Those with multiple VAP episodes >7 days apart with a different causative organism were counted separately.

Results. Fifty-six patients (67 episodes) with VAP in 992 admissions were identified. Ten had ≥2 episodes. In 11 episodes, ≥2 isolates were found from a respiratory sample; 78 isolates were identified in total. The cohort median age was 61 (interquartile range [IQR]: 48–70) years, with 43 (76.8%) males. Fourteen (24.6%) patients had diabetes, 10 (17.5%) had chronic kidney diseases, 17 (29.8%) had congestive heart disease, 9 (15.8%) had COPD, and 5 (8.8%) had malignancy. Among isolated bacteria, *Acinetobacter baumannii* (ACB) was highly resistant to meropenem, levofloxacin, and amikacin (Table). The 7-day mortality was 13% (n = 7) and 31-day mortality was 43.8% (n = 21). ACB cases had higher 31-day mortality (18 [56.2%] vs. 4 [25%]; P = 0.041) and longer ICU stay (16 days [IQR: 10–27] vs. 9 [3–15]; P = 0.024; deceased excluded) than non-ACB. Colistin was used in 23 (41.1%) cases as empiric therapy and 25 (44.6%) as definitive therapy.

Conclusion. High resistance rates and worse clinical outcomes were found in VAP cases due to ACB in ICU in Vietnam. Further study is warranted for appropriate treatment and infection control measures.

Table: Antimicrobial resistance of bacterial isolates* in ventilator-associated pneumonia, n (%)

	Acinetobacter baumannii (n = 37)	*Klebsiella pneumoniae* (n = 11)	*Pseudomonas aeruginosa* (n = 15)
Meropenem	37 (100)	7 (63.6)	11 (73.3)
Ceftazidime	37 (100)	11 (100)	10 (66.7)
Levofloxacin	37 (100)	11 (100)	11 (73.3)
Amikacin	35 (94.6)	3 (27.3)	10 (66.7)
Colistin	0	0	0

*Include *Stenotrophomonas maltophilia* (n = 6), *Serratia marcescens* (n = 3), *Enterobacter cloacae* (n = 2), *Elizabethkingia meningoseptica* (n = 2).

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2150. Quality of Non-Bronchoscopic Bronchoalveolar Lavage Specimens and the Diagnosis of Ventilator-Associated Pneumonia

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Background. Ventilator-associated pneumonia (VAP) is a significant cause of hospital-acquired infection. Many institutions use National Healthcare Safety Network (NHSN) definitions for VAP surveillance. One criterion of the NHSN definition for possible VAP (PVAP) is a positive culture obtained via non-bronchoscopic bronchoalveolar lavage (NB-BAL). NB-BAL specimens are not routinely assessed for oropharyngeal contamination prior to quantitative culture. Thus, we hypothesized that NB-BALs can yield poor quality specimens that may contribute to the misdiagnosis of PVAP.

Methods. From May 2016 to January 2017, we performed background quality assessments for NB-BAL specimens collected from patients on mechanical ventilation for >3 days. Thereafter, we retrospectively reviewed NB-BAL quality, culture results, and contribution to NHSN-defined PVAPs. Quality assessments included number of white blood cells (WBC) or squamous epithelial cells (SEC) per low-power field (lpf). Specimens were deemed acceptable if they had ≤10 SEC/lpf by "standard" criteria and zero SEC/lpf by "strict" criteria. All specimens were cultured regardless of quality assessment results, which were not revealed to ordering clinicians.

Results. Of 117 NB-BAL specimens, 8 (7%) did not pass standard quality assessment and an additional 47 (40%) did not pass strict quality assessment. Most samples (82%) were purulent (>25 WBC/lpf). Overall, 56 (48%) of samples resulted in significant growth of at least one species of bacteria (>10^4 CFU/mL). Of the 8 samples that did not pass standard assessment, 7 (87%) resulted in significant bacterial growth. Four PVAPs were diagnosed on the basis of NB-BAL specimens. Of these, all were acceptable by standard criteria, but one failed by strict criteria.

Conclusion. Approximately 50% of our NB-BAL specimens had evidence of oropharyngeal contamination on quality assessment, including one specimen that contributed to a NHSN-reported PVAP. While limited by small sample size and short study duration, our data suggest that the quality of NB-BAL specimens may affect the diagnosis and surveillance of VAP.

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2151. Real-Time Automated Surveillance for Ventilator Associated Events Using Streaming Electronic Health Data

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Background. Criteria defining Ventilator Associated Events (VAEs) are objective and often available in the electronic health record (EHR) data. The use of ventilation data extracted directly from the patient's bedside monitor to allow for real-time surveillance, however, has not been previously incorporated into electronic surveillance approaches. Here we describe validation of a system that can detect and report on VAEs hospital-wide autonomously and in real-time.

Methods. We developed a secure informatics hardware and software platform to identify VAEs autonomously using streaming data. The automated process included 1) archiving and analysis of bedside physiologic monitor data to detect increases in positive end-expiratory pressure (PEEP) or FiO2 settings; 2) real-time querying of EHR data for leukopenia or leukocytosis and concurrent antibiotic initiation; and 3) retrieval and interpretation of microbiology reports for the presence of respiratory pathogens. The algorithm was validated on two 3-month periods in 2015 and 2016 as follows: 1) autonomous surveillance (**AS**) generated detections of three VAE subclasses: VAC, IVAC, and PVAP; 2) manual surveillance (**MS**) by Infection Control (IC) staff independently performed standard surveillance based on chart review, 3) senior IC staff adjudicated the gold standard for cases of AS-MS discordance. The sensitivity (Se), specificity (Sp), and positive predictive value (PPV) of the algorithm are reported.

Results. The number of ventilated patients, ventilator days, and events were: 1,591/9,407/3,014. In cases with complete data, AS detected 66 VAE events identified by MS; AS detected 32 VAEs missed by MS; no MS-identified events were missed by AS. The Se, Sp, and PPV of AS and MS were: 91%/100%/100%, and 61%/100%/83%, respectively. Clinical surveillance case reports generated by AS enabled visual interpretation (figure).

Conclusion. We developed a surveillance tool directly streaming bedside physiologic monitor and EHR data including ventilator settings, laboratory results, and microbiology reports, to apply the CDC's VAE definitions on source data. This resulted in an accurate, objective, and efficient method for real-time hospital-wide surveillance.

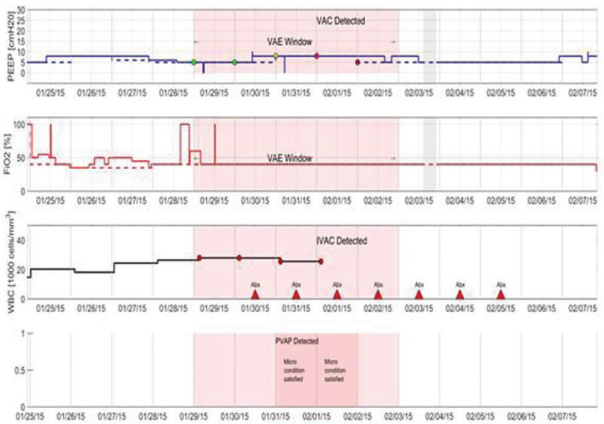

Fig. Example report showing VAE detection. Green dots in the PEEP trend indicate beginning of an initial baseline stability period; the yellow dot indicates worsening PEEP, and red dots indicate persistence of worsening, satisfying criteria for a Ventilator Associated Condition (VAC) event. Pink shading indicates the "VAE window". In this case no concerning trend was detected in the FiO2 data. In the third panel, a rising WBC trend and introduction of a qualifying antibiotic within the VAE window leads to detection of an Infection-related VAC (IVAC) event. In the fourth panel, red shading within the VAE window indicates that microbiology culture results satisfy criteria for detection of a Possible Ventilator Associated Pneumonia (PVAP) event.

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