SCT, including readmissions for sepsis and number of days of antibiotics therapy, was assessed. Controls were matched for time and type of SCT in a three controls to one case ratio. T-test was performed to analyze differences between groups (statistical significance attributed when $P < 0.05$).

Results. The case sample had 20 SCT CPE-positive patients, of which allograft ($n = 9$) and autograft ($n = 11$). The control sample was made up of 59 SCT CPE-negative patients, allograft ($n = 27$), and autograft ($n = 32$). All patients had antibiotic therapy post SCT. Average LoS for the case sample was significantly longer in the autograft group (41.7 vs. 23.6 days, case vs. control, $P = 0.01$), but not significant in the allograft group (75.1 vs. 58 days, $P = 0.12$). Both autograft and allograft case samples had significantly longer duration of meropenem therapy, 24.8 vs. 14.4 days for allograft ($P = 0.03$) and 9.4 vs. 5.5 days for autograft ($P = 0.03$), cases vs. control. Colistin therapy was longer in both case samples ($P = 0.03$ in autograft and $P = 0.006$ in allograft). Tigecycline therapy was significantly longer in the autograft case vs. control sample ($P = 0.006$), with teicoplanin and piperacillin–tazobactam therapy significantly longer in the autograft case vs. control sample, $P = 0.015$ and $P = 0.03$, respectively.

Conclusion. The LoS post SCT and duration of antibiotic therapy were found to be key proxy measures of worsening outcomes for CPE-positive patients vs. CPE-negative patients who had undergone SCT. Although reasons for CPE colonization vary, there appears to be an overall negative impact on patient outcomes and increased use of more toxic agents, demonstrating the need for early directed CPE decontamination therapy of these at-risk patients, such as use of Faecal Microbiota Transplant (FMT).

Disclosures. **All authors:** No reported disclosures.

1172. Travel-Associated Multidrug-Resistant Organism Acquisition and Risk Factors Among US Military Personnel

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Background. International travel is a risk factor for incident colonization with extended spectrum β-lactamase (ESBL)-producing organisms. These and other multidrug-resistant (MDR) bacteria are major pathogens in combat casualties. We evaluated risk factors for colonization with MDR bacteria in US military personnel traveling internationally for official duty.

Methods. TravMil is a prospective observational study enrolling subjects presenting to military travel clinics. We analyzed surveys, antimicrobial use data, and pre- and post-travel self-collected perirectal swabs in military travelers to regions outside the continental United States, Canada, Western or Northern Europe, or New Zealand presenting to one clinic from December 2015 to December 2017. Gram-negative isolates recovered from swabs underwent real-time identification and susceptibility testing (BD Phoenix). Characteristics of trip and traveler were analyzed to determine risk factors for MDR organism colonization.

Results. One hundred ten trips were planned by 99 travelers (74% male, median age 38 years [IQR 31, 47.25]); 72 trips were completed by 64 travelers. Median trip duration was 21 days (IQR 12.75, 79.5). Of those with trips completed, 17% traveled to Mexico/Caribbean/Central America, 15% to Asia, 57% to Africa, and 10% to South America; 56% stayed in hotels and 50% in dormitories/barracks. Travelers used doxycycline (15%) for malaria prophylaxis, 11% took an antibiotic for travelers' diarrhea (TD) treatment (fluoroquinolone 7%, azithromycin 4%). Incident MDR organism colonization occurred in eight travelers (incidence density 3.5/1,000 travel days; cumulative incidence 11% of trips [95% CI: 4%–19%]), all ESBL-producing *E. coli*. A higher incidence of ESBL-producing *E. coli* acquisition was associated with travel to Asia (36% vs. 7%, $P = 0.02$) but not with travel to other regions, TD, or use of antimicrobials. No relationship was seen between fluoroquinolone or doxycycline exposure and resistance to those antimicrobials.

Conclusion. Consistent with other studies of US military personnel travelers, incident colonization with MDR organisms following official travel occurs at a lower rate in this population compared with civilian travelers, with no identified modifiable risk factors. The highest incidence of ESBL acquisition was observed during travel to Asia.

Disclosures. **All authors:** No reported disclosures.

1173. A Cluster of Carbapenemase-Producing *Acinetobacter baumannii*

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Background. Carbapenem-resistant *A. baumannii* (CRAB) is reportable in Colorado with three to 11 cases detected annually. Between December 2017 and February 2018, Denver Health Medical Center (DHMC) detected two inpatients with CRAB in urine. The hospital and the Colorado Department of Public Health and Environment (CDPHE) conducted an investigation to determine epidemiologic links and molecular relatedness of the isolates.

Methods. We reviewed medical records and performed infection control observations among staff. Pulsed-field gel electrophoresis (PFGE) was performed at CDPHE; antimicrobial susceptibility (AST) and carbapenemase testing was performed at CDC.

Results. *Epidemiologic investigation*: Both patients had neurogenic bladders managed by suprapubic catheters, stage IV decubitus ulcers, and recent surgery. Neither had traveled outside of Colorado. Although both received recent antibiotics, neither received a carbapenem in the 6 previous months. Both isolates were regarded to be asymptomatic bacteriuria. In November 2017, the patients overlapped for 7 days at DHMC on different units. During this week, the same nurse provided wound care for both patients on the same day. Observations of the wound care team revealed opportunities to improve hand hygiene prior to donning and after doffing gloves, the use of single-use scissors on multiple patients, and inconsistent cleaning of a mobile device used to photograph wounds. *Microbiologic and molecular investigations:* Isolates from the two patients were indistinguishable by PFGE. AST found both isolates susceptible to colistin, but resistant to all other antimicrobials tested (Table 1); both harbored OXA-23-like genes by a Research Use Only assay performed at CDC.

Conclusion. These are the first carbapenemase-producing *A. baumannii* strains identified in Colorado. We suspect that they were transmitted during the overlapping hospital admission, although we could not determine where the organism originated or the route of transmission. Opportunities to improve hand hygiene and low-level disinfection were identified. The emergence of previously undetected carbapenemases in Colorado is of great public health concern; collaboration between public health and healthcare facilities is critical to halt transmission of novel regional pathogens.

Table 1. Extended antimicrobial susceptibility testing performed by CDC.

Antimicrobial	Patient #1		Patient #2	
	MIC (μg/mL)	Interpretation	MIC (μg/mL)	Interpretation
Amikacin	>64	R	>64	R
Ampicillin-sulbactam	>32/16	R	>32/16	R
Cefepime	>32	R	>32	R
Cefotaxime	>64	R	>64	R
Ceftazidime	>128	R	>128	R
Ceftriaxone	>32	R	>32	R
Ciprofloxacin	>8	R	>8	R
Colistin	1	S	1	S
Doripenem	>8	R	>8	R
Gentamicin	>16	R	>16	R
Imipenem	64	R	64	R
Levofloxacin	8	R	>8	R
Meropenem	>8	R	>8	R
Minocycline	≤4	S	8	I
Piperacillin-tazobactam	>128/4	R	>128/4	R
Tetracycline	>32	R	>32	R
Tigecycline	1	NA	4	NA
Tobramycin	>16	R	>16	R
Trimethoprim-sulfamethoxazole	>8/152	R	>8/152	R

MIC, mean inhibitory concentration; S, susceptible; I, intermediate; R, resistant; NA, not available

Disclosures. **All authors:** No reported disclosures.

1174. Epidemiology of Carbapenem-Resistant Enterobacteriaceae, a 5-Year Experience at a Tertiary Care Hospital

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Background. Carbapenem-resistant Enterobacteriaceae (CRE) has been increasing worldwide. Our objectives were to study the epidemiology of CRE and compare risk factors and mortality of carbapenem nonsusceptibility to ertapenem alone Enterobacteriaceae (NSEE) with nonsusceptibility to other carbapenems (imipenem, meropenem, or doripenem) Enterobacteriaceae (NSOCE) at a tertiary care hospital in Thailand.

Methods. All CRE isolated from clinical and surveillance cultures were identified from December 2011 to December 2016. Quarterly incidence rate per 100,000 patient-days was estimated. Hospital-wide carbapenem consumption were calculated as defined daily doses (DDD) per 1,000 patient-days. Relationships between hospital-wide carbapenem consumption and incidence of CRE were tested using Poisson regression. Comparative analysis of factors associated with NSEE and NSOCE, and risk factors associated with 14- and 30-day mortality in patients with CRE infection was conducted in adult patients.

Results. The quarterly CRE incidence of unique patients increased significantly from 3.37 per 100,000 patient-days in the last quarter of 2011 to 32.49 per 100,000 patient-days in the last quarter of 2016. Quarterly CRE incidence increased 1.07 per 100,000 patient-days (95% confidence interval [CI], 0.49–1.06; *P*-value for trend <0.001). Quarterly hospital-wide carbapenem consumption increased 1.58 DDD per 1,000 patient-days (95% CI, 0.56–2.59; *P*-value for trend = 0.004). The expected increase of CRE incidence was 1.02 per 100,000 patient-days for a one DDD per 1,000

patient-days increase in carbapenem consumption (95% CI, 1.01–1.03; $P < 0.001$). There were 40 patients with NSEE and 134 patients with NSOCE. In the multivariate analysis, lower carbapenem exposure was significantly associated with the NSEE group (adjusted odds ratio: 0.25; 95% CI, 0.11–0.56). No difference in 14-day and 30-day all-cause mortality between NSEE group and NSOCE group was observed.

Conclusion. The incidence of CRE has risen significantly over a 5-year period at our institution. The important risk factor for nonsusceptibility to other carbapenems compared with nonsusceptibility to ertapenem alone was previous carbapenem use. Our hospital-wide carbapenem use has significantly increased over time, and associated with the increasing incidence of CRE.

Disclosures. **All authors:** No reported disclosures.

1175. Clinical and Microbiological Features of *Klebsiella pneumoniae* Liver Abscess Caused by Multidrug-Resistant Strains

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Background. The endemic *Klebsiella pneumoniae* liver abscess (KPLA) in East Asian countries are usually caused by hypervirulent strains. These hypervirulent strains are usually susceptible to commonly used antibiotics, aside from their intrinsic resistance to ampicillin. However, hypervirulent *K. pneumonaie* strains with multidrug-resistant (MDR) phenotype has been reported recently. We aim to investigate clinical and microbiological features of KPLA caused by MDR-resistant strains, and the evolution of drug-resistance in the resistant strain causing recurrent KPLA.

Methods. Patients with KPLA were retrospectively identified at Taipei Veterans General Hospital during January 2013 to February 2018. Capsular genotypes were analyzed in all *K. pneumoniae* isolates. Antimicrobial-resistant mechanisms were determined for MDR isolates. Pulse-field gel electrophoresis (PFGE), conjugation experiment, and *in vivo* mice lethality were determined on the strains from a patient with recurrent infection.

Results. During the study period, a total of 211 patients with KPLA, and five patients with recurrence were identified. Most of *K. pneumoniae* isolates ($n = 175$, 83.3%) belonged to capsular type K1/K2/K5/K20/K54/K57. Nineteen MDR strains were identified and 15 of them had virulent capsular types (K1 = 7, K2 = 5, K5 = 2, K54 = 1). The major resistance mechanisms of these MDR strains involved the presence of β-lactamases and the overexpression of efflux pumps. The in-hospital mortality of KPLA caused by MDR strains was not significantly higher than wild-type stains (10.53% vs. 4.69%, $P = 0.275$). In a case with recurrent KPLA, the recurrent capsular type K1 strain (TVGHKP2611) with *bla*SHV-12 was genetically identical to the primary wild-type resistance strain (TVGHKP2329) by PFGE. The SHV-12-carrying plasmid from TVGHKP2611 was successfully conjugated to *Eschericia coli* J53. TVGHKP2611 retained high virulence similar to TVGHKP2329 in mice lethality study (median lethal dose < 500 CFU) despite carrying the resistance determinant.

Conclusion. MDR *K. pneumoniae* strains belonging to virulent capsular types have emerged in KPLA. One SHV-12 producing capsular K1 strain causing recurrent KPLA retained its high virulence, which signals this highly pathogenic and resistant strain could be a major concern in the future.

Disclosures. **All authors:** No reported disclosures.

1176. Risk Factors for ESBL *Enterobacteriaceae* Colonization Identified by Universal Admission Screening in a London Teaching Hospital

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Background. Individual risk factors such as antibiotic use and foreign travel are typically associated with ESBL-producing Enterobacteriaceae (ESBL-E) carriage. Few studies have evaluated variations in community demographics or social and material deprivation as risk factors for ESBL-E carriage.

Methods. All admissions to a London hospital group were screened for ESBL-E carriage from rectal swabs for four months in 2015. Patients completed a risk factor questionnaire, and those with a residential postcode in the catchment area were linked to a database containing community-based risk factor data. Risk factors for ESBL-E carriage were determined by binary logistic regression. Isolates that were ESBL-E phenotypically were confirmed by microarray (CT103XL Check-MDR, CheckPoint). The Check-MDR array simlutaneously detects common ESBL and carbapenemase genes, including plasmid-mediated AmpC. Genotypic ESBL-E were split into three groups: CTX-M-15 (Group 1), CTX-M-9 (Group 2), and other (Group 3) for further analysis.

Results. Three hundred sixty (9.0%) of 4,006 patients carried ESBL-E; of which, 1,633 had a residential postcode within the catchment area. In multivariable analysis, risk factors for phenotypic ESBL-E carriage included travel to Asia (OR 5.0, CI 2.5–10.0) or Africa (OR 2.9, CI 1.2–7.0) in the past 12 months, and two or more courses of antibiotics in the past 6 months (OR 2.2, CI 1.5–3.4). Residence in an area with a high proportion of Arab residents and residence in an area with a low proportion of houses with two or more bedrooms were associated with ESBL-E carriage in univariable but not multivariable analysis. Risk factors for the three genotypic ESBL groups were broadly similar to the analysis of phenotypic ESBL carriage, although the number of days traveling abroad in the past 12 months was more associated with Group 1 (CTX-M-15) and Group 3 (other), and older age was associated with Group 3 (other) ESBLs.

Conclusion. We linked individual risk factor information with community-based risk factor information, concluding that individual risk factors (including antibiotic use and overseas travel) were more important than community-based risk factors for predicting colonization with ESBL-E at the time of hospital admission. This information is useful when identifying risk groups for targeted screening.

Disclosures. **All authors:** No reported disclosures.

1177. Carbapenemase-Producing Carbapenem-Resistant Organism Colonization Screening Surveys, Maryland, April 2017–April 2018

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Background. In April 2017, the Maryland Department of Health (MDH) began screening healthcare contacts of confirmed cases of carbapenemase-producing carbapenem-resistant organisms (CP-CROs) to identify potential transmission, per guidance published by the Centers for Disease Control and Prevention. The results of MDH's CP-CRO colonization screening surveys (CSSs) conducted as of April 1, 2018, are summarized.

Methods. Rectal swabs were collected on epidemiologically linked CP-CRO contacts and sent to the MDH Laboratories Administration, where the Cepheid Xpert® Carba-R assay was used to detect five carbapenemases: *Klebsiella pneumoniae* carbapenemase (KPC), New Delhi metallo-β-lactamase (NDM), Verona integron encoded metallo-β-lactamase (VIM), imipenemase (IMP), and oxacillinase-48-like carbapenemase (OXA-48). Identification of CP-CROs in contacts sometimes resulted in additional CSSs to ensure complete case detection. Non-KPC cases were combined for analysis.

Results. During April 1, 2017–April 1, 2018, MDH received reports of 278 incident cases of confirmed CP-CROs. Of these, 16 (6%) expressed non-KPC carbapenemases. The 7 (3%) cases with healthcare contacts prompting CSSs led to screening of 132 first-round contacts, with additional CP-CROs identified in 13 (10%), all of which had KPC. Of these, 12 (92%) resided in ventilator units of skilled nursing facilities (vSNFs). In the first-round CSS at one vSNF, 64% of screened contacts were positive for KPC, which had not been identified in the index case. Weekly follow-up CP-CRO admission screenings and serial follow-up CSSs at the vSNF resulted in screening of a total of 72 unique patients; 38 (53%) were KPC-positive. Of these 38 cases, 32 (89%) were previously unidentified and were placed on contact precautions if not already on them. Staff were re-trained in infection prevention (IP) techniques, and staff and KPC-positive patients were cohorted.

Conclusion. Detection of CP-CROs that express non-KPC carbapenemases in Maryland is rare, and transmission of these carbapenemases has not been identified. However, CSSs identified previously unknown cases of KPC, most commonly in vSNFs, demonstrating the utility of CSSs to detect CP-CROs, and resulting in important IP interventions.

Disclosures. **All authors:** No reported disclosures.

1178. A Multicenter Prospective Study of Clinical and Molecular Epidemiological Analysis of Carbapenem-Resistant *Enterobacteriaceae* (CRE) and Carbapenemase-Producing *Enterobacteriaceae* (CPE) in Japan

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Background. Data of a multicenter study on CRE from Japan are limited. Comparative analyses of carbapenemase-producing *Enterobacteriaceae* (CPE) and non-carbapenemase-producing CRE (NCP-CRE) have not yet been conducted.

Methods. Cases with CPE or CRE (defined as (1) meropenem [MPM] MIC, ≥2 mg/L or (2) imipenem [IPM] MIC, ≥2 mg/L and cefmetazole MIC, ≥64 mg/L [CLSI criteria]) were included from August 2016 to May 2017. PCR was used to detect carbapenemase.

Results. From five tertiary hospitals, 24 isolates (14 CPE and 10 NCP-CRE) were collected from 22 patients. Of the 10 NCP-CRE, seven were *Enterobacter aerogenes* and three were *Enterobacter cloacae*; of the 14 CPE, five were *Klebsiella pneumoniae*; 3, *E. cloacae*; 3, *E. coli*; 2, *Citrobacter freundii*; and 1, *E. aerogenes.* CPE were frequently isolated from the urine (5 [42%]) and sputum (3 [25%]) and NCP-CRE from sputum (4 [40%]), bile (3 [30%]), and urine (2 [20%]). Cases with CPE were older with more frequent use of urinary catheter and/or NG tube than