# N4: PATHOPHYSIOLOGY TOPIC 2: INFECTION AND IMMUNITY

**Study Guide**

# Description

Hello everyone!

We are now transitioning to more specific concepts that are important in pathophysiology – infection and immunity. With the COVID-19 pandemic still in our midst, you may find this topic to be of much interest and for good reason. We have been seeing so much information about how COVID-19 infection occurs, what it does to the body, and why the signs and symptoms are such. Fundamental to our understanding of COVID-19 as well as other infectious process is immunity. As you may recall in Nursing 3, our body has non-specific and specific immunity – *non-specific immunity* pertaining to mechanisms that are not antigen specific and is mounted every time an antigen is detected by the immune system; and *specific immunity* is antigen

specific and is important when we talk about development of ‘immunity’.

Infectious processes are just an example of how the immune system may be triggered to work and, you want your immune system to adequately respond to an infecting antigen to curb the development of disease. This is an expected response whenever a foreign antigen enters the body. However, there may also be instances when the immune system would react to ‘self- antigens’ and this may be triggered by several factors. These are called *hypersensitivity reactions* where the immune system is overly active that instead of just attacking foreign

antigens, it may also attack ‘self-antigens’.

In this topic, we will examine closely the alterations in the immune function specifically on hypersensitivity reaction. We will also look into infection and how would the body supposedly respond to infecting organisms.

As you will soon find out, much of the prerequisite knowledge needed for Topic 2 on Infection and Immunity are discussed in Nursing 3. If you think there is a need for you to go back to your notes in Nursing 3, please do so.

This topic will cover the following subtopics:

1. Infection
2. Alterations in Immunity

**Learning outcomes**

After going through this topic, you should be able to:

1. Discuss the pathogenesis of infection and the factors leading to disease development.
2. Explain the clinical course of infection.
3. Trace the pathogenesis of infection to explain the clinical manifestations.
4. Discuss the four types of hypersensitivity reactions differentiating them based on their pathogenic immune response and the mechanism of tissue injury.
5. Trace the immune response and tissue injury per type of hypersensitivity reaction to explain the clinical manifestations.

**Resources:**

Please read the main reference below to have a better understanding of the topics.

Norris, T. (2019). Porth’s pathophysiology: Concepts of altered health states (10th ed.). Philadelphia, PA: Wolters Kluwer.

Specific chapters you need to read:

 Chapter 7 Stress and Adaptation

Chapter 9 Inflammation, Tissue Repair and Wound Healing

 Chapter 10 Mechanisms of Infectious Diseases

 Chapter 11 Disorders of the Immune Response, Including HIV/AIDS

You may supplement this resource with any of the other references mentioned during your orientation.

**Activities:**

1. Pre-session Quiz (10 points, non-graded)

2. Lecture session

3. Time for self-study

4. Post-session Quiz (10 points, graded)

## Pre-session Quiz

Before delving into the subtopics, please answer the **pre-session quiz** which has 10 items. This is non-graded, and it will help you focus yourself to the topic at hand and to serve as review of the concepts that you have previously learned in N3: Anatomy and Physiology and other subjects.

After answering the pre-session quiz, you may now proceed to the subtopics. The lecture for the subtopics will be delivered live and the slides will be available for your review. If you have any questions as you through each of the following sub-topics, do not hesitate to get in touch with your faculty-in-charge during or after the lecture. The policies on communicating with your faculty is found at the course guide.

**TOPIC OUTLINE:**

1. Stress and Adaptation

This chapter includes a review of previous topics in N3. You may either read these previously lectured topics as a review or go straight to the section on Disorders of the Stress Response.

a. Identify and describe possible stress-induced health problems, including acute and chronic stress

 b. Describe the characteristics of posttraumatic stress disorder

 c. Describe non-pharmacologic treatment modalities for treating stress

2. Inflammation, Tissue repair and Wound healing

This chapter includes a review of previous topics in N3. You may either read these as a review or go straight to the following topics:

 a. Enumerate major inflammatory mediators and their functions (histamine, arachidonic acid metabolites, platelet-activating factor, plasma proteins, cytokines and chemokines, nitric oxide and free radicals)

 b. Contrast acute and chronic inflammation

 c. Describe systemic manifestations of inflammation

3. Mechanisms of Infectious Diseases

 a. Describe the triad of infectious disease model

 b. Describe concepts of host-microorganism interaction

 c. Describe agents of infectious diseases and be able to give examples for each

 d. Discuss modes of infectious disease transmission and stages of an infectious disease

 e. Discuss the pathogenesis of infection and the factors leading to disease development.

f. Explain the clinical course and manifestations of infection through its pathogenesis.

g. Describe methods for diagnosis of infectious diseases

h. Describe treatment modalities for infectious diseases

4. Disorders of the Immune Response

 a. Identify the differences between primary and secondary immunodeficiency disorders

 b. Identify and give an overview of the major categories of immunodeficiency disorders (cellular and humoral immunodeficiency disorders, complement system disorders and disorders of phagocytosis)

c. Discuss the immune responses involved in type I, type II, type III and type IV hypersensitivity reactions, including examples for each type and common clinical manifestations for each

d. Discuss possible mechanisms for autoimmune diseases

e. Give examples of autoimmune diseases, their diagnosis and treatment modalities

f. Describe HIV transmission, its etiology and pathogenesis

**Subtopic 1. INFECTION**

Despite improvement in environmental sanitation and hygiene and the use of antibiotics, we are still confronted with burden from infections. There are endemic infections in our country just like Dengue Fever and there are also those which have been effectively suppressed by vaccination efforts like diphtheria and pertussis. We also have ongoing epidemics just like HIV/AIDS and a pandemic which is COVID-19. We have success stories in combatting infectious diseases (e.g., smallpox eradication) but there is still a whole gamut of these diseases that needs to be addressed.

In this subtopic, you will be given an overview of infection, the etiologic agents of infection, the clinical course, and the clinical manifestations of infection. You will also see some resources about COVID-19 below. COVID-19 is a new infectious disease that is affecting us in more ways than one and much is still to be learned about this disease. Thus, you will find links on some useful resources about COVID-19 below.

To supplement your understanding, you may also check these resources:

* + Read more about emerging infections from this website - <https://www.niaid.nih.gov/research/emerging-infectious-diseases-pathogens>
	+ The most important infection of public health concern nowadays is undoubtedly the COVID-19. Our understanding of this disease is still evolving and there are several papers published on its pathogenesis. One of these papers is that of Parasher (2020). Read the paper through this link: <https://pmj.bmj.com/content/early/2020/10/06/postgradmedj-2020-138577>
	+ Other resources on COVID-19 if you are interested:

<https://www.health.harvard.edu/diseases-and-conditions/covid-19-basics#:~:text=Common%20symptoms%20of%20COVID%2D19%20include%20fever%2C%20dry%20cough%2C,breath%2C%20which%20often%20indicates%20pneumonia>.

<https://www.who.int/publications-detail-redirect/WHO-2019-nCoV-ipc-guideline-2023.1>

* + COVID-19 Dashboard – Philippines - <https://covid19.who.int/region/wpro/country/ph>

# Subtopic 1. ALTERATIONS IN IMMUNITY

You or someone you know may be experiencing from allergies – this could be from the very common *allergic rhinitis* or it could be a food allergy from, say, seafoods. Allergy is a type of a hypersensitivity reaction where the body, because of the mounted response against foreign antigen (e.g., pollen, food etc.) may also cause damage to the body tissues. And the signs and symptoms reflect not only the body’s response to the foreign antigen, but the tissue damage as well. Allergy or the type 1 hypersensitivity reaction is just one of the hypersensitivity reactions that we know. In this topic, we shall delve deeper into the hypersensitivity reactions, their pathogenesis, and clinical manifestations.

To supplement your understanding, you may also check these resources:

* + Let us try to relate what you are studying in Pathophysiology with your health assessment. Watch this video on assessment for allergic reactions - <https://www.youtube.com/watch?v=79ry5KlCMfw>
	+ One of the ways to understand deeper the pathogenesis of a condition is when we encounter someone who has it. Check this short video of a patient with systemic lupus erythematosus - <https://www.youtube.com/watch?v=NZJTZMgbdeU>

## Post-session Quiz

After you have viewed and read all the preceding resources, you are now ready to take the **post-session quiz.** This is a graded quiz consisting of 10 items which will test the knowledge that you have acquired from the preceding subtopics.

**CONGRATULATIONS for finishing Topic 2 – Infection and Immunity! You may now proceed to the next topic.**