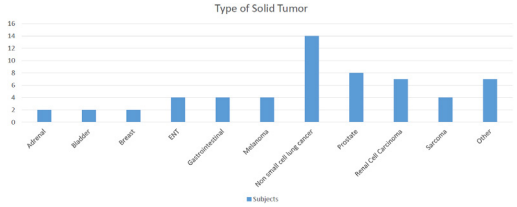

	Total N=92	Group 1 N= 50	Group 2 N= 42
Demographics			
Median age (IQR)	61 (50-71)	61 (51-69)	61 (48-73)
Female subjects (%)	37 (40)	24 (48)	13 (31)
Race (%):			
Caucasian	65 (71)	33 (66)	32 (76)
Hispanic	14 (15)	9 (18)	5 (12)
African American	8 (9)	4 (8)	4 (10)
Asian	1 (1)	1 (2)	0 (0)
Other	4 (4)	3 (6)	1 (2)
Smoking status (%):			
Never	49 (53)	29 (58)	20 (48)
Former	38 (41)	18 (36)	20 (48)
Current	5 (5)	3 (6)	2 (5)
Type of viral infection (%):			
Influenza	34 (37)	18 (36)	16 (38)
RSV	19 (21)	11 (22)	8 (19)
PIV	19 (21)	8 (16)	10 (24)
HMPV	18 (20)	11 (22)	7 (17)
Mixed	3 (3)	2 (4)	1 (2)
Cancer type (%):			
Hematological Malignancy	35 (38)	17 (34)	16 (38)
Solid tumor	59 (64)	33 (66)	26 (62)
Type of Hematological Malignancy (%):			
Acute Leukemia	10 (11)	5 (10)	5 (12)
Chronic Leukemia	3 (3)	2 (4)	1 (2)
Myelodysplastic syndrome	5 (5)	2 (4)	3 (7)
Hodgkin Lymphoma	10 (11)	5 (10)	5 (12)
Non Hodgkin Lymphoma	7 (8)	3 (6)	4 (10)
Type of Solid tumor (%):			
Adrenal	2 (2)	0 (0)	2 (5)
Bladder	2 (2)	1 (2)	1 (2)
Breast	2 (2)	1 (2)	1 (2)
ENT	4 (4)	2 (4)	2 (5)
Gastrointestinal	4 (4)	3 (6)	1 (2)
Melanoma	4 (4)	2 (4)	2 (5)
NSCLC	14 (15)	11 (22)	3 (7)
Prostate	8 (9)	1 (2)	7 (17)
RCC	7 (8)	4 (8)	3 (7)
Sarcoma	4 (4)	2 (4)	2 (5)
Other	7 (8)	5 (10)	2 (5)
Cancer status (%):			
Remission	10 (11)	4 (8)	6 (15)
Active Disease	82 (89)	46 (92)	36 (85)
Type of Check point inhibitor (%):	16 (18)	5 (10)	11 (26)
Ipilimumab	46 (50)	27 (54)	19 (45)
Nivolumab	23 (25)	11 (22)	12 (28)
Pembrolizumab	4 (4)	4 (8)	0 (0)
Atezolizumab	3 (3)	1 (2)	2 (5)
Avelumab	6 (7)	3 (6)	3 (7)
Durvalumab	5 (5)	2 (4)	3 (7)
More than one agent			
Side effects from CPI 6 months prior to infection (%):	12 (13)	0 (0)	12 (28)
Use of steroids within 30 days of infection (%):	6 (7)	1 (2)	5 (13)
Radiation therapy within 18 months of infection (%):	11 (12)	6 (12)	5 (13)
Received Influenza Vaccine (%):	19 (21)	10 (20)	9 (21)
Baseline laboratory values			
White blood cell count (IQR)	5.5 (3.35-7.85)	5.5 (3.2-7.6)	5.5 (3.6-8.3)
Absolute Lymphocyte count≤200 (%)	6 (7)	1 (2)	5 (12)
Absolute neutrophil count ≤500 (%)	8 (9)	3 (6)	5 (12)
Creatinine (IQR)	0.88 (0.73-1.11)	0.9 (0.7-1.13)	0.87 (0.74-1.11)
Antiviral therapy			
Received antiviral therapy (%)	38 (42)	20 (40)	18 (44)
Agent used (%):			
Oseltamivir	29 (32)	16 (32)	13 (32)
Oral Ribavirin	8 (9)	4 (8)	4 (10)
IVIG	4 (4)	0 (0)	4 (10)
Duration of therapy (%):			
Oseltamivir	5 (5-7)	5 (5-5)	5 (5-9)
Ribavirin	8 (7-11)	7 (6-13)	10 (9-10)
Therapy initiated with 48 hours of symptoms (%)	29 (78)	15 (75)	14 (82)
Outcomes			
Total LRTI (%)	29 (32)	12 (24)	17 (40)
Progressed to LRTI (%)	5 (5)	3 (6)	2 (5)
Proven LRTI (%)	9 (31)	4 (33)	5 (29)
Cases admitted (%)	55 (60)	33 (66)	22 (52)
Cases requiring ICU care (%)	11 (20)	5 (15)	6 (27)
Median length of stay (IQR)	4 (2-11)	3 (2-9)	8 (4-13)
Oxygen use (%)	29 (32)	16 (32)	13 (31)
Mechanical Ventilation (%)	4 (4)	3 (6)	1 (2)
30 day Mortality (%)	7 (8)	2 (4)	5 (12)
60 day mortality (%)	9 (10)	3 (6)	6 (14)

Table 1: Comparison of characteristics and outcomes in infected patients while on CPI therapy (group 1) or with prior exposure to CPI (group 2).

CPI: Check point inhibitor; RSV: Respiratory syncytial virus; PIV: Parainfluenza virus; HMPV: Human Metapneumovirus; NSCLC: Non-small cell lung cancer; RCC: Renal cell carcinoma; LRTI: Lower respiratory tract infection

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2682. Prophylaxis-Driven Molecular Epidemiology of *Pseudomonas aeruginosa* Bloodstream Infections in Adults With Leukemia

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Background: Fluoroquinolones (FQs) are routinely used as antimicrobial prophylaxis in leukemia patients receiving chemotherapy to prevent Pseudomonas aeruginosa infections. Patients who are intolerant to FQs may receive cefpodoxime (CPD) or other agents. How FQ use affects the resistance profile and epidemiology of breakthrough P. aeruginosa infections is unknown. To determine this, we performed a whole-genome sequencing (WGS)-driven epidemiologic study of leukemia patients with P. aeruginosa bloodstream infections.

Methods: All adult (age > 17 years) inpatients with leukemia and a first episode of monomicrobial P. aeruginosa bloodstream infection were included. Clinical data were extracted from the electronic medical record. Isolates were sequenced using an Illumina NextSeq and phylogenomics was performed using an in-house analysis pipeline consisting of Bowtie2, SAMtools and bcftools.

Results: 110 patients were included and most had a diagnosis of acute myeloid leukemia (n = 66). Twenty (18%) patients received FQ prophylaxis, 56 (54%) received CPD, and the remaining 34 (31%) received other agents. 9 (8%) isolates were multidrug-resistant (MDR). MDR was more common in those receiving FQ prophylaxis (20% vs 6%, P = 0.06). 76 sequence types (STs) were represented with ST235 (n = 8) being most common followed by ST244 (n = 7). ST235 strains were genetically distinct, but closely related (>10 but < 250 SNPs) in comparison to other STs. 2 ST244 strains were genetically identical despite being isolated 4 months apart, suggesting horizontal transmission. MDR was more common among ST235 isolates compared with other STs (38% vs 6%, P = 0.02). ST235 strains were more common in patients receiving FQ vs other prophylaxis (20% vs 4%, P = 0.04). 1 ST244 isolate harbored a VIM-2 β-lactamase. In 20 FQ-resistant isolates, 80% had mutations in either parC (S87L) or gyrA (T83I) and 50% had both. FQ-resistance mutations were more common in FQ recipients (50% vs 8%, P < 0.01).

Conclusion: Most P. aeruginosa infections occurred in non-FQ recipients, while MDR P. aeruginosa infections were more common in FQ recipients. These data suggest that decisions on empiric treatment of patients with P. aeruginosa bacteremia must take antimicrobial prophylaxis history into account.

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2683. Evaluation of the Negative Predictive Value (NPV) of Methicillin-Resistant *Staphylococcus aureus* (MRSA) Nasal Swab Screening in Acute Myeloid Leukemia Patients

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Background: Methicillin-Resistant *Staphylococcus aureus* (MRSA) nasal swabs are utilized to guide discontinuation of empiric MRSA therapy. In multiple studies, MRSA nasal swabs has been shown to have a negative predictive value (NPV) of ~99% in non-oncology patients with pneumonia and other infections. At Yale New Haven Hospital (YNHH), a negative MRSA nasal swab is utilized in acute myeloid leukemia (AML) patients to de-escalate empiric MRSA antibiotic therapy. The primary endpoint was to assess the percentage of patients with a negative MRSA nasal swab who developed a culture documented (CD) MRSA infection during their admission. Secondary endpoints included the number of MRSA nasal swabs that were initially negative but converted to positive, and the types of MRSA infections.

Methods: This was a retrospective chart review of AML patients with a suspected infection and a MRSA nasal swab collected at YNHH between 2013 and 2018. Patients were excluded if < 18 years old, prior confirmed MRSA infection or positive MRSA nasal swab within the past year.

Results: 194 patients were identified with 484 discrete encounters analyzed. Hematopoietic stem cell transplantation occurred in 83 (43%) patients. A total of 468 (97%) encounters had a negative MRSA nasal swab upon admission with no CD MRSA infection during their hospitalization. Three encounters (0.6%) had a negative MRSA nasal swab with a subsequent CD MRSA infection during their admission. Identified infections were bacteremia (2) and pneumonia (1). Median duration from the negative MRSA nasal swab to CD infection was 16 days. Thirteen encounters (3%) had a positive MRSA nasal swab, 5 of which had a CD MRSA infection. Infections included bacteremia (3), pneumonia (2), and sputum with negative chest X-ray (1). MRSA nasal swab had a sensitivity of 57% (CI 0.56–0.58), specificity of 98% (CI 0.98–0.98) positive predictive value of 31% (CI 0.3–0.32), and NPV of 99% (CI 0.99–0.99).

Conclusion: The results of this retrospective study demonstrate that a negative MRSA nasal swab has a 99% NPV for subsequent MRSA infections in AML patients with no prior history of MRSA colonization or infection. Based on these findings, a negative MRSA nasal swab can help guide de-escalation of empiric MRSA antibiotic therapy in this immunosuppressed population.

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2684. The Prospective Pilot Study of Infectious Complication Surveillance in Active Systemic Lupus Erythematosus Patients with Intense Immunosuppressive Therapy: Cellular Response and Clinical Outcomes

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Background: Despite a common complication, the real interplays between the infectious sequelae and systemic lupus erythematosus (SLE) with intense immunosuppressive therapy (IT) are not fully understood.

Objective: To identify the cellular biomarkers that justify the risk for overall infection in active SLE patients with intense IT.

Methods: An observational, prospective cohort pilot study was conducted in active SLE patients with intense IT aged >15 years from November 2017 March 2019 at Ramathibodi Hospital, Bangkok, Thailand. Clinical data and T-cell subpopulation analyses, at weeks 0 (at enrollment), 2, 4, 8, and 16 were obtained. Every patient was monitored over a 24-week period. The infections of interest were any emerging infections other than cytomegalovirus infection (CMV). Intense IT was defined as an induction therapy of active SLE disease with either the National Institute of Health or Euro-Lupus Nephritis Trial protocol regimens.

Results: A total of 23 active SLE patients were enrolled, 91.3% were female with the median age (interquartile range, IQR) of 27.7 (23.0–42.1) years old. The median SLE disease activity index (IQR) was 16 (10–20) and 73.9% had renal abnormality. At week 12, the prevalence of infection was 39.1% being bacterial infection in 77.8% and viral infection in 22.2%. There was no mortality in this study. Non-infection group had higher proportions of absolute lymphocyte count (ALC), CD3+ T cell, and CD3+CD56+ natural killer T (NKT) cell numbers compared with the infection group; [median of 1169.8 (694.4–1921.4) vs 716.1 (429.0–882.0) cells/μL; $P = 0.044$, 585.1 (245.1–669.2) vs. 204.9 (73.9–286.5) cells/μL; $P = 0.017$, and 50.5 (13.7–152.2) vs. 4.35 (2.44–52.9) cells/μL, $P = 0.040$, respectively]. Patients with NKT cells >9.31 cells/μL had longer median infection-free day of 25.3 days (19.7–25.3) vs. 2.0 days (1.7–4.0) in patients with lower NKT cell count (log rank $P < 0.001$). The Cox-proportional hazard ratio was 0.03, $P = 0.003$ (95% confidence interval 0.004–0.300).

Conclusion: Bacterial infections are common in active SLE patients with intense IT. Monitoring of ALC, CD3+ T-cell, and NKT-cell counts can potentially be used as the infectious risk prognosticators. However, a study in a larger scale is encouraged to verify these findings.

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2685. Oral Third-Generation Cephalosporins vs. Levofloxacin for Antibacterial Prophylaxis in Neutropenic Patients with Hematologic Malignancies

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Background: Fluoroquinolone (FQ) prophylaxis for high-risk neutropenic patients has been shown to reduce rates of febrile neutropenia and is standard at many centers. For patients who cannot receive a FQ, oral third-generation cephalosporins (OTGCs) are often used as an alternative; however, this strategy is not well studied. We sought to compare clinically-relevant outcomes in patients receiving FQ vs. OTGC prophylaxis.

Methods: This was a retrospective cohort study of adults who were admitted to the Malignant Hematology service at the University of California, San Francisco between December 2012 and June 2018 and received >48 hours of an OTGC (cefdinir or cefpodoxime) or an FQ (levofloxacin) for neutropenic prophylaxis. For each OTGC patient, an FQ patient was randomly selected from the same admission year. Exclusion criteria were fever on admission, receipt of systemic antibiotics prior to or during the prophylaxis period, diagnosis of acute promyelocytic leukemia, and crossover. A multivariable logistic regression analysis adjusting for age, QTc, Charlson Comorbidity Index, underlying diagnosis, receipt of stem cell transplant (SCT), and duration of neutropenia was used to compare the groups with respect to a primary composite outcome of 30-day in-hospital mortality, intensive care unit (ICU) admission, and bacteremia.

Results: Of 520 patients screened, 173 (33.3%) were included in the study; 76 of these received an OTGC and 97 received an FQ. Hematologic diagnoses included multiple myeloma (38.2%), acute myeloid leukemia (29.5%), acute lymphoblastic leukemia (8.7%), B-cell lymphoma (12.7%), aplastic anemia (2.9%), and others (3.5%). During admission, 9.2% underwent allogeneic SCT and 28.3% underwent autologous SCT. Outcomes are shown in Table 1.

Conclusion: Prophylaxis with an OTGC rather than a FQ was not associated with worse outcomes in this pragmatic evaluation of a heterogeneous group of patients with hematologic malignancies. In this multivariable model, neutropenia lasting more than 7 days was the only consistent predictor of failure across outcomes, suggesting that degree of immunosuppression is a much more significant driver of poor outcomes in this population than is prophylaxis choice. Further evaluation of the role of prophylaxis is needed.

Table 1. Frequency of outcomes and logistic regression analyses for patients receiving OTGC vs. FQ prophylaxis

	Outcome	Primary outcome	30-day mortality	30-day ICU admission	Bacteremia	Neutropenic Fever
	Frequency	29 (16.8%)	5 (2.9%)	9 (5.2%)	24 (15.3%)	73 (42.2%)
aOR (95% CI)	OTGC (vs. FQ)	0.91 (0.36-2.3)	0.05 (0.00-3.0)	0.44 (0.07-2.7)	0.99 (0.37-2.7)	1.2 (0.46-0.68)
	Age, per year	1.0 (0.97-1.0)	1.4 (0.98-1.9)	10.5 (1.0-1.2)	0.99 (0.96-1.0)	0.96 (0.93-0.99)
	Neutropenia >7 days	9.1 (2.5-34)	-	27 (1.4-540)	5.4 (1.5-20)	16 (5.6-49)
	QTc >500	2.0 (0.67-5.8)	2.4 (0.10-54)	2.9 (0.50-17)	1.6 (0.47-5.4)	1.0 (0.41-2.5)
	CCI >2	0.53 (0.20-1.4)	0.10 (0.01-1.7)	0.37 (0.06-2.4)	0.42 (0.14-1.2)	1.7 (0.78-3.9)
	Allo SCT	2.1 (0.55-8.4)	-	10 (1.0-105)	1.8 (0.41-8.0)	6.7 (1.4-33)
	Auto SCT	0.34 (0.08- 1.5)	-	0.29 (0.02-4.9)	0.21 (0.04-1.1)	3.7 (1.3-11)
	AML	0.68 (0.14-3.4)	-	1.2 (0.08-19)	0.37 (0.07-2.1)	1.1 (0.22-5.1)
	ALL	0.57 (0.08-4.2)	-	-	0.44 (0.05-3.6)	0.40 (0.06-2.8)
	Multiple Myeloma	1.3 (0.18-10.1)	-	3.9 (0.07-220)	0.76 (0.10-6.1)	1.9 (0.36-10)
	B-cell Lymphoma	1.2 (0.16-8.4)	-	13 (0.42-418)	0.93 (0.12-7.2)	2.6 (0.45-49)
	Aplastic Anemia	0.35 (0.02-5.7)	-	1.6 (0.04-64)	-	0.38 (0.02-7.3)

*aOR = odds ratio; SE = standard error; CI = confidence interval; CCI = Charlson Comorbidity Index; allo SCT = allogeneic SCT; auto SCT = autologous SCT; AML = acute myeloid leukemia; ALL = acute lymphoblastic leukemia

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2686. strong>Bloodstream Infection Survey in High-Risk Oncology Patients (BISHOP) with Fever and Neutropenia (FN): Viridans Group Streptococcus Emerges as an Important Pathogen

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Background: In this prospective nation-wide survey of bloodstream isolates associated with first episode of FN in high-risk cancer patients from 14 US cancer centers (December 2016 and June 2018), viridans group Streptococci (VGS) were the most common Gram-positive isolate. We sought to clinically and microbiologically characterize VGS bloodstream infections (BSI).

Methods: Among 343 patients,we compared 90 with VGS vs 253 with non-VGS BSI. Minimum inhibitory concentrations for blood culture isolates were determined by broth dilution for selected agents at our reference microbiology laboratory (UNMC). Clinical data were electronically captured in RedCap, including local site isolate identification and confirmatory reference lab identification via MALDI. Categorical and continuous variables were assessed via chi-square and Mann–Whitney U tests, respectively.

Results: Ninety-two VGS isolates were identified among 90 FN patients, representing 27% of all BSI isolates. *S. mitis* or *oralis* comprised 64 (70%) of VGS. There were no differences between age, sex, and primary diagnosis (50% with AML) among the 2 groups; 1/3 were HSCT recipients. Fluoroquinolone prophylaxis was used in 64 (71%) vs. 139 (55%), $P < 0.01$, in VGS vs non-VGS groups. Critical illness composite (new need for pressor(s), mechanical ventilation or death within 30 days) was 6 (7%) vs. 44 (17%), $P = 0.01$, in the VGS vs non-VGS groups. Figure 1 displays an overview of