

The OSCILLATE trial: Implications for respiratory therapists then and now

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Acute respiratory distress syndrome (ARDS) continues to be associated with a high mortality rate, ranging from 26% to 28% (1,2). Many survivors experience long-term complications following discharge from hospital (3). Early randomized controlled trials (RCTs) investigating the use of high-frequency oscillatory ventilation (HFOV) in ARDS compared conventional mechanical ventilation (CV) with HFOV. Although these trials showed a potential reduction in mortality with HFOV, the strategies that were used in the CV protocols are not currently considered to be lung protective (4,5). In addition, small sample sizes were used in these trials (6,7), which may have impacted the generalizability of the results to a broader ARDS population, and introduced potential misrepresentation and bias. Recently, a larger RCT of HFOV versus CV for early ARDS was conducted, and results contrasted those of earlier trials showing that HFOV failed to improve mortality in ARDS (8). These results now cause critical care clinicians caring for ARDS patients to question what modality of mechanical ventilation to use during the late phase of ARDS.

The Oscillation for Acute Respiratory Distress Syndrome (ARDS) Treated Early (OSCILLATE) trial was undertaken to evaluate the effect of early initiation of HFOV on all-cause mortality in adults with moderate to severe ARDS. The study involved a multicentre RCT in five countries (Canada, United States, Chile, Saudi Arabia and India), engaging 39 intensive care units with the goal of enrolling a larger target sample size and using a more lung-protective strategy than previous trials (8). To date, the OSCILLATE trial is the sole RCT of HFOV in ARDS that has enrolled a large number of patients and provided up-to-date, protocolized lung-protective ventilation. The pilot phase of the trial was conducted from July 2007 to June 2008, and the main trial from July 2009 to August 2012. Five hundred forty-eight of the planned 1200 patients were randomly assigned to receive either HFOV following a lung-protective protocol of high set frequency coupled with a prescribed high maximum power and lung recruitment manoeuvres (8-11), or CV using a lung-protective strategy of low tidal volume, high positive end-expiratory pressure and lung-recruitment manoeuvres modelled after the experimental arm of the Lung Open Ventilation Study (12). On recommendation of the data monitoring committee, the trial was stopped early because interim analysis revealed no decrease in mortality with HFOV – and perhaps a tendency toward harm.

Because the OSCILLATE trial compared two mechanical ventilation strategies, involvement of and reliance on respiratory therapists (RTs) was of utmost value. However, undertaking the strict protocols outlined by the OSCILLATE trial rather than the usual local HFOV or CV policy/protocol posed implications. Before starting the OSCILLATE trial pilot, the principal investigators questioned whether trial protocols would be similar to centres' usual practices in the HFOV arm of the trial. A self-reporting survey was e-mailed to charge RTs at multiple Canadian hospitals practicing HFOV before the pilot phase of the trial to observe what HFOV parameters were being used. Pretrial, both frequency and mean airway pressure tended to be set lower in many centres. These differences in practice may have made it more challenging for bedside RTs at participating centres because they would have to consciously refer to the OSCILLATE protocol rather than providing their usual HFOV care with ease, thereby increasing

their workload. In fact, for centres experienced with HFOV for ARDS, some reported that the protocol varied with respect to parameters, such as mean airway pressure and power, causing them to be more conscious to avoid straying from the protocol. Centres with minimal previous HFOV experience reported an even greater imposition of work on the RTs.

In participating OSCILLATE trial centres, research coordinators (RCs) performed the tasks of daily collection of ventilatory data, arterial blood gases, cointerventions (sedation, neuromuscular blocking agents, steroids, vasopressor requirements, etc) and reporting any protocol violations. In some centres, the RC's clinical background was in respiratory therapy; others included registered nurses or other backgrounds. However, in some of the centres, where either the RC was not an RT or there was not an RC employed, they relied heavily on the bedside clinical RTs to collect the required ventilator data and ventilator protocol violations, thus increasing their daily workload. Reporting of protocol violations alerted the trial coordinating centre as to how well specific centres were adhering to the protocol. This allowed for timely feedback to be provided to the respective centres so that study results would be based on protocol rather than an alternative method.

Today, the trial continues to have implications for RTs. Based on trial results, RTs – in consultation with the critical care team – must now decide on how best to provide mechanical ventilatory support for adult ARDS patients using HFOV or CV. The OSCILLATE trial demonstrated that early institution of HFOV in adult patients with moderate to severe ARDS did not decrease mortality, but may have increased it. The challenge now for RTs is whether to use HFOV for adults with moderate to severe ARDS. If a decision has been made to use HFOV, at what stage of ARDS should it be initiated? The option to institute HFOV in later, moderate to severe ARDS should not be discounted because this subset of patients has not been separately studied, nor have alternative HFOV protocols using different parameter options, such as lower mean airway pressures, been studied. The question remains: what is the role (if any) of HFOV in 'late' ARDS? An RCT for this group of patients, perhaps with a redesigned protocol, would likely be welcomed by the critical care community.

There is currently an OSCILLATE trial knowledge translation initiative underway, funded by the Canadian Institutes of Health Research, involving centres that were involved with the OSCILLATE trial (25 centres in Canada and one in Saudi Arabia). Retrospective data are being collected on practice patterns in the management of adults with moderate to severe ARDS in 2014. Once summarized, these descriptive practice patterns for ARDS will help critical care staff compare their practice with others, as well as with ARDS management guidelines currently under development by the American Thoracic Society. Identified practice patterns will also help researchers identify other areas for knowledge translation, identification and frequency of use of mechanical ventilation strategies that are currently being used (but not well investigated) for ARDS. This includes airway pressure release ventilation and deciding on the most appropriate control group mechanical ventilator parameters for future RCTs in ARDS, inclusive of novel ventilatory strategies and pharmaceuticals.

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BIOGRAPHICAL NOTE

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