in the treatment of the patient who is critically ill. Moreover, in these patients, since the resting oxygen demands cannot be met, blood flow will be reduced through low-extraction tissues, such as the liver and gut, to be rerouted to essential tissues such as the brain; in this situation, the IVC SvO₂ will reliably show an early decrease, indicating tissue hypoxia. The study by Davison et al demonstrates elegantly the discrepancy between SvO₂ measurements in the upper and lower body in patients who are critically ill. However, considering the low margin between the mean SvO₂ levels reported (73.1% ± 11.6% vs 69.1% ± 12.5%) and considering the utility of using trends rather than absolute values in the individual patient, IVC SvO₂ is still clinically useful, though numerically different, and should not be discarded from the critical care armamentarium.

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Response

To the Editor:

We thank Drs El-Rassi and Yazigi for their thoughtful comments regarding femoral-based central venous oxygen saturation (SvO₂) and its potential use as a surrogate marker for central SvO₂ to help guide resuscitation. Drs El-Rassi and Yazigi point out that the absolute margin of difference between central SvO₂ and femoral SvO₂ reported in our study is small (73.1% ± 11.6% vs 69.1% ± 12.5%, respectively; P = .002). Although the absolute difference is small, when considering the SD (SD ± 11.6%) and large limits of agreement (18.4%-28.4%), the range of discrepancy is significant and clinically relevant.

As stated in our article, according to these findings, a central SvO₂ of 70% corresponds to a femoral SvO₂ range of 58.5% to 81.2%. A value of 58.8% would prompt the physician to optimize oxygen delivery by means of volume resuscitation, blood transfusion, or the initiation of inotropic agents. Yet, a value of 81.2% alone would not generate the same intervention. Thus, we believe that the femoral SvO₂ cannot reliably be used to make clinical decisions or guide resuscitation. SvO₂ values differ among organ systems because each organ extracts variable amounts of oxygen, particularly in states of physiologic stress. Absolute values of venous oxygenation, therefore, depend greatly on the site of measurement. It has been well established that the mixed SvO₂ value obtained from the distal port of a pulmonary artery catheter reflects the venous return from both the upper and lower portions of the body and, therefore, is a marker of global tissue hypoxia. However, it is important to note that the standard femoral venous catheters are 20 cm in length. In the average-sized adult, the tip, and hence the venous sampling, is within the iliac vein and not in the inferior vena cava. Thus, SvO₂ from the intraabdominal organs, including the liver, kidney, and splanchnic regions, is not necessarily sampled. A low femoral SvO₂, therefore, may not necessarily reflect a redistribution of blood flow to indicate that global tissue hypoperfusion is present.

Future studies examining trends of femoral SvO₂, particularly in patients in the early stages of shock, may produce more promising results, and we intend to conduct the same study in patients with shock. Based on our current study, we believe that femoral SvO₂ cannot be used to reliably guide resuscitation. The topic of differences in regional blood flow and oxygen delivery is an interesting one and deserves further evaluation.

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References

Survival in Pulmonary Hypertension Registries
The Importance of Incident Cases

To the Editor:

We read with interest the characteristics and survival data of patients with connective tissue disease-associated pulmonary
arterial hypertension (CTD-APAH) enrolled in REVEAL (the Registry to Evaluate Early and Long-term Pulmonary Arterial Hypertension Disease Management) as described in the article by Chung et al (December 2010). We note that the observed survival rates in patients with systemic sclerosis-associated pulmonary arterial hypertension (PAH) were markedly superior to those noted in the UK CTD-APAH registry. We would agree that this is likely related to the different composition of the two registry populations and believe this issue merits further discussion.

In the REVEAL cohort, only 15% of the 641 cases of patients with CTD-APAH were incident cases (defined in REVEAL as diagnosed within 3 months of entry). The mean time from diagnosis to enrollment was 27.2 ± 29.9 months, with the majority of patients already taking PAH-specific medication at entry into the registry. In the United Kingdom, all adult patients with PAH receive their diagnosis, initiation of therapy, and treatment via seven nationally designated centers. Consequently, all 484 patients enrolled into the UK CTD-APAH registry were truly unselected, treatment-naive patients with incident disease.

The different outcomes of patients with incident and prevalent PAH were highlighted by the French idiopathic PAH (IPAH) registry, in which survival rates were significantly superior for patients with prevalent disease and, indeed, were progressively better the longer the length of time from diagnosis to enrollment. Even so, the French registry, composed of 354 patients with IPAH-like disease, included only 56 true incident cases. The 134 patients with prevalent disease enrolled <3 years from diagnosis were used to augment this group to enable formulation of a predictive survival equation. In an attempt to remove the survivor bias caused by the inclusion of patients with prevalent disease and different lengths of time between diagnosis and enrollment, survival estimates were adjusted for delay from diagnosis to study entry. A similar method was employed as a sensitivity analysis in the formation of REVEAL’s PAH survival predictor. These statistical techniques may have given the impression of increased survival rates in both the French and REVEAL registries by underestimating the proportion of patients with more severe disease who died soon after diagnosis.

We would, therefore, argue that describing survival on the basis of patients with predominantly prevalent disease produces an inaccurate picture of overall survival. Data derived only from consecutive and unselected true incident cases, such as in the UK CTD-APAH and chronic thromboembolic pulmonary hypertension registries, provide a more reliable estimation of survival.

Future registries should be designed, where possible, to enroll only true incident cases, as in the forthcoming IPAH registry for the United Kingdom and Ireland.

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REFERENCES


Response

To the Editor:

We appreciate the review of our article by Dr Condliffe and colleagues. We agree that unadjusted outcomes of incident and prevalent populations of patients with pulmonary arterial hypertension (PAH) differ. Therefore, it is paramount that target populations are explicitly described when reporting data obtained from large registries. REVEAL (the Registry to Evaluate Early and Long-term Pulmonary Arterial Hypertension Disease Management) was designed to observe and characterize a patient