Bedside Blood Gas Interpretation Online Course

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Latest Review January 2025
Accreditation: RACGP (Activity Number 756463) & ACRRM (Activity Number: 39709) for the 2026 - 2028 triennium

Learning Outcomes

At the completion of the course the participants should be able to:

1. Interpret acid base disorders using blood gases
2. Identify blood gas patterns for metabolic acidosis, metabolic alkalosis, respiratory acidosis and respiratory alkalosis
3. Describe (expected) physiological compensation for the four acid base patterns
4. Identify the features of a mixed acid base disorder
5. Diagnose the acid base abnormalities in mixed acid base disorders
6. Discriminate between acute, chronic and acute on chronic respiratory acidosis
7. Identify common causes for metabolic acidosis and metabolic alkalosis
8. Identify common causes for respiratory acidosis and respiratory alkalosis

Summary of the e-Learning Program

The e-learning is interactive and requires the clinician to consider a series of blood gases and identify key abnormalities. The mastery quiz incorporates both formative and summative assessment components. There are 9 topics with a total course time of 7.5 hours.

The nine topics are:

1. Blood Gases – Normal Values and Patterns
2. Acid Base Disorders and the Blood Gas
3. Compensation I Acid Base Disorders
4. Respiratory Compensation in Metabolic Acid Base disorders
5. Renal Compensation in Respiratory Acid Base Disorders
6. Recognising the Mixed acid Base Disorder
7. Respiratory Acidosis – Acute, Chronic or Mixed disorder ?
8. Differential Diagnosis of Acid Base Disorders
9. Diagnosing the cause(s) in Mixed acid base disorders

Outline of the Program

1. Basic Principles: Normal Values and Patterns

Module summary: In this first topic we look at the blood gas variables that are most useful for determining acid base disorders in clinical practice and consider the differences in the normal values between the arterial and venous specimens. There four clinical patterns that may be seen in acid base disorders and these are explained in the video and form the basis for the concepts discussed in the videos that follow.

Interaction/Assessment:

- Video eTutorial: Blood Gas Interpretation in Clinical Practice
- Video eTutorial: Normal values and Patterns
- Topic Quiz – Normal Values and Patterna

2. The Pattern: Acid Base Disorders and the Blood Gas

Module summary: For each of the four acid base abnormalities we can look for the characteristic pattern on the blood gas that will assist to rapidly enable us to identify the disorder. For this discussion we focus on three parameters ; the pH, the Bicarbonate (HCO3) and the Partial pressure of Carbon dioxide (pCO2) and begin to develop our approach to examining blood gases that will form the basis of discussions in later videos.

Interaction/Assessment:

- Video eTutorial: Acid Based Disorders and the Blood Gas
- Topic Quiz – Acid Based Disorders and the Blood Gas

3. Compensation in Acid Base Disorders

Module summary: In this topic we begin exploring the topic of *Physiologic Compensation*. The body has built in mechanisms that enable it to reduce the impact of disturbances to the acid base balance in the body. Primarily operating through the lungs and kidneys these mechanisms allow the body to maintain and restore acid base homeostasis in the setting of acid load (acidosis) or acid deficiency (alkalosis). The concepts discussed in this video provide the foundation for later videos in tthis course that will introduce you to complex acid base disturbances.

Interaction/Assessment:

- Video eTutorial: Compensation in Acid Base Disorders
- Topic Quiz – Compensation in Acid Base Disorders

4. Respiratory Compensation in Metabolic Acid Base Disorders

Module summary: In this topic we explore how you can reliably predict the degree of to which body will compensate for a metabolic acid base abnormality using the lungs to raise or lower the level of pCO2 in the blood.

Interaction/Assessment:

- Video eTutorial: Respiratory Compensation in Metabolic Acid Base Disorders
- Topic Quiz – Respiratory Compensation in Metabolic Acid Base Disorders

5. Renal Compensation in Respiratory Acid Base Disorders

Module summary: In the previous video we explored how we can predict the level of pCO2 we can expect in response to a metabolic acid base disturbance. We identified that there are limits to this compensation with the body as a general rule limiting the pCO2 compensation to between 20 and 60 mmHg. In this next topic we turn the spotlight on Respiratory acid base disturbances. We examine how the kidney responds to respiratory acid base disorders and consider the limits to which we will see the HCO3 move in response to a respiratory acidosis and respiratory alkalosis.

Interaction/Assessment:

- Video eTutorial: Renal Compensation in Respiratory Acid Base Disorders
- Topic Quiz – Renal Compensation in Respiratory Acid Base Disorders

6. Toward the Summit in Blood Gas Drama

Module summary: In this video we will bring together all of the concepts explored in the previous 5 videos to reveal the secret to understanding even the most difficult acid base disorders. Very exciting!

Interaction/Assessment:

- Video eTutorial: The Great Reveal
- Topic Quiz – The Great Reveal

7. Chronic Respiratory Acidosis or a Mixed Disorder?

Module summary: As we have discussed *Respiratory Acidosis* is one of the most interesting acid base disorders because via the kidney, the body has the capacity to correct the pH to normal / near normal over time. In this topic we explore how chronic respiratory acidosis and the mixed acid base disorder of respiratory acidosis with metabolic alkalosis can be confused and identify the diagnostic finding that distingiushes the two acid base disturbances

Interaction/Assessment:

- Video eTutorial: Chronic Respiratory Acidosis or a Mixed Acid Disorder
- Topic Quiz – Chronic Respiratory Acidosis or a Mixed Acid Disorder

8. Differential Diagnosis of Acid Base Disorders

Module summary: Blood gases provide a useful insight into acid base disturbances and may provide a clue to diagnosis. An understanding of the causes for the range of acid base disturbances encountered in clinical practice will be the focus of this module.

Interaction/Assessment:

- Video eTutorial: Differential Diagnosis of Acid Base Disorders
- Topic Quiz – Diffrential Diagnosis of Acid Base Disorders

9. The Mixed Acid Base Disorder

Module summary: We are near to completing this series on blood gas interpretation and no discussion of acid base disorders would be complete with a bedside discussion of the complex medical case. In this video we examine a series of clinical cases and blood gases that demonstrate the complexity of blood gases in clinical care and exemplify the connection between clinical assessment and acid base disturbance. They provide an excellent way to review many of the concepts introduced in the course and link the value of blood gases to clinical practice.

Interaction/Assessment:

- Video eTutorial: The Ultimate Acid Base Experience
- Topic Quiz – Mixed Acid Base Disorder

10. Final Post Course Assessment

Final Course Quiz – Blood Gas Interpretation