Table 1. Description of Participation Before Each Assessment

First Assessment	
Number participating	151
Number completing all questions for this assessment before exam	136
% questions designed for this assessment answered before exam	83.50%
Daily average users 48 hours before exam	66
Second Assessment	
Number participating	175
Number completing all questions for this assessment before exam	136
% questions designed for this assessment answered before exam	79.60%
Daily average users 48 hours before exam	62.5
Final	
Number participating	181
Number completing all questions before final	161
% total questions answered before final exam	96.50%
Daily average users 48 hours prior to game end	84.3

Table 2. Survey Responses Regarding Perceptions of Game Elements

	Strongly Agree	Agree	Neutral	Disagree
Game Construction				
Questions were clear, No. (%)	30 (49)	26 (43)	3 (5)	2 (3)
Explanations were clear, No. (%)	43 (70)	15 (25)	1 (2)	2 (3)
Explanation format emphasized important concepts., No. (%)	44 (72)	14 (23)	1 (2)	2 (3)
Impact on Learning				
My performance on the module was improved by Kaizen, (No. %)	25 (41)	25 (41)	9 (15)	2 (3)
Helped me to prioritize concepts for review, (No. %)	28 (46)	22 (36)	9 (15)	2 (3)
Helped me prepare for quizzes, (No. %)	29 (48)	21 (34)	9 (15)	3 (5)
Helped me connect complex concepts, (No. %)	31 (51)	18 (30)	9 (15)	3 (5)
Helped identify gaps in my knowledge, (No. %)	32 (51)	25 (41)	0 (0)	4 (6)
Forced me to apply theoretical knowledge to clinical scenarios, (No. %)	33 (54)	24 (39)	0 (0)	4 (6)
Gamification Aspects				
I found the competitive aspects beneficial, (No. %)	19 (31)	18 (30)	16 (26)	8 (13)
The team engagement increased my participation, (No. %)	20 (33)	15 (25)	16 (26)	10 (16)
Kaizen platform made it easy to retain microbiology knowledge, (No. %)	35 (57)	20 (33)	4 (7)	2 (3)

Conclusion: Our gamification infused Microbiology course was well received. Students appreciated the opportunity to apply core foundational microbiology concepts to clinical medicine scenarios early in training. Novel teaching methods may increase student engagement in Medical Microbiology courses, for many the birthplace of their passion for Infectious Diseases.

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138. Creation of a Clinical Educator Elective for ID Fellows

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Session: O-26. ID Medical Education

Background: While fellows are expected to educate residents and students, they often receive limited formal instruction on how to teach. To address this, we developed a 2–4 week Clinical Educator Elective (CEE) for senior ID fellows. Goals were to increase fellow teaching engagement and promote excellence in medical education by improving understanding of adult learning theory and application to medical education.

Methods: *Curriculum development:* Methodology used Kern's 6 step approach. A targeted needs assessment was obtained from CEE fellows at the start of the block. A reading list was created from key areas (table). Instructional methods included flipped classroom, learner-led discussions, and exercises in evaluation and feedback of peer and faculty teaching. Fellows completed a required capstone educational project.

Learner Assessment: Standardized peer and faculty feedback surveys of fellow teaching were used.

Program Assessment: CEE narrative assessments were evaluated. Anonymous pre- and post-CEE self-assessment fellow surveys rating their confidence in knowledge and skills in clinical education on a 1–10 scale (1 lowest, 10 highest) were compared. Post-CEE fellows' medical student (MS3) teaching was compared to a 4-year pre-CEE historical cohort (PCHC).

Results: From 2017–9, 7 of 11 (64%) senior ID fellows completed the CEE. 5 (71%) were male, 3 started fellowship post-residency, 3 were chief residents, and 1 was an internist for 2 years. They had a median of 10 hours of prior faculty development (IQR 1–26). Career goals included GME in 6 of 7 pre-CEE. Narrative assessments revealed fellows highly valued the CEE. 6 available post-rotation surveys showed increased confidence in knowledge of adult learning theory, characteristics of effective educators, and fellows' ability to teach across a range of settings (table). 5 of 7 CEE fellows precepted MS3s compared to 1 of 8 fellows in the PCHC (p=.04). CEE and PCHC fellows won 7 and 2 teaching awards, respectively.

Fellows' confidence in knowledge and skills of various aspects of medical education before and after the clinical educator elective

	Pre-Clinical Educator Elective, median (IQR)	Post-Clinical Educator Elective, median (IQR)	*p*-value
How confident do you feel in your knowledge of:			
Adult learning theory	3 (1.5, 4.5)	9 (8.25, 9.75)	< 0.01
Characteristics of a "great" clinical teacher	7 (4.75, 7)	9 (9, 9.75)	< 0.01
The ACGME core clinical competencies	7.5 (4.75, 8.75)	9.5 (9, 10)	0.07
How confident do you feel in your ability to:			
Establish a productive learning climate	7.5 (7, 8)	9.5 (9,10)	0.02
Set goals & expectations	6.5 (6, 7)	9 (8.25, 9.75)	< 0.01
Teach clinical reasoning	6 (3.75, 6.75)	8.5 (8,9.75)	< 0.01
Motivate learners	6 (5, 7.75)	8.5 (8, 9)	0.03
Evaluate learners	6 (4.25, 7)	9 (8.25, 9)	< 0.01
Give feedback to learners	5 (4.25, 6.5)	9 (8.25, 9.75)	< 0.01
Teach one-on-one	7.5 (5.5, 8)	9 (8.25, 9.75)	0.04
Teach in small groups (on rounds)	7 (4.75, 7.75)	8.5 (8, 9.75)	0.04
Give didactic large lectures	6.5 (4.5, 7)	9 (8.25, 9.75)	< 0.01
Use simulation in education	4 (2.25, 5.75)	8 (7.25, 9.5)	< 0.01

Conclusion: A CEE was highly valued and improved fellow self-assessed knowledge and skills in clinical teaching, even in those with prior teaching experience. It was also associated with more MS3 teaching. Future evaluations of long-term retention in academic medicine and teaching performance can further examine this approach.

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139. association of Physician Orders for Life-sustaining Treatment (POLST) with Antimicrobial Use at End of Life in Cancer Patients: An Antimicrobial Stewardship Opportunity

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Session: O-27. Innovation in Antimicrobial Stewardship

Background: IDSA/SHEA guidelines recommend that antimicrobial stewardship programs support providers in antibiotic decisions for end of life care. Washington State Physician Orders for Life-Sustaining Treatment (POLST) forms allow patients to indicate antimicrobial use preferences. We sought to characterize antimicrobial use in the last 30 days of life for cancer patients by presence of a POLST and antimicrobial use preferences.

Methods: We performed a single-center, retrospective cohort study of cancer patient deaths from January 1, 2016 - June 30, 3018. Patient demographics, clinical characteristics, POLST, and antimicrobial use within 30 days before death were extracted from electronic records. To test for an association between POLST completed at least 30 days before death and inpatient antimicrobial days of therapy (DOT) in the 30 days before death, we used negative binomial models adjusted for age, sex, race, and service line (hematologic versus solid malignancy); model estimates are presented as incidence rate ratios (IRR) with 95% confidence intervals (CI)

Results: Of 1796 patients, 406 (23%) had a POLST. 177/406 (44%) were completed less than 30 days before death, and 58/177 (32.8%) specified limited antibiotic use; 40/177 (23%) did not specify any antimicrobial use preference (Fig 1). Of 1295 patients with at least 1 inpatient day in the 30 days before death, 1070 (83%) received at least 1 inpatient antimicrobial with median DOT of 1077 per 1000 inpatient days (Tab 1). There was no difference in DOT among patients with and without a POLST > /= 30 days before death (IRR 0.92, CI 0.77, 1.10). Patients with a POLST specifying limited antibiotic use had significantly lower inpatient IV antimicrobial DOT compared to those without a POLST (IRR 0.64, CI 0.42–0.97) (Fig 2).

Figure 1. Classification of Patients by Presence of POLST, Timing, and Antimicrobial Preference Content of POLST. Numbers shown represent the number of patients (percentage). Full antibiotic use refers to the selection "Use antibiotics for prolongation of life." Limited antibiotic use refers to the selection "Do not use antibiotics except when needed for symptom management."

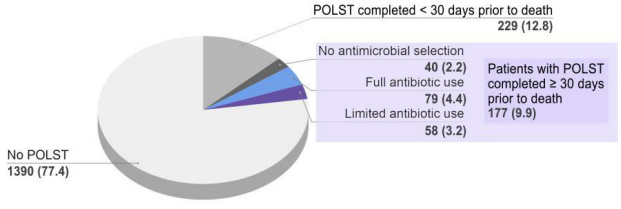
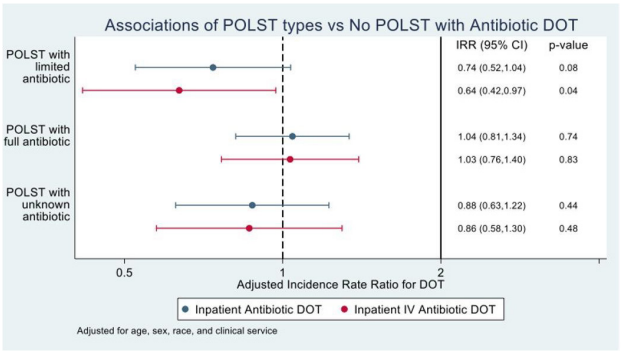


Table 1: Antimicrobial use for all patients and by advance directive group

Among all patients	**All** patients (n = 1796)	POLST completed ≥ 30 days prior to death (n = 177)[a]			**No POLST** completed ≥ 30 days prior to death (n = 1619)
		Limited antimicrobial use (n = 58)	**Full** antimicrobial use (n = 79)	**No antimicrobial selection** (n = 40)	
Any inpatient or outpatient antimicrobial use, n (%)	1166 (65)	26 (45)	45 (57)	27 (65)	1068 (66)
Any use of anti-MRSA antibiotics[b]	716 (40)	10 (17)	32 (41)	17 (43)	657 (41)
Any use of non-fluoroquinolone antipseudomonal antibiotics[c]	808 (45)	12 (21)	36 (46)	18 (45)	742 (46)
Any use of a carbapenem antibiotic	242 (14)	3 (5)	8 (10)	5 (13)	226 (14)
Any use of a fluoroquinolone	517 (29)	11 (19)	20 (25)	13 (33)	473 (29)
Among patients with at least 1 inpatient day	**All** (n = 1295)	**Limited** (n = 34)	**Full** (n = 55)	**No selection** (n = 30)	**No POLST** (n = 1176)
Any inpatient antimicrobial use	1070 (83)	20 (59)	43 (78)	24 (80)	983 (84)
Inpatient antimicrobial days of therapy DOT/1000 inpatient-days, median (range)	1076.9 (0 – 7166.7)	271.4 (0 - 4933.3)	1000 (0 - 5600)	979.2 (0 - 4666.7)	1111.1 (0 - 7166.7)
Any inpatient IV antimicrobial use	996 (77)	16 (47)	42 (76)	22 (73)	916 (78)
Inpatient IV antimicrobial days of therapy DOT/1000 inpatient-days, median (range)	666.7 (0 – 4379.3)	0 (0 - 2750)	645.2 (0 - 4333.3)	556.5 (0 - 2322.6)	666.7 (0 - 4379.3)

[a] Full antibiotic use refers to the selection "Use antibiotics for prolongation of life." Limited antibiotic use refers to the selection "Do not use antibiotics except when needed for symptom management."
[b]Anti-MRSA antibiotics are vancomycin (excluding enteral administration), daptomycin, ceftaroline, and linezolid
[c]Non-fluoroquinolone antipseudomonal antibiotics are aztreonam, piperacillin, ticarcillin, ceftazidime, cefepime, ceftolozane, imipenem, meropenem, colistin, tigecycline, amikacin, gentamicin, tobramycin, and derivatives/combinations of these agents

Figure 2. Forest plot of model estimates, represented as incidence rate ratios (IRR) with 95% confidence intervals (CI), for associations between POLST antimicrobial specifications completed at least 30 days before death and inpatient antibiotic days of therapy (DOT) in the 30 days before death. Estimates represent comparisons between each POLST category and no POLST completed at least 30 days before death. Dots represent the IRR and brackets extend to the lower and upper limit of the 95% CI. Blue estimates are for the inpatient antibiotic DOT outcome and red estimates are for the inpatient IV antibiotic DOT outcome.



Conclusion: POLST completion is rare > /= 30 days before death, with few POLSTs specifying antimicrobial use. Compared to those with no POLST in this time frame, patients who indicated that antibiotics should be used only for symptom management received significantly fewer inpatient IV antimicrobials. Early discussion of advance directives including POLST with specification of antimicrobial use preferences may promote more thoughtful use of antimicrobials near the end of life in a compassionate, patient-centered way.

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140. Symptoms and Situations Predispose Patients to Use Antibiotics Without Medical Advice

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Session: O-27. Innovation in Antimicrobial Stewardship

Background: Use of antibiotics without a prescription (non-prescription use) contributes to antimicrobial resistance. Non-prescription use includes obtaining and taking antibiotics without a prescription, taking another person's antibiotics, or taking one's own stored antibiotics. We conducted a quantitative survey focusing on the factors that impact patients' decisions to use non-prescription antibiotics.

Methods: We surveyed patients visiting public safety net primary care clinics and private emergency departments in a racially/ethnically diverse urban area. Surveys were read aloud to patients in Spanish and English. Survey domains included patients' perspectives on which syndromes require antibiotic treatment, their perceptions of health care, and their access to antibiotics without a prescription.

Results: We interviewed 190 patients, 122 from emergency departments (64%), and 68 from primary care clinics (36%). Overall, 44% reported non-prescription antibiotic use within the past 12 months. Non-prescription use was higher among primary care clinic patients (63%) than the emergency department patients (39%, p = 0.002). The majority felt that antibiotics would be needed for bronchitis (78%) while few felt antibiotics would be needed for diarrhea (30%) (Figure 1).

The most common situation identified "in which respondents would consider taking antibiotics without contacting a healthcare provider was "got better by taking this antibiotic before" (Figure 2). Primary care patients were more likely to obtain antibiotics without prescription from another country than emergency department patients (27% vs. 13%, P=0.03). Also, primary care patients were more likely to report obstacles to seeking a doctor's care, such as the inability to take time off from work or transportation difficulties, but these comparisons were not statistically significant.

Figure 1. Patients' agreement that antibiotics would be needed varied by symptom/syndrome.

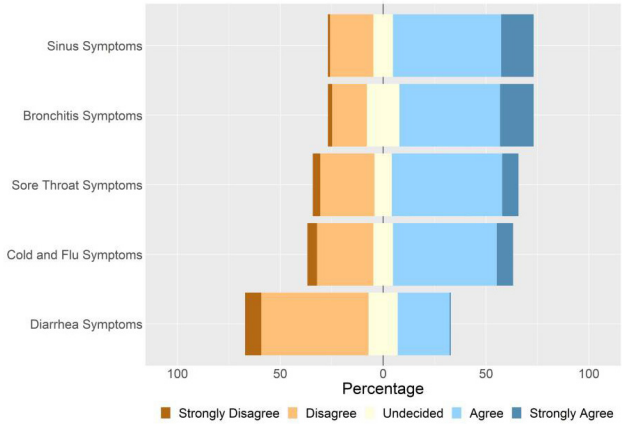
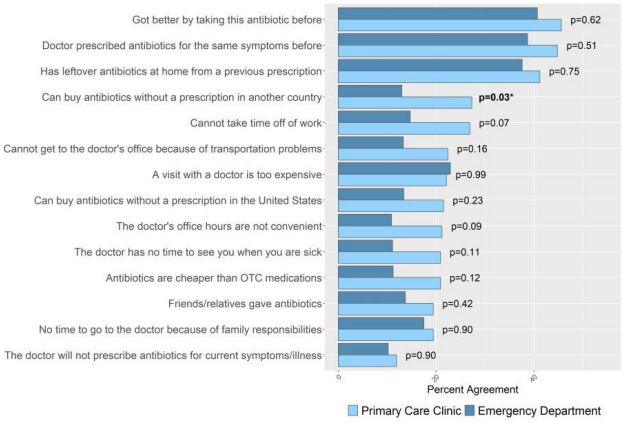


Figure 2. Situations that lead to non-prescription antibiotic use impacted the two clinical populations differently



Conclusion: Non-prescription antibiotic use is a widespread problem in the two very different healthcare systems we included in this study, although factors underlying this practice differ by patient population. Better understanding of the factors driving non-prescription antibiotic use is essential to designing patient-focused interventions to decrease this unsafe practice.

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141. Rapid Reduction in Concomitant Vancomycin and Piperacillin-tazobactam Use: A Model for Future Antimicrobial Stewardship Interventions

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