

Intradialytic arterial oxygen saturation in chronic hemodialysis patients – Results from a large US population

Hanjie Zhang¹, Anna Meyring-Wösten¹, Xiaoling Ye¹, Doris H. Fuertinger¹, Franz Kappel², Mikhail Artemyev¹, Nancy Ginsberg¹, Stephan Thijssen¹, Peter Kotanko¹

¹Renal Research Institute, New York, NY, ²University of Graz, Austria

Background and Aims

Intradialytic hypoxemia has been recognized since the early days of hemodialysis (HD), but data from large populations are still lacking. Technological advances in the last decade made routine continuous measurement of blood oxygen saturation during HD possible. The Crit-Line™ monitor is approved for the measurement of both hemoglobin oxygen saturation and hematocrit in the extracorporeal circulation. Depending on the type of vascular access, mixed venous oxygen saturation can be determined in patients with central venous catheters, and arterial oxygen saturation in patients with arterio-venous access.

The aim of this study was to assess the epidemiology of intradialytic arterial oxygen saturation (SaO₂).

Methods

We analyzed intradialytic arterial SaO₂ in chronic non-catheter HD patients treated between January 2012 and September 2014 in 17 facilities. SaO₂ was reported every minute by the CritLine™ monitor. Patients in whom the undocumented use of a central-venous catheter as vascular access was suspected (i.e., mean SaO₂ < 80%) were excluded. SaO₂ variables were averaged first per-patient and then across all patients. Hypoxemia was defined as SaO₂ < 90%.

Results

We studied 1608 patients (59% males; 50% whites) during 70330 HD treatments. Mean SaO₂ was hypoxemic in 128 (8%) patients (Fig 1). On average, patients spent 11.9% of their treatment at an SaO₂ below 90%, and 3.1% below 87% (Table 1); 199 patients (12.4%) were hypoxemic for more than 1/3 of the treatment. Analysis of the time course revealed that an initial SaO₂ decline was followed by a recovery above starting levels (Fig.2).

Table 1: Descriptive statistics of the study population and treatment SaO₂ data.

Variable	Mean±SD	Min	Max
No. of treatments per patient	44±41	1	277
Age (years)	62±15	20	97
Vintage (years)	3.9±4.0	0.0	31.9
Mean SaO ₂ (%)	92.6±1.9	80.1	96.7
Median SaO ₂ (%)	92.7±1.9	80.9	96.7
Min SaO ₂ (%)	90.1±3.1	60.0	95.4
Max SaO ₂ (%)	94.4±1.4	82.1	98.0
SD SaO ₂ (%)	0.9±0.5	0.2	9.0
% of time spent below 90% SaO ₂	11.9±20.4	0	100
% of time spent below 87% SaO ₂	3.1±9.8	0	100
Start SaO ₂ (%)	92.4±2.0	76.6	97.2
End SaO ₂ (%)	93.0±1.9	64.0	97.1

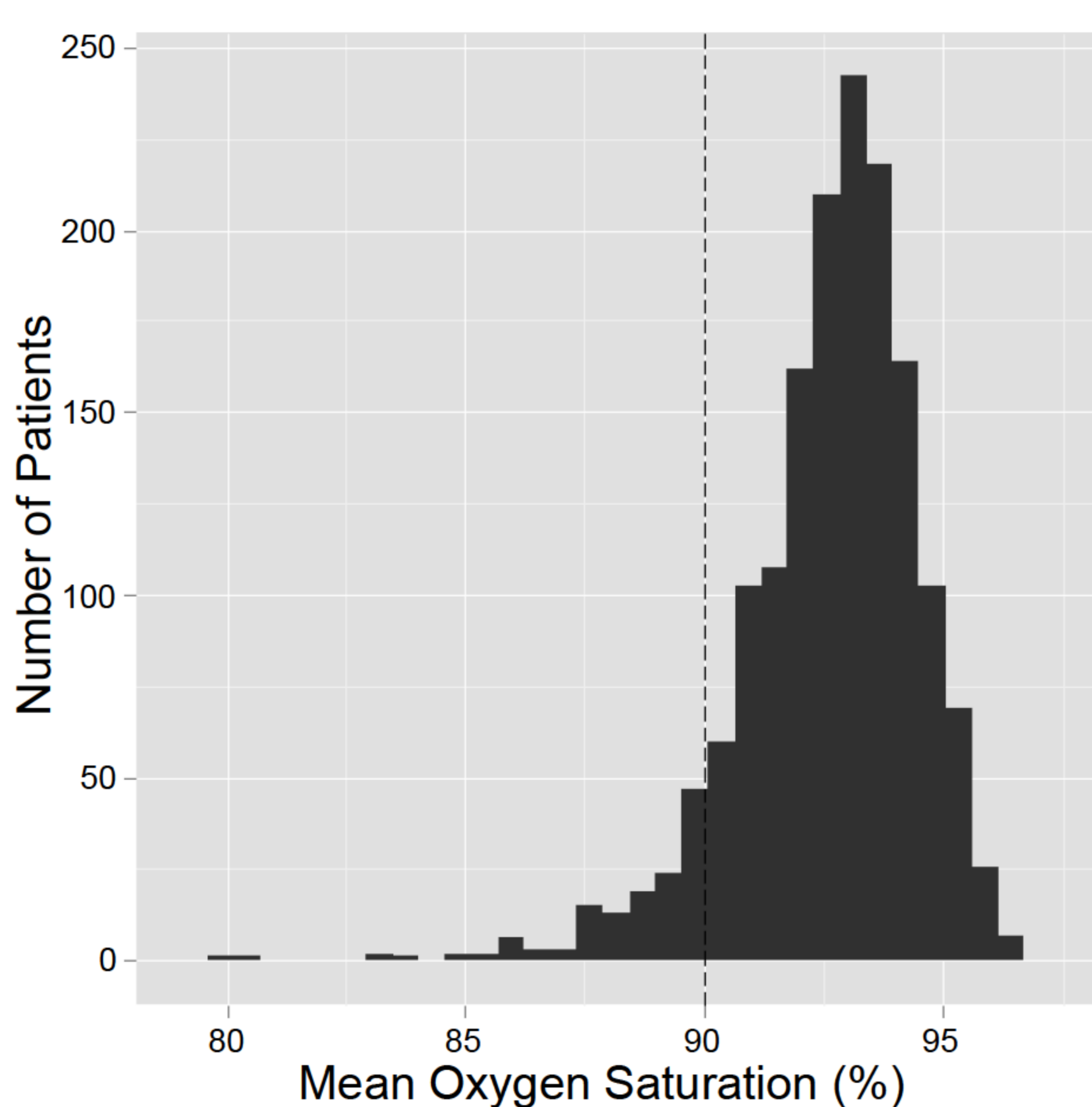


Figure 1: Distribution of mean intradialytic SaO₂. The dotted line indicates the hypoxemia threshold.

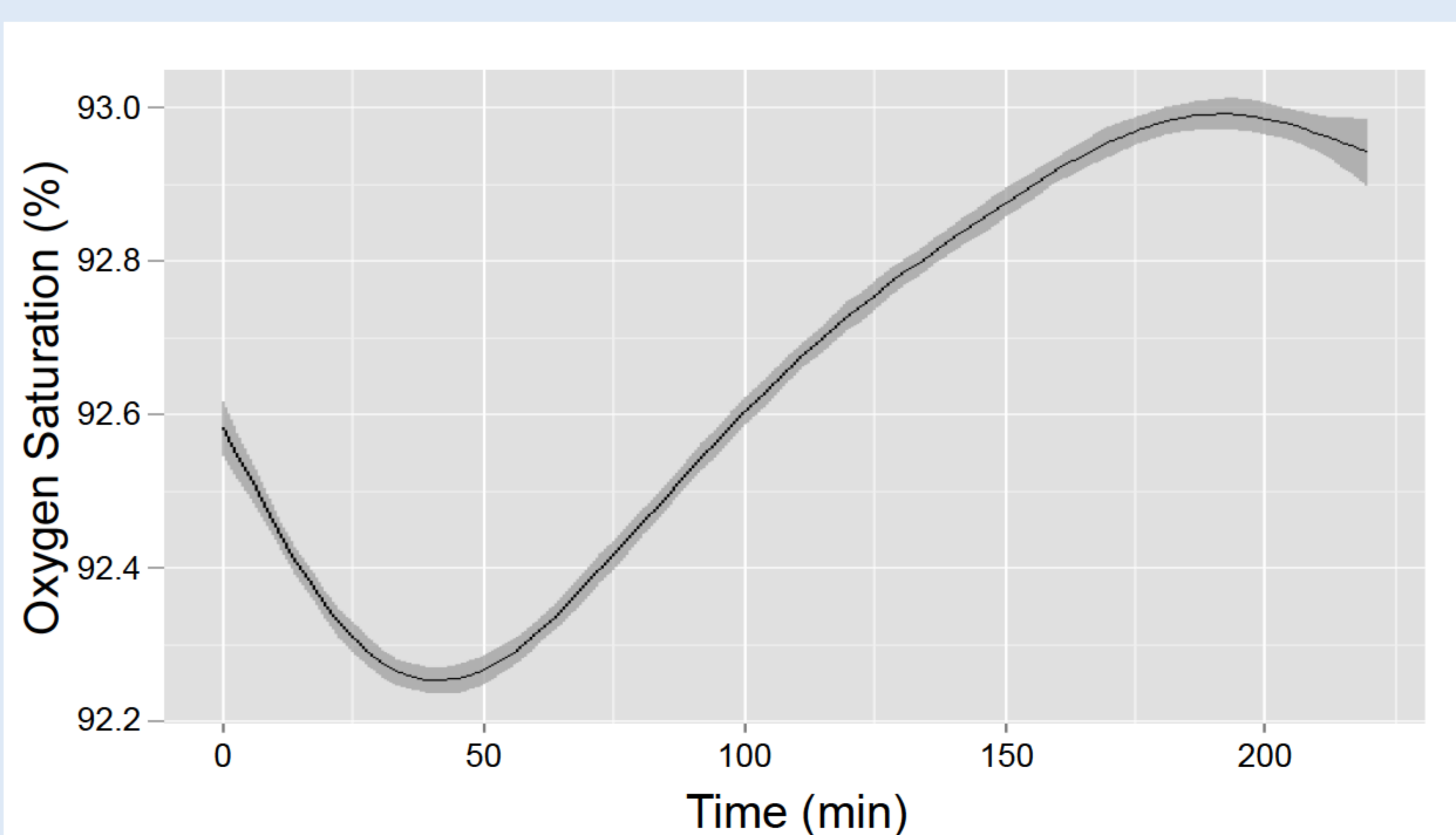


Figure 2: Mean (95% CI) SaO₂ per treatment minute.

Conclusion

Our data indicate a high prevalence of intradialytic hypoxemia; the clinical consequences remain to be elucidated.

