LETTERS TO THE EDITOR

Discordance between Novel and Traditional Surveillance Paradigms of Ventilator-Associated Pneumonia

To the Editor—We read with great interest the article by Klompas et al[1] that described the epidemiology and attributable morbidity of ventilator-associated events (VAEs). In the study, they showed that the incidence of possible and probable ventilator-associated pneumonia (VAP) according to the new surveillance definition[2] was 1.5 and 0.7 per 1,000 ventilator-days, respectively.[1] They noted that probable pneumonia is a relatively closer proxy for the traditional VAP definition in the previous Centers for Disease Control and Prevention study.[3] However, we wondered whether VAP defined by the novel and traditional surveillance system is the same thing. Therefore, we conducted this investigation to identify any discordance between the novel and tradition surveillance paradigms of VAP.

This study was conducted at a regional teaching hospital in southern Taiwan with 5 acute intensive care units (ICUs; total beds, 63). In November 2011, the institution introduced a ventilator bundle for the prevention of VAP in our ICUs,[4] and a multidiscipline team, including 2 chest physicians, 1 infection specialist, and 1 radiologist, was establish to help accurately diagnose VAP on the basis of a combination of clinical signs and radiographic and microbiologic evidence. To assess the validity of novel surveillance, we retrospectively analyzed all VAP cases identified by the traditional definition using the new VAE algorithm. In this diagnostic algorithm, ventilator-associated conditions (VACs) are defined by an increase of more than 3 cm of H_2O from daily minimum positive end-expiratory pressure (PEEP) or an increase of more than 20% in the fraction of inspired oxygen (FiO_2). Infection-related VAC (IVAC) was defined by VAC with inflammatory signs and use of new antibiotics for more than 4 days, and VAP was defined by IVAC with microbiological evidence of pneumonia. The outcomes, including ventilator-days, length of hospital stay, and in-hospital mortality, were recorded. As in the previous study,[1] the duration of mechanical ventilation and the length of hospital stay were calculated from the day of VAP onset to extubation and discharge, respectively.

In this retrospective study, a total 107 episodes of VAP were identified by the traditional surveillance definition from November 2011 to February 2013. Of 107 episodes of traditional VAP, 36 (33.6%), 26 (24.3%), 13 (12.1%), and 1 (0.9%) were classified as VAC-plus (all patients with VAC, including those with IVAC and VAP), IVAC-plus (all patients with IVAC, including those with VAP), possible VAP, and probable VAP according to the new VAE algorithm, respectively. Twenty-six (72.2%) VAC-plus events developed in the medical ICU, and 10 (27.8%) events developed in the surgical ICU. Among VAC-plus events, 17 (47.2%) of 36 VACs met both criteria of increasing FiO_2 level and PEEP, 12 (33.3%) events were triggered by increasing PEEP setting only, and 7 (19.4%) events were triggered by increasing FiO_2 level only. All IVAC-plus episodes fulfilled the criteria of new antibiotic use; 12 and 19 met the criteria of temperature and white blood cell (WBC) count, respectively. In addition, only 5 IVAC events met all 3 criteria—temperature, WBC count, and antibiotics. The outcomes of different VAE and traditional VAP are summarized in Table 1. However, no significant differences were found between each group.

In this study, only 33.6% of VAP episodes by the tradition definition were considered VACs by the new VAE algorithm, suggesting poor concordance between the new VAE algorithm and traditional VAP surveillance. Despite our findings being different from those of Klompas et al,[1] they are similar to those of a recent study[5] showing that the new VAE surveillance identified only 32% of the patients with VAP by the traditional definition. As the VAE algorithm was a relatively more objective and reliable measurement of the complications of mechanical ventilation, the difference between these studies[1,5] may be caused by the relatively more subjective traditional assessment of VAP. Further studies are warranted to investigate the validity of the new VAE surveillance.

In contrast to the previous studies,[1,5] we found that there was no significant difference among the outcomes of patients with VAC, IVAC, novel VAP, and traditional VAP. However, our finding is based on limited cases. We still need more large-scale studies to draw solid conclusions.

TABLE 1. Outcomes of Different Ventilator-Associated Events

Variable	Ventilator-days, mean ± SD	Length of hospital stay, mean ± SD, days	Hospital mortality, %
VAC-plus (n = 36)	12.3 ± 15.4	14.2 ± 17.6	69.4
IVAC-plus (n = 26)	14.1 ± 17.3	16.2 ± 19.7	65.4
VAP (n = 14)	14.9 ± 17.7	15.1 ± 17.7	57.1
Traditional VAP (n = 107)	14.9 ± 17.8	15.1 ± 17.8	57.1

NOTE. IVAC, infection-related VAC; SD, standard deviation; VAC, ventilator-associated condition; VAP, ventilator-associated pneumonia.

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As in a previous study,[5] most of the VACs were identified by increases in PEEP setting as opposed to increases in FiO_2 level. The reason should be that most institutions, including our ICUs, adjust the ventilator setting according to the ARDSNet protocol. Therefore, increasing PEEP setting may be more commonly used for the condition of worsening oxygenation than increasing FiO_2 level.

In conclusion, the novel VAE algorithm is poorly concordant with traditional VAP surveillance. More studies are needed for further validation of its application.

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Hui-Chun Chang;[1] Shu-Chen Kung;[1] Ching-Min Wang, MD;[2] Wei-Lun Liu, MD[3]

Affiliations: 1. Section of Respiratory Therapy, Chi Mei Medical Center, Tainan, Taiwan; 2. Department of Internal Medicine, Chi Mei Medical Center, Tainan, Taiwan; 3. Department of Intensive Care Medicine, Chi Mei Medical Center, Tainan, Taiwan.

Address correspondence to Wei-Lun Liu, MD, Department of Intensive Care Medicine, Chi Mei Medical Center, No. 201, Taikang, Taikang Village, Liuying District, Tainan City, Taiwan (medrpeterliu@gmail.com).

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Discordance between Novel and Traditional Surveillance Definitions for Ventilator-Associated Pneumonia: Insights and Opportunities to Improve Patient Care

To the Editor—I wish to thank Dr Liu and colleagues for their letter[1] regarding their experience with the Centers for Disease Control and Prevention's (CDC's) ventilator-associated event (VAE) surveillance definitions versus traditional ventilator-associated pneumonia (VAP) surveillance definitions. VAE definitions and concepts are still very new, and hence operational data regarding their performance and interpretation are welcome resources to help us understand how to best use these new definitions to catalyze better care for patients.

Dr Liu and colleagues retrospectively reviewed 107 episodes of traditionally defined VAP from a 16-month period in 5 intensive care units (ICUs) in 1 hospital in Taiwan. They found that only 36 (34%) of 107 traditionally defined VAPs met VAE criteria for ventilator-associated conditions (VACs), and only 13 (36%) of 36 met VAE criteria for possible or probable VAP. Dr Liu and colleagues' report provides important insights and lessons about both traditional VAP definitions and the CDC's new VAE definitions.

Dr Liu and colleagues defined VAP using a "combination of clinical signs and radiographic and microbiologic evidence." They did not provide details regarding their specific criteria in any of these domains; hence, it is difficult to comment on the precise performance characteristics of their definition. Nonetheless, it is well established that all clinical and surveillance definitions for VAP are subjective and nonspecific.[2-6] The limited data we have from Dr Liu and colleagues suggest that this is likely the case with their definition as well.

First, the inclusion of radiographic criteria in their definition inevitably introduces latitude for differences of opinion between different observers. Multiple studies attest that there is considerable variability between clinicians on the interpretation of chest radiographs.[7-9]

Second, only one-third of Liu and colleagues' VAPs met VAE criteria. This means that two-thirds of their VAPs did not suffer pulmonary deterioration severe enough to trigger increased ventilator support at or above the VAE thresholds. While it is certainly conceivable that some bona fide pneumonias do not precipitate physiological deterioration severe enough to meet VAE ventilator-change thresholds, one wonders about the clinical significance of these milder cases and whether some of these physiologically benign events may have been more indicative of colonization rather than invasive disease.

Third, we learn that only 26 of the 36 patients who met both Liu and colleagues' VAP definition and VAE criteria qualified as infection-related ventilator-associated complications (IVACs). This means that, in practice, almost one-third

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