

Statement-on-Multiple-Patients-Per-Ventilator/Joint-Statement-Patients-Single-Ventilator.pdf?lang=en-US.

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Reply to Chase *et al.* and to Milner *et al.*

From the Authors:

Surges in cases of coronavirus disease (COVID-19)-associated respiratory failure have caused acute regional shortages of ventilators. Repurposing of anesthesia machines and noninvasive ventilators unquestionably has helped support additional patients but may be insufficient during dramatic increases in caseload. Proposed actions to address acute shortages have included ventilator rationing, manual bag ventilation, and “splitting” the external ventilator circuit to support multiple patients simultaneously. None of these options is ideal. None is risk-free. None negates the need for more ventilators. However, these were the options we were forced to consider in New York City just a few months ago (1).

In our view, rationing ventilators among multiple potentially rescuable patients is a last resort and should be considered only if all reasonable alternatives are exhausted. Extended-duration manual bag ventilation requires prolonged exposure with high risk for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) transmission to those performing the ventilation, and yet it still seems unlikely to provide appropriate support to severely lung-injured patients. With these considerations in mind, ventilator sharing seems a more palatable stopgap.

When developing our ventilator-sharing protocol (2), we followed several guiding principles: 1) maximization of safety for each patient, 2) maintenance of lung-protective ventilation, 3) prevention of harm during equipment issues or clinical events, 4) potential for human error, and 5) practical scalability in context. The context in New York included extremely high patient-to-clinician ratios, adoption of a tiered staffing strategy in ICUs, clinicians practicing outside their specialty, caring for critically ill patients in makeshift ICUs, and minimal lead time for planning or onboarding.

There are many potential engineering solutions to share one ventilator among two or more patients, including those advocated by Chase and colleagues and Milner and colleagues. Proposals that increase circuit complexity also may increase risk of (potentially fatal) adverse events from equipment issues, clinical events, or human error (3). Reliance on components that are not routinely used in similar clinical applications, are not medical grade, and/or have not undergone rigorous testing increases these risks; this is especially true for mechanical components that regulate airflow,

in which component failure could cause abrupt cessation of ventilator support for one or both patients. Circuit configurations that require unconventional ventilator settings, such as a near-doubling of preset V_T or respiratory rate, increase these risks even further.

We do not question the altruistic intent with various proposals for configuring a shared ventilator. However, the extent to which complex configurations offer meaningful benefits to patients over simpler circuitry should be carefully weighed against their potential to cause unintended harm. Regardless of the circuit configuration, responsible implementation requires adequate safeguards (including patient monitoring), multidisciplinary planning, and a carefully detailed clinical protocol.

Experts can disagree reasonably on the best approach to ventilator sharing or whether it should even be entertained. However, we hope broad consensus exists for the most important issue: regional (and global) coordination is needed to respond to acute ventilator shortages (4). The problem in New York was unequivocally regional; ventilators elsewhere in the United States sat idle as New York hospitals began preparations to implement rationing protocols. Had New York hospitals reached the point of rationing ventilators, it would have signified a moral failure of our profession and our healthcare system. We came frighteningly close. We must work together to ensure future crises cannot get to that point again. ■

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Endoscopic Ultrasound in the Diagnosis of Sarcoidosis: A Forgotten Tool?

To the Editor:

With keen interest, we read the guidelines for the diagnosis and detection of sarcoidosis by Crouser and colleagues in a recent issue of the *Journal* (1). We congratulate the authors for achieving this daunting task of formulation of guidelines for sarcoidosis. The authors have extensively elaborated on the role of endobronchial ultrasound-guided transbronchial needle aspiration (EBUS-TBNA) in the diagnosis of sarcoidosis. However, the document lacks the discussion on the utility of fine-needle aspiration using endoscopic ultrasound (EUS-FNA) as well as endoscopic ultrasound using echobronchoscope (EUS-B-FNA).

EUS-FNA is a real-time fine-needle aspiration procedure, through the esophagus, providing access to left paratracheal, subcarinal, and paraesophageal lymph node stations. It is a highly sensitive, accurate, fast, safe, and minimally invasive method. Its diagnostic yield for sarcoidosis varies between 77% and 94% (2, 3). Randomized trials comparing EBUS-TBNA and EUS-FNA have either shown a similar yield or a higher yield of EUS-FNA (4, 5). EUS-B-FNA has also been demonstrated to have a comparable yield as EBUS-TBNA in a randomized trial (6). The sensitivity of the endosonography for diagnosing sarcoidosis was 85% overall, 84% for EBUS-TBNA, and 87% for EUS-B-FNA. Oki and colleagues also demonstrated a diagnostic yield of 86% with EUS-B-FNA in 29 patients for the diagnosis of stage I and II sarcoidosis (3). The procedure is better tolerated in patients with reduced lung function and intractable cough. The reduced need for sedatives and topical anesthesia as well as reduced procedure duration are the added advantages of EUS-B-FNA compared with EBUS-TBNA (6). The training required for EUS-B-FNA is also

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minimal for a trained interventional pulmonologist, and the procedure can be performed using the same echobronchoscope circumventing the additional expenditure of involving a gastroenterologist.

Meta-analysis comparing overall diagnostic yield and safety of EUS-B-FNA combined with EBUS-TBNA in the diagnosis of mediastinal lymphadenopathy demonstrated an additional diagnostic gain of 7.6% in EUS-B-FNA over EBUS-TBNA (7). The procedure is also considered safe, and a meta-analysis demonstrated a complication rate of 0.30% after EUS as compared with 0.05% in the EBUS group. Most of the reported complications were in patients with lung cancer, and the complication rate was even lower for sarcoidosis (8). The advantage of EBUS-TBNA over EUS-B-FNA is its higher reach for mediastinal lymph node stations so that a multistation sampling can be done.

Keeping these points in mind, we are of the view that sampling of mediastinal lymph nodes for the diagnosis of sarcoidosis may be performed with either EBUS-TBNA or EUS-(B)-FNA depending on the operator's comfort, the patient's general status, involved lymph node stations (7 and 4L), and equipment availability. ■

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