



Module 1: Acute Care Hemodialysis Orientation Manual and Assessment Tools

Anatomy and Physiology

It is essential that the nurse working in nephrology has a basic understanding of the anatomy and physiology of the kidney. The kidney is responsible for filtering the blood and removing waste products of metabolism as well as playing a major role in blood pressure regulation, acid-base balance, hormonal responses, and drug metabolism.

Organ cross talk involving the kidney affects multiple systems in the acutely ill patient. It is important for the nurse to understand this feedback system to evaluate the patient's response and formulate a comprehensive plan of care.

Goals

At the completion of this chapter, the nephrology nurse in the acute care setting will be able to:

- Identify the gross anatomical components of the kidney and the function of each.
- Identify the anatomical components of the nephron and the function of each.
- State the major roles of the kidneys.
- Assess and analyze pathophysiology of kidney function.
- Discuss the major indications for renal replacement therapy.
- Integrate patient assessment and lab data with functional kidney status.

_____ has met the skills and requirements of this chapter

Date: _____ Preceptor: _____

Additional Readings

- Burrows, L.M. (2006). Diseases of the kidney. In A. Molzhan (Ed.), *Contemporary nephrology nursing: Principles and practice* (2nd ed., pp. 141-149). Pitman, NJ: American Nephrology Nurses Association.
- Cashion, A., & Driscoll, C.J. (2006). Genetics and kidney disease. In A. Molzhan (Ed.), *Contemporary nephrology nursing: Principles and practice* (2nd ed., pp. 159-175). Pitman, NJ: American Nephrology Nurses Association.
- Chmielewski, C., Holechek, M.J., Ludlow, M., Yucha, C.B., Guthrie, D., Dungan, J., & Candela, L. (2008). (2006). Renal physiology. In A. Molzham (Ed.), *Contemporary nephrology nursing: Principles and practice* (2nd ed., pp. 71-118). Pitman, NJ: American Nephrology Nurses Association.
- Parker, K.P. (2006). Alternations in fluid, electrolyte, and acid-base balance. In A. Molzhan (Ed.), *Contemporary nephrology nursing: Principles and practice* (2nd ed., pp. 121-139). Pitman, NJ: American Nephrology Nurses Association.
- Parker, K.P. (2006). Assessment of the renal system. In A. Molzhan (Ed.), *Contemporary nephrology nursing: Principles and practice* (2nd ed., pp. 179-198). Pitman, NJ: American Nephrology Nurses Association.



- Shira, M. (2006). The kidney. In C. Counts (ed.), *Core curriculum for nephrology nursing* (5th ed., pp. 1-88). Pitman, NJ: American Nephrology Nurses Association.
- Yaklin, K.M. (2011). Acute kidney injury: An overview of pathophysiology and treatments. *Nephrology Nursing Journal*, 38(1), 13-19, 30.



Anatomy and Physiology Skills Checklist

The orientee is able to:

Self-Assessment	Topic	Date Introduced/ Reinforced	Date Met	Method	Orientation Level Achieved	Preceptor Initials
	Identify the Gross Anatomical Components of the Kidney and the Function of Each					
	Number, size, location					
	Capsule					
	Cortex					
	Medulla					
	Ureters					
	Bladder					
	Urethra					
	Identify the Anatomical Components of the Nephron and the Functions of Each					
	Glomerulus					
	Tubules					
	Proximal					
	Loop of Henle					
	Distal					
	Collecting Duct					
	State the Major Roles of the Kidneys					
	Waste removal					
	Fluid/electrolyte balance					
	Acid-base balance					
	Blood pressure regulation					



Anatomy and Physiology Skills Checklist

The orientee is able to:

Self-Assessment	Topic	Date Introduced/ Reinforced	Date Met	Method	Orientation Level Achieved	Preceptor Initials
	Hormonal influences					
Assess and Analyze the Pathophysiology of Kidney Function						
	Describe pressure gradients/regulation in the kidney					
	Pre-renal acute kidney injury -					
	Causes					
	• Hypotension					
	• Hypovolemia					
	• Hypoperfusion					
	• Pathophysiology					
	• Treatment					
	• Nursing Assessment					
	Intra-renal acute kidney injury					
	Causes					
	• Acute tubular necrosis					
	• Acute interstitial nephritis					
	• Glomerular disease					
	• Vascular disease					
	Pathophysiology					
	Treatment					
	Nursing assessment					



Anatomy and Physiology Skills Checklist

The orientee is able to:

Self-Assessment	Topic	Date Introduced/ Reinforced	Date Met	Method	Orientation Level Achieved	Preceptor Initials
	Post-renal acute kidney					
	Causes					
	<ul style="list-style-type: none"> • Obstruction 					
	Treatment					
	Alter dialysis therapy in response to patient assessment (i.e. high output failure would necessitate less fluid removal)					
	Interpret electrolyte abnormalities and act proactively to prevent complications					
	Identify how renal impairments affect other organs such as heart, lung, liver (organ cross-talk)					
	Renin-angiotension regulation of blood pressure					
	Discuss the Major Indications for Renal Replacement Therapy					
	Oliguria 0.5 mg/kg/hour greater than 6 hours					
	Anuria greater than 12 hours					
	Elevated serum creatinine					
	Elevated BUN					
	Fluid overload					



Anatomy and Physiology Skills Checklist

The orientee is able to:

Self-Assessment	Topic	Date Introduced/ Reinforced	Date Met	Method	Orientation Level Achieved	Preceptor Initials
	Hyperkalemia					
	Recognize signs and symptoms of uremia					
	<ul style="list-style-type: none"> • Metabolic acidosis 					
	<ul style="list-style-type: none"> • Electrolyte imbalance 					
	Apply RIFLE/AKIN					
	Analyze importance of dialysis dose					
	<ul style="list-style-type: none"> • Calculate dose by Kt/V or URR 					
	<ul style="list-style-type: none"> • Daily or intermittent hemodialysis vs. CRRT 					
	<ul style="list-style-type: none"> • Assess for fluid volume status 					
	Integrate Patient Assessment and Lab Data with Functional Kidney Status					
	Identify type of renal failure based on patient assessment					
	Alter therapy goals in response to patient assessment (i.e. high output failure would necessitate less fluid removal)					
	Interpret electrolyte abnormalities and act proactively to prevent complications					



Anatomy and Physiology Skills Checklist

The orientee is able to:

Self-Assessment	Topic	Date Introduced/ Reinforced	Date Met	Method	Orientation Level Achieved	Preceptor Initials
	Identify how renal impairments affect other organs such as heart, lung, liver (organ cross-talk)					
	Renin-angiotension regulation of blood pressure					

Keys

<p>Key for Self-Assessment 0 = Have not performed and/or unfamiliar with item 1 = Performed less than 5 times or have some knowledge and need additional instruction 2 = Performed more than 5 times and/or have sufficient knowledge and feel confident to perform independently</p>	<p>Key for Method CR = Chart Review Ex = Written Exam O = Observation S = Simulation V = Verbalization RD = Return Demonstration</p>	<p>Key for Orientation Level Achieved N = Novice AB = Advanced Beginner C = Competent P = Proficient E = Expert</p>
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***Module 1: Acute Care Hemodialysis Orientation
Manual and Assessment Tools***

Principles

Hemodialysis is a life-saving therapy. It must be done safely, accurately, and with the adjustment of treatment parameters to treat the specific needs of each patient. The nephrology nurse must understand the basic principles of dialysis to provide safe and effective treatment for the patient. The principles of dialysis are universal and do not change from one manufacturer to another or from one company's policies to another. Techniques may vary depending on equipment and practice patterns, but the principles remain the same. A comprehensive understanding and application of those principles are essential to provide safe, effective, quality care.

Goals

Upon completion of this chapter, the nephrology nurse in the acute care setting will be able to:

- Discuss and describe the basic principles of hemodialysis.
- Demonstrate machine setup using above principles.

_____ has met the skills and requirements of this chapter.

Date: _____ Preceptor: _____

Additional Readings

- King, B. (2008). Principles of hemodialysis. In C. Counts (Ed.), *Core curriculum for nephrology nursing* (5th ed., pp. 662-674). Pitman, NJ: American Nephrology Nurses Association.
- Latham, C.F. (2006). Hemodialysis technology. In A. Molzahn (Ed.), *Contemporary nephrology nursing: Principles and practice* (2nd ed., pp. 531-551). Pitman, NJ: American Nephrology Nurses Association.



Principles Skills Checklist

The orientee is able to:

Self-Assessment	Topic	Date Introduced and/or Reinforced	Date Met	Method	Orientation Level Achieved	Preceptor Initials
Discuss and Describe the Basic Principles of Hemodialysis						
	Diffusion of solute across a semi-permeable membrane					
	Osmosis of water across a semi-permeable membrane					
	Ultrafiltration					
	Osmotic pressure					
	Hydraulic pressure					
	Negative pressure					
	Solute drag/convection					
	Counter – current flow					
Demonstrate Machine Setup Using Above Principles						

Keys

Key for Self-Assessment
 0 = Have not performed and/or unfamiliar with item
 1 = Performed less than 5 times or have some knowledge and need additional instruction
 2 = Performed more than 5 times and/or have sufficient knowledge and feel confident to perform independently

Key for Method
 CR = Chart Review
 Ex = Written Exam
 O = Observation
 S = Simulation
 V = Verbalization
 RD = Return Demonstration

Key for Orientation Level Achieved
 N = Novice
 AB = Advanced Beginner
 C = Competent
 P = Proficient
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Module 2: Acute Care CRRT Orientation
Manual and Assessment Tools

Anatomy and Physiology

It is essential that the nurse working in nephrology has a basic understanding of the anatomy and physiology of the kidney. The kidney is responsible for filtering the blood and removing waste products of metabolism as well as playing a major role in blood pressure regulation, acid-base balance, hormonal responses, and drug metabolism.

Organ cross talk involving the kidney affects multiple systems in the acutely ill patient. It is important for the nurse to understand this feedback system to evaluate the patient's response and formulate a comprehensive plan of care.

Goals

At the completion of this chapter, the nephrology nurse in the acute care setting will be able to:

- Identify the gross anatomical components of the kidney and the function of each.
- Identify the anatomical components of the nephron and the function of each.
- State the major roles of the kidneys.
- Assess and analyze pathophysiology of kidney function.
- Discuss the major indications for renal replacement therapy.
- Integrate patient assessment and lab data with functional kidney status.

_____ has met the skills and requirements of this chapter.

Date: _____

Preceptor: _____

Additional Readings

Burrows, L.M. (2006). Diseases of the kidney. In A. Molzahn (Ed.), *Contemporary nephrology nursing: Principles and practice* (2nd ed., pp. 141-149). Pitman, NJ: American Nephrology Nurses Association.

Cashion, A., & Driscoll, C.J. (2006). Genetics and kidney disease. In A. Molzahn (Ed.), *Contemporary nephrology nursing: Principles and practice* (2nd ed., pp. 159-175). Pitman, NJ: American Nephrology Nurses Association.

Chmielewski, C., Holechek, M.J., Ludlow, M., Yucha, C.B., Guthrie, D., Dungan, J., & Candela, L. (2008). (2006). Renal physiology. In A. Molzahn (Ed.), *Contemporary nephrology nursing: Principles and practice* (2nd ed., pp. 71-118). Pitman, NJ: American Nephrology Nurses Association.

Parker, K.P. (2008). (2006). Alterations in fluid, electrolyte, and acid-base balance. In A. Molzahn (Ed.), *Contemporary nephrology nursing: Principles and practice* (2nd ed., pp. 121-139). Pitman, NJ: American Nephrology Nurses Association.



- Parker, K.P. (2008). (2006). Assessment of the renal system. In A. Molzahn (Ed.), *Contemporary nephrology nursing: Principles and practice* (2nd ed., pp. 179-198). Pitman, NJ: American Nephrology Nurses Association.
- Shira, Mary, (2006). The kidney. In C. Counts (ed.), *Core curriculum for nephrology nursing* (5th ed., pp. 1-88). Pitman, NJ: American Nephrology Nurses Association.
- Yaklin, K.M. (2011). Acute kidney injury: An overview of pathophysiology and treatments. *Nephrology Nursing Journal*, 38(1), 13-19, 30.



Anatomy and Physiology Skills Checklist

The orientee is able to:

Self-Assessment	Topic	Date Introduced/ Reinforced	Date Met	Method	Orientation Level Achieved	Preceptor Initials
	Identify the Gross Anatomical Components of the Kidney and the Function of Each					
	Number, size, location					
	Capsule					
	Cortex					
	Medulla					
	Ureters					
	Bladder					
	Urethra					
	Identify the Anatomical Components of the Nephron and the Functions of Each					
	Glomerulus					
	Tubules					
	Proximal					
	Loop of Henle					
	Distal					
	Collecting Duct					
	State the Major Roles of the Kidneys					
	Waste removal					
	Fluid/electrolyte balance					
	Acid-base balance					



Anatomy and Physiology Skills Checklist

The orientee is able to:

Self-Assessment	Topic	Date Introduced/ Reinforced	Date Met	Method	Orientation Level Achieved	Preceptor Initials
	Blood pressure regulation					
	Hormonal influences					
Assess and Analyze Pathophysiology of Kidney Functions						
	Describe pressure gradients/regulation in the kidney					
	Pre-renal acute kidney injury					
	Causes					
	• Hypotension					
	• Hypovolemia					
	• Hypoperfusion					
	Pathophysiology					
	Treatment					
	Nursing Assessment					
	Intra-renal acute kidney injury					
	Causes					
	• Acute tubular necrosis					
	• Acute interstitial nephritis					
	• Glomerular disease					
	• Vascular disease					



Anatomy and Physiology Skills Checklist

The orientee is able to:

Self-Assessment	Topic	Date Introduced/ Reinforced	Date Met	Method	Orientation Level Achieved	Preceptor Initials
	Pathophysiology					
	Treatment					
	Nursing assessment					
	Post-renal acute kidney injury					
	Causes					
	• Obstruction					
	Pathophysiology					
	Treatment					
	Nursing assessment					
	Discuss the Major Indications for Renal Replacement Therapy (RRT)					
	Oliguria 0.5 mg/kg/hour greater than 6 hours					
	Anuria greater than 12 hours					
	Elevated serum creatinine					
	Elevated BUN					
	Fluid overload					
	Hyperkalemia					
	Recognize signs and symptoms of uremia					
	• Metabolic acidosis					



Anatomy and Physiology Skills Checklist

The orientee is able to:

Self-Assessment	Topic	Date Introduced/ Reinforced	Date Met	Method	Orientation Level Achieved	Preceptor Initials
	<ul style="list-style-type: none"> Electrolyte imbalance 					
	Apply RIFLE/AKIN					
	Analyze importance of dialysis dose					
	<ul style="list-style-type: none"> Calculate dose by Kt/V or URR 					
	<ul style="list-style-type: none"> Daily or intermittent hemodialysis vs. CRRT 					
	<ul style="list-style-type: none"> Assess for fluid volume status 					
Integrate Patient Assessment and Lab Data with Functional Kidney Status						
	Identify type of renal failure based on patient assessment					
	Alter therapy goals in response to patient assessment (i.e. high output failure would necessitate less fluid removal)					
	Interpret electrolyte abnormalities and act proactively to prevent complications					
	Identify how renal impairments affect other organs such as heart, lung, liver (organ cross-talk)					



Anatomy and Physiology Skills Checklist

The orientee is able to:

Self-Assessment	Topic	Date Introduced/ Reinforced	Date Met	Method	Orientation Level Achieved	Preceptor Initials
	Renin-angiotension regulation of blood pressure					

Keys

Key for Self-Assessment	Key for Method	Key for Orientation Level Achieved
0 = Have not performed and/or unfamiliar with item 1 = Performed less than 5 times or have some knowledge and need additional instruction 2 = Performed more than 5 times and/or have sufficient knowledge and feel confident to perform independently	CR = Chart Review Ex = Written Exam O = Observation S = Simulation V = Verbalization RD = Return Demonstration	N = Novice AB = Advanced Beginner C = Competent P = Proficient E = Expert

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***Module 2: Acute Care CRRT Orientation
Manual and Assessment Tools***

Principles of CRRT

CRRT is a life-saving therapy. It must be done safely, accurately, and with the adjustment of treatment parameters to treat the specific needs of each patient. The nephrology nurse must understand the basic principles of dialysis to provide safe and effective treatment for the patient. The principles of CRRT are universal and do not change from one manufacturer to another or from one company's policies to another. Techniques may vary depending on equipment and practice patterns, but the principles remain the same. A comprehensive understanding and application of those principles are essential to provide safe, effective, quality care.

Goals

Upon completion of this chapter, the nephrology nurse in the acute care setting will be able to:

- Discuss and describe the basic principles of CRRT.
- Demonstrate machine setup using above principles.

_____ has met the skills and requirements of this chapter.

Date: _____

Preceptor: _____

Additional Readings

King, B. (2008). Principles of hemodialysis. In C. Counts (Ed.), *Core curriculum for nephrology nursing* (5th ed., pp 662-674). Pitman, NJ: American Nephrology Nurses Association.

Latham, C.F. (2006). Hemodialysis technology. In A. Molzahn (Ed.), *Contemporary nephrology nursing: Principles and practice* (2nd ed., pp 531-551). Pitman, NJ: American Nephrology Nurses Association.



Principles of CRRT Skills Checklist

The orientee is able to:

Self-Assessment	Topic	Date Introduced/ Reinforced	Date Met	Method	Orientation Level Achieved	Preceptor Initials
Discuss and Describe the Basic Principles of CRRT						
	Diffusion of solute across a semi-permeable membrane					
	Osmosis of water across a semi-permeable membrane					
	Ultrafiltration					
	Osmotic pressure					
	Hydraulic pressure					
	Negative pressure					
	Solute drag/convection					
Demonstrate Machine Setup Using Above Principles						

Keys

Key for Self-Assessment

0 = Have not performed and/or unfamiliar with item
 1 = Performed less than 5 times or have some knowledge and need additional instruction
 2 = Performed more than 5 times and/or have sufficient knowledge and feel confident to perform independently

Key for Method

CR = Chart Review
 Ex = Written Exam
 O = Observation
 S = Simulation
 V = Verbalization
 RD = Return Demonstration

Key for Orientation Level Achieved

N = Novice
 AB = Advanced Beginner
 C = Competent
 P = Proficient
 E = Expert

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Module 3: Acute Care Peritoneal Dialysis Orientation Manual and Assessment Tools

Anatomy and Physiology

It is essential that the nurse working in nephrology has a basic understanding of the anatomy and physiology of the kidney. The kidney is responsible for filtering the blood and removing waste products of metabolism as well as playing a major role in blood pressure regulation, acid-base balance, hormonal responses, and drug metabolism.

Organ cross talk involving the kidney affects multiple systems in the acutely ill patient. It is important for the nurse to understand this feedback system to evaluate the patient's response and formulate a comprehensive plan of care.

Goals

At the completion of this chapter, the nephrology nurse in the acute care setting will be able to:

- Identify gross anatomy components of the kidney.
- Identify internal structures and functions of the nephron.
- Identify roles of the kidney.
- Discuss kinetics related to peritoneal dialysis therapy.

_____ has met the skills and requirements of this chapter.

Date: _____ Preceptor: _____

Additional Readings

- Dutka, P., & Szromba, C. (2011). Pathophysiology. In C. Counts (Ed.), *Core curriculum for nephrology nursing* (6th edition, pp. 52- 90). Pitman, NJ: American Nephrology Nurses Association.
- Groenhoff, C.L., Ales, L. & Todd, L.B. (2015) Peritoneal dialysis therapy. In C. Counts (Ed.), *Core curriculum for nephrology nursing: Module 3. Treatment options for patients with chronic kidney failure* (6th edition, pp 240-267). Pitman, NJ: American Nephrology Nurses Association
- Groetin, C.L., Ales, L., & Todd, L.B. (2011). Peritoneal dialysis therapy. In C. Counts (Ed.), *Core curriculum for nephrology nursing* (6th edition, pp. 240-266). Pitman, NJ American Nephrology Nurses Association.
- Guest, S. (2010). *Handbook of peritoneal dialysis*. Lexington, KY: Author.
- Headley, C.M. (2011) Anatomy and physiology. In C. Counts (Ed.), *Core Curriculum for nephrology nursing* (6th edition, pp. 25-52). Pitman, NJ: American Nephrology Nurses Association.
- Lambertson, K. (2015) Peritoneal dialysis access therapy. In C. Counts (Ed.), *Core curriculum for nephrology nursing* (6th ed., pp 231-240) Pitman, NJ: American Nephrology Nurses Association.
- Li, X., Hassoun, H.T., Santora, R., & Rabb. H. (2009). Organ cross talk: Yhe role of the kidney, *Current Opinion in Critical Care*, 15(6), 481-487.
- Yaklin, K.M. (2011). Acute kidney injury: An overview of pathophysiology and treatments. *Nephrology Nursing Journal*, 38(1), 13-19, 30.



Anatomy and Physiology Skills Checklist

The orientee is able to:

Self-Assessment	Topic	Date Introduced/ Reinforced	Date Met	Method	Orientation Level Achieved	Preceptor Initials
Identify Gross Anatomy Components of the Kidney						
	Capsule					
	Cortex					
	Medulla					
	<ul style="list-style-type: none"> • Pyramids 					
	<ul style="list-style-type: none"> • Renal column 					
	<ul style="list-style-type: none"> • Loops of Henle 					
	<ul style="list-style-type: none"> • Vasa recta 					
	<ul style="list-style-type: none"> • Medullary collecting ducts 					
	Calyces					
	<ul style="list-style-type: none"> • Minor calyces 					
	<ul style="list-style-type: none"> • Major calyces 					
	Ureters					
	Bladder					
	Urethra					
	Blood supply					
	Lymph drainage					
Identify Internal Structures and Functions of the Nephron						
	Glomerulus (GFR)					
	Cortical nephrons					



Anatomy and Physiology Skills Checklist

The orientee is able to:

Self-Assessment	Topic	Date Introduced/ Reinforced	Date Met	Method	Orientation Level Achieved	Preceptor Initials
	Juxtamedullary nephrons					
	Vascular components					
	Tubular components					
Identify Roles of the Kidney						
	Waste removal					
	Fluid and electrolyte balance					
	Acid-base balance					
	Blood pressure regulation					
	Hormonal influences					
	AKI and distant organ cross talk					
	• Liver					
	• Lung					
	• Brain					
	• Heart					
	• Other organs					
Discuss Kinetics Related to Peritoneal Dialysis Therapy						
	Peritoneal membrane					
	• Visceral					
	• Mesothelium					
	• Omentum					



Anatomy and Physiology Skills Checklist

The orientee is able to:

Self-Assessment	Topic	Date Introduced/ Reinforced	Date Met	Method	Orientation Level Achieved	Preceptor Initials
	• Parietal					
	• Surface area					
	Diffusion					
	• Small solute transport					
	Osmosis					
	• Osmotic forces					
	Ultrafiltration					
	Convection					
	• Solute drag					
	• Middle molecules					
	Drug transport					
	• Insulin					
	• Antibiotics					
	Hydrostatic forces					
	Colloid/crystalloid gradient					
	Intra-abdominal pressure					
	Equilibrium					
	Reabsorption					
	3 pore model					
	• Peritoneal capillary – main barrier to solute transport					
	• Aquaporins					
	• Small pores					



Anatomy and Physiology Skills Checklist

The orientee is able to:

Self-Assessment	Topic	Date Introduced/ Reinforced	Date Met	Method	Orientation Level Achieved	Preceptor Initials
	<ul style="list-style-type: none"> Large pores 					
	Drug transport					
	Strategies for preserving residual renal function					

Keys

Key for Self-Assessment	Key for Method	Key for Orientation Level Achieved
0 = Have not performed and/or unfamiliar with item 1 = Performed less than 5 times or have some knowledge and need additional instruction 2 = Performed more than 5 times and/or have sufficient knowledge and feel confident to perform independently	CR = Chart Review Ex = Written Exam O = Observation S = Simulation V = Verbalization RD = Return Demonstration	N = Novice AB = Advanced Beginner C = Competent P = Proficient E = Expert

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***Module 3: Acute Care Peritoneal Dialysis Orientation
Manual and Assessment Tools***

Principles

Dialysis is a life-saving therapy. It must be done safely, accurately, and with the adjustment of treatment parameters to treat the specific needs of each patient. The nephrology nurse must understand the basic principles of dialysis to provide safe and effective treatment for the patient. The principles of dialysis are universal and do not change from one manufacturer to another or from one company's policies to another. Techniques may vary depending on equipment and practice patterns, but the principles remain the same. A comprehensive understanding and application of those principles are essential to provide safe, effective, quality care.

Goals

Upon completion of this chapter, the nephrology nurse in the acute care setting will be able to:

- Discuss and describe the principles of peritoneal dialysis.
- Describe the role of dialysis solution.

_____ has met the skills and requirements of this chapter.

Date: _____ Preceptor: _____

Additional Readings

- King, B. (2008). Principles of hemodialysis. In C. Counts (Ed.), *Core curriculum for nephrology nursing* (5th ed., pp 662-674). Pitman, NJ: American Nephrology Nurses Association.
- Latham, C.F. (2006). Hemodialysis technology. In A. Molzahn (Ed.), *Contemporary nephrology nursing: Principles and practice* (2nd ed., pp 531-551). Pitman, NJ: American Nephrology Nurses Association.



Principles Skills Checklist

The orientee is able to:

Self-Assessment	Topic	Date Introduced/ Reinforced	Date Met	Method	Orientation Level Achieved	Preceptor Initials
Discuss and Describe Basic Principles of Peritoneal Dialysis						
	Diffusion of solute across a semi-permeable membrane					
	Ultrafiltration					
	Osmotic pressure					
	Hydraulic pressure					
	Negative pressure					
	Solute drag/convection					
Describe the Role of Dialysis Solution						
	Solute transfer					
	Effect on electrolytes					
	Fluid removal					

Keys

Key for Self-Assessment

0 = Have not performed and/or unfamiliar with item
 1 = Performed less than 5 times or have some knowledge and need additional instruction
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Key for Method

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Key for Orientation Level Achieved

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Module 4: Acute Care Therapeutic Apheresis Orientation Manual and Assessment Tools

Anatomy and Physiology

It is essential that the nurse working in apheresis has a basic understanding of the anatomy and physiology of the immune system. The immune system is responsible for protecting the body against invaders such as viruses, bacteria and other threats to health such as cancer. The immune system also plays a major role in accepting or rejecting a transplanted organ. Abnormalities of this complex system may lead to immunodeficiency or autoimmune diseases. Since most of the diseases treated with therapeutic apheresis have immunologic pathogenesis, it is important for the nurse performing apheresis therapies to understand the impact of these procedures on the patient's immune system function. This essential knowledge will aid in evaluating the patient's response to apheresis and the execution of an appropriate treatment plan.

Goals

Upon completion of this chapter, the nurse in the acute care setting will be able to:

- Identify the gross anatomy of the organs of the immune system and their functions.
- Identify the main immune system cells and their primary function.
- Identify the ways that immune cells communicate with each other.
- Define the innate immune response.
- Define the acquired immune response.
- Define the classifications of other immune cells.

_____ has met the skills and requirements of this chapter.

Date: _____ Preceptor: _____

Additional Readings

- Parsons, J. (2014). Basic science. In W. Linz (Ed), *Principles of apheresis technology: Technical principles of apheresis medicine* (5th ed., pp. 1-21). Vancouver, BC: American Society For Apheresis.
- Sung, A., Kang, Y., & Chao, N. (2015). Immune reconstitution. In J. Wingard, et al (Eds), *Hematopoietic stem cell transplantation: A handbook for clinicians* (2nd ed., pp. 273-275). Bethesda, MD: AABB.
- Understanding the immune system: How it works (September 2003). NIH Publication No. 03-5423. Retrieved from www.nci.nih.gov, www.niaid.nih.gov, US Dept of Health and Human Services, National Institutes of Health, National Institute of Allergy and Infections Disease, National Cancer Institute.



Anatomy and Physiology Skills Checklist

The orientee is able to:

Self-Assessment	Topic	Date Introduced/ Reinforced	Date Met	Method	Orientation Level Achieved	Preceptor Initials
	Identify the Gross Anatomy of the Organs of the Immune System and Their Functions					
	Tonsils					
	Skin					
	Thymus					
	Spleen					
	Bone Marrow					
	Lymph Nodes					
	Peyer's Patches					
	Identify the Main Immune System Cells and Their Primary Functions					
	T-Lymphocytes					
	B-Lymphocytes					
	Plasma Cells					
	Macrophages					
	Dendritic Cells					
	Neutrophils					
	Mast cells					
	Eosinophils					
	Basophils					
	Identify the Ways That Immune Cells Communicate With Each Other					



Anatomy and Physiology Skills Checklist

The orientee is able to:

Self-Assessment	Topic	Date Introduced/ Reinforced	Date Met	Method	Orientation Level Achieved	Preceptor Initials
	Cytokines					
	Cell to cell contact					
	Define the Innate Immune Response					
	Physical barriers					
	Inflammation					
	Complement system					
	Natural Killer Cells					
	Define the Acquired Immune Response					
	Lymphocytes					
	Killer T-Cells					
	Helper T-Cells					
	B-Lymphocytes and Antibodies					
	Immunologic memory					
	Define the Classifications of Other Immune Cells					
	Immunodeficiency – Primary and Acquired					
	Autoimmunity					
	Hypersensitivity					
	Define humoral immunity					
	Define Cellular immunity					



Keys

Key for Self-Assessment	Key for Method	Key for Orientation Level Achieved
0 = Have not performed and/or unfamiliar with item 1 = Performed less than 5 times or have some knowledge and need additional instruction 2 = Performed more than 5 times and/or have sufficient knowledge and feel confident to perform independently	CR = Chart Review Ex = Written Exam O = Observation S = Simulation V = Verbalization RD = Return Demonstration	N = Novice AB = Advanced Beginner C = Competent P = Proficient E = Expert
Note: This checklist may be adapted and reproduced for the sole purpose of internal use within the purchaser's facility.		



Module 4: Acute Care Therapeutic Apheresis Orientation Manual and Assessment Tools

Principles

Therapeutic apheresis is a disease-modifying and often a life-saving therapy. It must be done safely, accurately and with the adjustment of treatment parameters to treat the specific needs of each patient. The apheresis/nephrology nurse must understand the basic principles of blood component separation to provide safe and effective treatment or collection of blood products. There are two basic ways to separate blood components: filtration and centrifugation. The techniques may vary depending on the type of separation device used but the basic principles remain the same. A comprehensive understanding of those principles are essential for choosing the best device and for delivering safe, effective, high quality care.

Goals

Upon completion of this chapter, the nurse in the acute care setting will be able to:

- Discuss and describe the principles of filtration separation.
- Discuss and describe the principles of centrifugal separation.

_____ has met the skills and requirements of this chapter.

Date: _____ Preceptor: _____

Additional Readings

- Crookston, K., & Novak, D., (2010). Physiology of apheresis. In B. McLeod, Z. Szczepiorkowski, & R. Weinstein (Eds.). *Apheresis: Principles and practice*, (3rd ed., pp. 45-69). Bethesda, MD: AABB Press.
- Karr, E., & Padmanabhan, A. (2014). Therapeutic apheresis procedures. In W. Linz, W. (Ed.), *Principles of apheresis technology: Technical principles of apheresis medicine* (5th ed., pp. 43-50). Vancouver, BC: American Society For Apheresis.
- Kiprof, D., Sanchez, A., & Pusey, C. (2015). Therapeutic Apheresis. In J. Daugirdas, P. Blake, & T. Ing (Eds.), *Handbook of dialysis* (5th ed., pp. 333-359). Philadelphia, PA: Wolters-Kluwer.
- Rohe, R. (2015). Therapeutic apheresis. In Counts, C. (Ed.), *Core curriculum for nephrology nurses* (6th ed. pp. 219-225). Pitman, NJ: American Nephrology Nurses Association.
- Weinstein, R. (2010). Basic principles of therapeutic blood exchange. In B. McLeod, Z. Szczepiorkowski, & R. Weinstein (Eds.). *Apheresis: Principles and practice*, (3rd ed., pp. 269-294). Bethesda, MD: AABB Press.



Principles Skills Checklist

The orientee is able to:

Self-Assessment	Topic	Date Introduced/ Reinforced	Date Met	Method	Orientation Level Achieved	Preceptor Initials
	Discuss and Describe the Principles of Filtration Separation					
	Movement of plasma across a semi-permeable membrane					
	Separation based on size vs. weight					
	Specific gravity of plasma					
	Hematocrit of cellular components exiting the membrane separator					
	The purity of plasma exiting the membrane separator					
	Addition of replacement fluids					
	Effect on patients taking ACE Inhibitors					
	Anticoagulation					
	Minimum blood flow rates needed					
	Venous access requirements					
	Limitation of clinical application					
	Efficiency of filtration separation					
	Advantages of separating cell-free plasma					
	Disadvantages of filtration separation					
	Discuss and Describe the Principles of Centrifugal Separation					



Principles Skills Checklist

The orientee is able to:

Self-Assessment	Topic	Date Introduced/ Reinforced	Date Met	Method	Orientation Level Achieved	Preceptor Initials
	Separation based on weight vs size					
	Specific gravity of cellular blood components					
	Specific gravity of plasma					
	Components of the buffy coat					
	Separation/packing factor					
	Addition of replacement fluid					
	Anticoagulation – extracorporeal vs systemic					
	Anticoagulation – amount in collected component vs. amount infused into patient					
	Anticoagulation – citrate vs. heparin					
	WBC and platelet contamination of separated plasma					
	Efficiency of centrifugation separation					
	Advantages of centrifugation separation					
	Disadvantages of centrifugation separation					
	Trace the flow path of whole blood and the separated blood components through the disposable set					



Keys

Key for Self-Assessment	Key for Method	Key for Orientation Level Achieved
0 = Have not performed and/or unfamiliar with item 1 = Performed less than 5 times or have some knowledge and need additional instruction 2 = Performed more than 5 times and/or have sufficient knowledge and feel confident to perform independently	CR = Chart Review Ex = Written Exam O = Observation S = Simulation V = Verbalization RD = Return Demonstration	N = Novice AB = Advanced Beginner C = Competent P = Proficient E = Expert
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