

Capnography during procedural sedation

Changes in capnography values and waveforms may help clinicians understand a patient's level of comfort, sedation, and respiratory function during procedural sedation.¹

Diagnosis ¹	Values ¹	Intervention ¹	
Normal	SpO ₂	Normal	None required, continue sedation
	etCO ₂	Normal	
	RR	Normal	
	Waveform	Normal	

Waveform²
etCO₂ 35-45 mmHg

Diagnosis ¹	Values ¹	Intervention ³	
Ineffective breathing pattern	SpO ₂	Normal	Reassess patient and continue sedation
	etCO ₂	Normal	
	RR	Normal	
	Waveform	Variable	

Waveform¹
etCO₂ 35-45 mmHg

Diagnosis ¹	Values ¹	Intervention ¹	
Hyperventilation	SpO ₂	Normal	Reassess patient and continue sedation
	etCO ₂	↓	
	RR	↑	
	Waveform	Decreased amplitude and width	

Waveform¹
etCO₂ <35 mmHg

Diagnosis ¹	Values ¹	Intervention ¹	
Hypopneic hypoventilation (shallow breathing)	SpO ₂	Normal	Reassess patient and continue sedation
	etCO ₂	↓	
	RR	↓	
	Waveform	Decreased amplitude	

Waveform¹
etCO₂ <35 mmHg

Diagnosis ¹	Values ¹	Intervention ¹	
Bradypneic hypoventilation	SpO ₂	Normal	Reassess patient and continue sedation
	etCO ₂	↑	
	RR	↓	
	Waveform	Increased amplitude and width	

Waveform¹
etCO₂ >45 mmHg

Diagnosis ¹	Values ¹	Intervention ¹	
Apnea	SpO ₂	Normal or ↓ depending on duration	Reassess patient
	etCO ₂	Zero	
	RR	Zero	
	Waveform	Absent	

Waveform¹
etCO₂ <35 mmHg

Diagnosis ¹	Values ¹	Intervention ¹	
Complete airway obstruction	SpO ₂	Normal or ↓ depending on duration	Reassess patient
	etCO ₂	Zero	
	RR	Zero	
	Waveform	Absent	

Waveform¹
etCO₂ <35 mmHg

The Microstream™ capnography monitoring system should not be used as the sole basis for diagnosis or therapy and is intended only as an adjunct in patient assessment.

1. Krauss B, Hess DR. Capnography for procedural sedation and analgesia in the emergency department. *Ann Emerg Med.* 2007;50(2):172-81. Epub Jan. 12, 2007.
 2. Gravenstein JS, editor. *Capnography: Clinical Aspects.* Cambridge University Press. 2004, 2011.
 3. <https://nurseslabs.com/ineffective-breathing-pattern/>
 4. MedicineNet.com. Definition of hyperventilation. <http://www.medicinenet.com/script/main/art.asp?articlekey=3853>. Accessed April 10, 2016.

Diagnosis ¹	Values ¹	Intervention ¹	
Hypopneic hypoventilation with periodic breathing	SpO ₂	Normal or ↓	Reassess the patient
	etCO ₂	↓	
	RR	↓	
	Waveform	Decreased amplitude	
	Other	Apneic pauses	

Waveform¹
etCO₂ <35 mmHg

Diagnosis ¹	Values ¹	Intervention ¹	
Partial airway obstruction	SpO ₂	Normal or ↓	Reassess patient
	etCO ₂	Normal	
	RR	Variable	
	Waveform	Noisy breathing and stridor resolve	

Waveform¹
etCO₂ <35 mmHg

Diagnosis ¹	Values ¹	Intervention ¹	
Complete laryngospasm	SpO ₂	Normal or ↓ depending on duration	Reassess patient
	etCO ₂	Zero	
	RR	Zero	
	Waveform	Absent	

Waveform¹
etCO₂ <35 mmHg

Diagnosis ¹	Values ¹	Intervention ¹	
Partial laryngospasm	SpO ₂	Normal or ↓ depending on duration	Reassess patient
	etCO ₂	Normal, ↓ or ↑ depending on duration and severity of bronchospasms	
	RR	Normal, ↓ or ↑ depending on duration and severity of bronchospasms	

Waveform¹
etCO₂ <35 mmHg

Diagnosis ¹	Values ¹	Intervention ¹	
Bronchospasm	SpO ₂	Normal or ↓ depending on duration and severity of bronchospasms	Reassess patient
	etCO ₂	Normal, ↓ or ↑ depending on duration and severity of bronchospasms	
	RR	Normal, ↓ or ↑ depending on duration and severity of bronchospasms	

Waveform¹
etCO₂ <35 mmHg

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Diagnosis ¹	Values ¹	Intervention ¹	
Complete airway obstruction	SpO ₂	Normal or ↓	Reassess patient
	etCO ₂	Zero	
	RR	Zero	
	Waveform	Absent	

Waveform¹
etCO₂ <35 mmHg

Diagnosis ¹	Values ¹	Intervention ¹	
Complete laryngospasm	SpO ₂	Normal or ↓ depending on duration	Reassess patient
	etCO ₂	Zero	
	RR	Zero	
	Waveform	Absent	

Waveform¹
etCO₂ <35 mmHg

Diagnosis ¹	Values ¹	Intervention ¹	
Partial airway obstruction	SpO ₂	Normal or ↓	Reassess patient
	etCO ₂	Normal, ↓ or ↑ depending on duration and severity of bronchospasms	
	RR	Normal, ↓ or ↑ depending on duration and severity of bronchospasms	
	Waveform	Curved	

Waveform¹
etCO₂ <35 mmHg

Diagnosis ¹	Values ¹	Intervention ¹	
Complete airway obstruction	SpO ₂	Normal or ↓ depending on duration	Reassess patient
	etCO ₂	Zero	
	RR	Zero	
	Waveform	Absent	

Waveform¹
etCO₂ <35 mmHg

Diagnosis ¹	Values ¹	Intervention ¹	
Complete laryngospasm	SpO ₂	Normal or ↓ depending on duration	Reassess patient
	etCO ₂	Zero	
	RR	Zero	
	Waveform	Absent	

Waveform¹
etCO₂ <35 mmHg

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