.99 to 0.99)	<0.001
Ethnicity, Hispanic vs. Non-Hispanic	1.01 (0.94 to 1.07)	0.836
Race		
Black	0.93 (0.91 to 0.96)	<0.001
Others	0.95 (0.91 to 0.98)	0.002
Unknown	1.02 (0.99 to 1.04)	0.201
White	Ref	
Surgical Specialty		
Gynecology	0.38 (0.37 to 0.39)	<0.001
Orthopedics	0.26 (0.25 to 0.26)	<0.001
Urology	0.74 (0.73 to 0.76)	<0.001
General Surgery	Ref	
Duration of surgery (minutes)	1.01 (1.01 to 1.01)	<0.001
ASA class		
2	0.87 (0.85 to 0.90)	<0.001
3	0.88 (0.85 to 0.91)	<0.001
4	0.92 (0.87 to 0.96)	0.004
5	0.80 (0.63 to 1.02)	0.070
1	Ref	
Blood products given, Yes vs. No	1.30 (1.25 to 1.36)	<0.001
Vasopressor use, Yes vs. No	0.91 (0.89 to 0.93)	<0.001
Supervision		
CRNA	1.14 (1.11 to 1.17)	<0.001
Combination*	1.09 (1.05 to 1.13)	<0.001
Resident	0.90 (0.87 to 0.92)	<0.001
Solo	Ref	
Off-hours Cases (Starting between 5PM and 6:30AM), Yes vs. No	1.08 (1.04 to 1.13)	<0.001
Year of Surgery		
2015	0.65 (0.64 to 0.67)	<0.001
2016	0.56 (0.55 to 0.58)	<0.001
2017	0.54 (0.52 to 0.55)	<0.001
2018	0.51 (0.50 to 0.53)	<0.001
2014	Ref	
Emergency case, Yes vs. No	1.35 (1.29 to 1.41)	<0.001

* Combination: Cases involving 2 of the following: solo anesthesiologist, CRNA with anesthesiologist, resident with anesthesiologist).

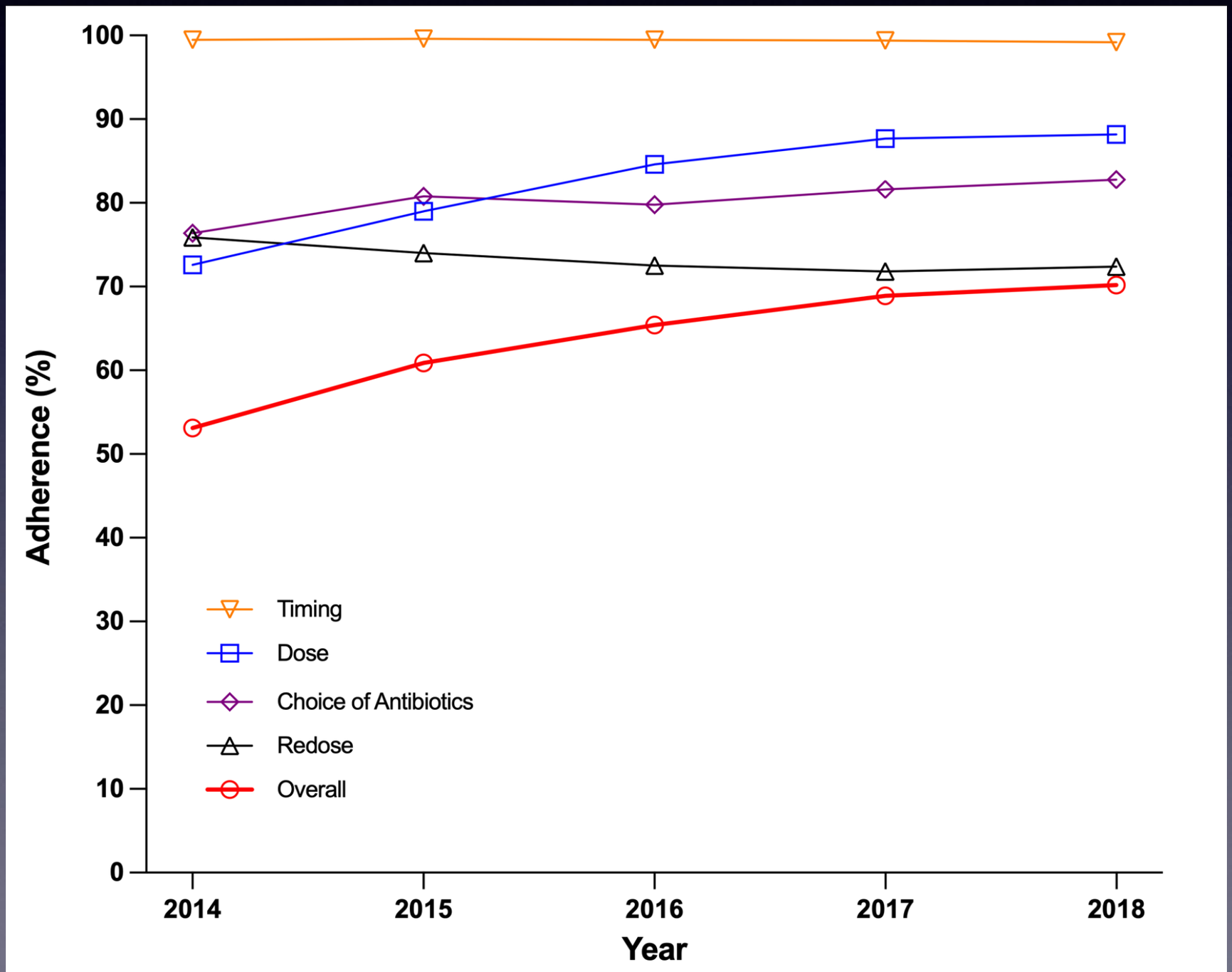
Results

Percent non-adherence by institution.



Results

Temporal trends in adherence from 2014 to 2018.



Conclusions

Significant opportunity for improvement in guideline based Intra-operative antibiotic administration exists.

The impact of these non-adherence on surgical site infections needs to be elucidated in future studies.

Thank you