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Introduction

The Veterinary Technician's Role in Pathology

By law, veterinary technicians are not allowed to perform specific tasks, including making a diagnosis, determining a prognosis, prescribing medication, initiating treatment, or performing surgery. However, the absence of diagnostic authority doesn't diminish the crucial role of veterinary technicians within the diagnostic process. Proficiency in pathology remains a cornerstone of their duties.

Tech Box 1.1

Veterinary technicians play a role as an integral part of the diagnostic team.

Why does the veterinary technician need pathology information? This question has many answers:

- Client education frequently falls within the realm of a technician's responsibilities. Veterinary technicians offer guidance to clients, both over the phone and in face-to-face interactions, regarding optimal pet care practices.
- Understanding disease is essential to preventing the spread of pathogens from patient to patient. The technician's role is to ensure that they are doing what they can to keep their patients in good health.
- An understanding of pathology will aid in protecting clients, co-workers, and the technicians themselves from zoonotic diseases.
- To excel as a technician, it's essential to grasp the intricacies of patient care. This comprehension of the disease process plays a pivotal role in delivering the best care possible to our patients.
- A technician who knows disease processes can anticipate the veterinarian's needs, expediting patient care.

Technician Duties and Required Skills

Technician responsibilities encompass patient care, client education, laboratory diagnostics, aiding veterinarians, and treatment. It's crucial to recognize that the specific duties of a technician may vary between veterinarians, clinics, or hospitals. Therefore, it's essential for technicians to have a clear understanding of their role in their respective workplaces.

Some of the necessary skills involved in dealing with sick patients include:

Client Education and Communication Skills

- The ability to speak with owners over the phone and in person
- The ability to clearly communicate with pet owners during intake, providing accurate information in a manner tailored to their understanding level
- The ability to keep clients informed about the status and progress of their animals
- The ability to effectively communicate information between the veterinarian and the owner
- The ability to articulate invoices or estimates (treatment plans) to clients, ensuring they comprehend the necessity and cost of procedures for their pet's treatment
- The ability to discharge a patient and clearly convey essential information for the ongoing care of their animal
- The ability to train/instruct owners on how to medicate or perform treatments that may be necessary once the animal is home

Laboratory and Other Diagnostic Skills

- The ability to properly collect specimens, including urine, feces, blood, and tissues
- The ability to properly submit and package samples to reference laboratories
- The ability to perform a complete blood count (CBC) and other basic hematological procedures
- The ability to run blood chemistry machines and enzyme-linked immunosorbent assays (ELISAs)
- The ability to collect cytologic specimens, set up slides, and analyze the slides
- The ability to collect samples for bacterial evaluation, set up and read culture and sensitivity tests
- The ability to set up, conduct, and process radiographs while prioritizing the safety of all individuals and animals present
- The ability to prepare and restrain patients for other diagnostic imaging techniques, including ultrasound (US), magnetic resonance imaging (MRI), and computed tomography(CT) scans
- The ability to prepare the patient, set up and clean equipment, and restrain patients for endoscopic procedures
- The ability to prepare the patient and equipment for other specialized diagnostic procedures

Treatment Skills

- The ability to place intravenous catheters (IVCs) in veins, including cephalic, lateral saphenous, and jugular veins
- The ability to prepare fluid bags and medications
- The ability to calculate the patient's fluid rate
- The ability to administer medications through routes including injection, oral, and topical
- The ability to isolate infectious materials and prevent further spread of contagious diseases
- The ability to maintain patient comfort and ensure clean living conditions
- The ability to advocate for the patient and prioritize their best interests above all else

Other Skills

- The ability to perform dosage calculations and other critical veterinary calculations
- The ability to induce the patient for surgery, maintain and monitor anesthesia, prepare the patient for surgery, and assist the veterinarian in surgery
- The ability to sterilize instruments, prepare surgical packs, and maintain sterility

- The ability to restrain patients for examinations and procedures, ensuring the safety of the animal and all persons involved
- The ability to lift patients onto exam tables, into and out of cages, and help patients ambulate if they are unable to
- The ability to perform euthanasia or aid in the process
- The ability to maintain patient records and hospital logs
- The ability to log and track controlled substances
- The ability to triage patients and manage multiple animals concurrently

There are other additional skills and duties that will be discussed with specific pathologies and highlighted by “Technician Duty” boxes.

Diagnosis

The word “diagnosis” literally means “a state of complete knowledge” and labels the patient’s condition.

Types of diagnosis include:

- A **presumptive diagnosis** is the identification of the likely cause of disease.
- A **definitive diagnosis** is the identification of the definite cause of the disease. This type of diagnosis involves diagnostic testing.
- A **differential diagnosis** is a list of possible diseases the patient could have. Testing will aid in ruling diseases out and narrowing down the list.

What comprises a diagnosis, and how does the technician contribute? Rarely do patients exhibit signs so unmistakable that veterinarians can immediately discern their illness. Attaining a diagnosis requires effort, involving a systematic process. Initially, a history is gathered, followed by a physical examination. This process generates a list of problems, aiding the veterinarian in forming a differential diagnosis. Diagnostic testing or imaging helps eliminate potential conditions. Technicians are instrumental throughout as the process extends beyond diagnosis. They administer treatment initiated by the veterinarian, maintain client communication during the animal’s hospitalization, and provide further education upon discharge. Thus, veterinary technicians are integral to the entire process.

Immunity

Immunity is the ability of the body to fight off disease and can be categorized in several ways.

Nonspecific immunity/resistance is the general protection that does not initiate a response against a specific pathogen. Mucous membranes provide the first line of defense, and the skin provides a physical barrier. Innate immunity, including inflammation, fever, antimicrobial proteins, and phagocytes, is the body’s second line of defense. Specific immunity/resistance is the body’s third line of defense, giving the body the ability to target and destroy specific antigens. Specific immunity involves lymphocytes that produce antibodies and memory cells.

Active immunity is formed when the body is allowed to create its own antibodies against a pathogen. Examples of active immunity include antibodies formed when the body is exposed to a disease or a vaccine. Passive immunity is produced when the body receives preformed antibodies such as colostrum or plasma.

Cellular Immunity (cell-mediated immunity) is immunity involving the activation of T cell lymphocytes. These T cells have different functions:

- **Cytotoxic T cells** have the ability to attach to the antigen and attack it
- **Helper T cells** enhance the activities of other immune responses
- **Suppressor T cells** aid in control of the immune response
- **Memory T cells** create a memory of the antigen for a quicker response with the second exposure

Humoral immunity involves the production of antibodies from B cell lymphocytes. B cells transform into plasma cells, creating antibodies that neutralize the pathogen, prevent cell attachment, immobilize bacteria, and enhance phagocytosis. Antibodies formed are for specific antigens and initiate memory B cells that create a quicker response in future exposures.

Factors Involved in Infectious Disease

How can two animals come in contact with a disease in their environment, and only one gets sick? The answer involves factors or variables involved with each patient and circumstance. First are host factors, which deal with the patients themselves. Age, nutritional status, health status, medications, immunization status, and stress affect how well a patient's immune system will protect them. Next are environmental factors, which involve temperature, humidity, and sanitation. Lastly, agent factors involve the micro-organism. Virulence, mode of transmission, and the amount of exposure needed aid in determining how a patient's immune system will react to each pathogen.

Common Terminology Necessary for Understanding Pathology

- **Pathology**—The study of disease
- **Homeostasis**—The ability of an organism to maintain its internal environment within specific constant ranges
- **Disease**—Any changes in the state of health disrupting homeostasis
- **Local disease**—A disease that affects a small area or part of the body
- **Systemic disease**—A disease that affects several organs/tissues or body systems
- **Infection**—Invasion and multiplication of a micro-organism in body tissues
- **Infectious disease**—A disease caused by a micro-organism
- **Contagious infectious disease**—An infectious disease that can be passed from one animal to another
- **Zoonotic Disease**—An infectious disease that can be passed from animal to man
- **Bacterial translocation**—The movement of bacteria or bacterial products across the intestinal lining to enter the lymphatics or peripheral blood circulation
- **Pathogen**—An infectious agent or micro-organism
- **Prognosis**—The estimate of the likely outcome of Disease
- **Incubation period**—The period of time from when a pathogen enters the body until signs of disease occur
- **Subclinical or unapparent infection**—An infection where clinical signs are not able to be observed
- **Carrier**—A living organism that serves as host to an infection yet shows no clinical signs of the disease

- **Reservoir**—A carrier or alternative host that maintains an organism in the environment
- **Latent infection**—An infection where the individual does not show signs of disease unless under stressful conditions
- **Vector**—Anything that transmits a contagious infectious disease
- **Biological vector**—An organism in whose body a micro-organism develops or multiplies prior to entering the definitive host
- **Mechanical vector**—An organism that transmits a micro-organism by moving it from one location to another
- **Fomite**—An inanimate object that transmits a contagious infectious disease
- **Endemic**—A disease that is present in the community at all times
- **Mortality**—The number of deaths among exposed or infected individuals
- **Morbidity**—A ratio of sick to well in a population refers to how contagious a disease is
- **Clinical sign**—Objective changes an observer can see or measure in a patient
- **Symptom**—Subjected changes that are not obvious to the observer requiring the patient to report them
- **Pathognomonic sign**—A hallmark sign or one that is unique to a particular disease
- **Resistance**—The ability to ward off disease (immune)
- **Susceptibility**—The lack of immunity or vulnerability to disease
- **Palliative**—Relieving clinical signs/symptoms without curing disease
- **Vaccine**—An immunization against a viral agent
 - **Core vaccine**—A vaccine that is required for all animals of the species it is manufactured for, usually due to high morbidity and high mortality.
 - **Noncore vaccine**—An optional vaccine based on the animal's risk factors for coming in contact with and/or contracting that disease.
- **Bacterin**—An immunization against a bacterial agent
- **Horizontal disease transmission**—Transmission of disease among unrelated animals that can occur through direct contact or vectors (horizontal disease transmission occurs when an animal comes in contact with a disease in their environment).
- **Vertical disease transmission**—Transmission of disease from parent to offspring in the period prior to birth or immediately after birth (examples of vertical disease transmission include transplacental transmission of disease or transmission through colostrum or lactation).

Disinfection

Disinfection is one of the most critical tasks technicians will perform when it comes to protecting the patient, client, and anyone in the veterinary hospital. Yet, we don't often do it correctly. Inappropriate disinfection can lead to infectious disease outbreaks, risking the practice. Disease outbreaks risk the hard-earned reputation the practice has worked hard to establish in the community, put veterinarians at risk of malpractice lawsuits, and may require the practice to take on the cost of caring for patients who become ill within their walls.

First, it is crucial to discern the difference between cleaning and disinfecting, as both are essential processes but are different. Cleaning uses a detergent (soap) and water to remove dirt, debris, and microbes physically. Disinfection, conversely, is using a chemical to kill, deactivate, or significantly reduce the number of micro-organisms on a surface. The two terms are often used interchangeably, and the processes are frequently mixed into one step. It is common to spray disinfectant

on a dirty surface and immediately wipe the chemical and debris off it. Instead, we must first ensure the surface is cleaned of organic material. In our veterinary practices, organic material is prevalent, even if not visible to the naked eye; whether it be dirt, feces, dander, or other material, we must get it off the surface for two reasons:

- Organic material will often deactivate many disinfectants
- Organic material usually acts as a physical barrier that will block the disinfectant from reaching the surface it is supposed to be acting on

Once the surface has been cleaned, it can be disinfected using the appropriate protocol.

Other common mistakes in disinfecting include:

1) Not diluting disinfectants properly

Many disinfectant chemicals are bought as concentrates that must be diluted. “Eyeballing,” the color of a diluted liquid in spray bottles, is fast and easy but inaccurate. All concentrated disinfectants come with instructions on how to dilute them. These instructions must be followed to the tee, which means measuring out specific volumes and resisting the urge to “guesstimate” the water-to-concentrated disinfectant ratio. Chemicals that are too dilute won’t work as they should, and those that are too concentrated can be dangerous.

2) Not knowing/tracking expiration dates of disinfectant bottles

Not only should you pay attention to the expiration date of the concentrated chemical, but dilutions are only stable for a set time period as well. Most chemicals, once diluted, are only good for a day or two at the most. Using chemicals beyond their stated expiration date will do as much good as wiping our surfaces down with water alone.

3) Topping off disinfectant bottles

Although topping off bottles may seem proactive, it is another common mistake. Once a chemical is diluted in a secondary container, do not top it off to keep it full. Adding to already diluted bottles means that the concentration is not likely what it should be. If the chemical in the container is close to expiring, the new diluted disinfectant will not work as well once mixing has happened. Always use the bottle until it is empty or empty the bottle of all contents, wash it out, and start fresh to ensure the disinfectant is at its full strength with a known expiration date.

4) Mixing chemicals/disinfectants

Mix only the concentrated chemical with the appropriate diluent listed in the instructions, and don’t add any other chemicals to the mixture. For example, some practices may mix scents or essential oils into disinfectants to make the practice smell better. Although smell is important, this will inactivate the disinfectant, putting patients at risk. The same thing goes for mixing soaps with disinfectants. If something is washed with soap and then isn’t thoroughly rinsed before adding a disinfectant to that surface, the chemicals can mix and potentially emit a toxic gas.

5) Not knowing or meeting disinfectant contact times

Time is of the essence when the day is busy, and turning that exam room, surgery table, or even cage is vital to keep your workflow moving smoothly and quickly. However, each chemical requires a specific time in which it must remain wet on the surface of the object being disinfected to be able to do its job entirely. The contact time for many veterinary disinfectants ranges from 30 seconds to up to 10 minutes. The labels must be read, the specific contact time for each chemical must be understood, and teams must be trained to allow that time. If a chemical with a contact time of five minutes is sprayed on an exam room table and immediately wiped dry, we have done very little to protect the next patient touching that table.

6) Not choosing the proper disinfectant

There are many chemicals on the market for use in our veterinary practices. Each type of disinfectant will work better on some micro-organisms than others. Choosing the wrong one will result in some organisms not being deactivated/killed. For example, a quaternary ammonium compound will easily kill gram-positive and gram-negative bacteria but is useless in killing most viruses. Ensuring the proper choice of disinfectant for practices is essential, and that might include needing more than one based on the situation/micro-organism. An exam table where a parvo puppy was examined will be disinfected differently than a treatment table where a cat with a cat bite abscess was treated.

7) Missing high-touch surfaces when it comes to disinfection

Many high-touch areas in the practice should be disinfected regularly but get missed. These include door handles, pens, computers, phones, cage handles, washing machine handles, etc. These surfaces will all act as fomites, contributing to the transmission of disease.

Further Reading

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