

Pharmacological Management of Psychiatric Disorders in Canines

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Goals: The goal of this lesson is to present a synopsis of diagnosis and treatment of psychiatric disorders in canines

Objectives:

1. Identify etiology and epidemiology of psychiatric disorders in canines
2. Recognize diagnostic strategies to correctly identify psychiatric disorders in canines
3. Recommend both pharmacological and nonpharmacological psychiatric disorder management expedients in canines
4. Describe the pharmacist's role in optimal canine psychiatric disorder treatment plans

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Introduction:

Numerous and obvious differences exist between the human species and our canine counterparts; however, we may be more similar than we think to man's best friend. Many may incorrectly surmise that psychological disorders are reserved solely for humans, however even though psychiatric diagnoses and treatments are not considered one of the primary reasons for a veterinary visit, psychological well-being of canines is becoming more widely recognized and treated in dogs. It is imperative to treat the psychological health of a dog as an utmost priority as studies have indicated that the more fearful and anxious a dog is, the shorter its lifespan will be. As such, it can be deduced that untreated psychological disorders in dogs have deleterious effects on the health, quality of life, and lifespan of canines.

Neuroimaging techniques at Emory University of both canine and human brains have indicated that numerous similarities exist in both species during emotional processing. Therefore, both brain types are susceptible to damage, chemical imbalance, and emotional trauma. Both pharmacological and non-pharmacological techniques have shown to be advantageous in both human and canine psychiatric disorder.

Influencing Factors for Psychiatric Disorders in Dogs:

Nature versus nurture comes to question when trying to delve into the cause of one's psychological well-being. Many will argue that both play a significant role in contributing to a dog's quality of life from a mental perspective. A multitude of factors are considered during the diagnosis process of psychiatric disorders in canines such as; genetic predisposition, physical disorders, developmental factors, and environmental factors.

Genetic Predisposition:

Genetics plays a key role in deciphering the type and intensity of psychiatric disorder one's canine is experiencing. Veterinarians will perform a thorough patient history to provide the

best diagnosis of the dog's mental state. Examples of genetic predispositions for psychiatric disorders in dogs include; Dobermans have a greater propensity for compulsively flank sucking and narcolepsy, smaller breeds of dogs (Chihuahuas, Shih-Tzu, Jack Russell Terriers) have shown greater tendencies to display anxious behaviors, bull terriers exhibit extreme repetitive spinning, miniature schnauzers engage in excessive fly chasing, and acral lick dermatitis is witnessed in medium to large breed dogs.

Physical Disorders:

Physical disorders are often unknowingly the underlying cause of a canine's behavior. It is imperative to investigate physical influence as being the potential culprit of a dog's angst before trying to incorrectly diagnose and prescribe the wrong medication. Examples of physical issues that can cause secondary psychological tendencies include pain, thyroid issues, itchy skin from allergies, anatomic disorders, toxic issues, abnormal nervous system activity, and degenerative issues. Adequate time should be allotted to rule out any physical ailments before other disorders are explored.

Developmental Factors:

Just like humans, dogs have multiple developmental stages throughout their life. To raise a confident, independent, non-fearful dog, it is imperative for owners to take advantage of the milestones that should be achieved during each developmental stage and ensure they provide adequate resources for their dog to attain these goals. The primary error owners make with their dog that contributes to psychological disorders in the dog's adult life is improper socialization. Dog owners should research their specific breed of dog and the socialization that is necessary and appropriate for that breed at the suitable life stage. Properly timed socialization will allow for a smoother transition into adult life and a lesser likelihood of their dog exhibiting psychological disorders.

Environmental Factors:

It is imperative to assess if the culprit of psychological distress in dogs may be the result of environmental factors. Often, environmental factors are the easiest issue to manipulate to improve the canine's quality of life. An example of an environmental change that is easily remedied would be if kenneling and confinement is the primary reason for the dog's distress. As such, the dog should slowly be allowed to roam a designated area and be rewarded when no offenses have been made (elimination errors, destructive tendencies, etc.). Once full integration and acclimation of the area has been achieved, then autonomy should be granted to the canine so confinement and kenneling can be reserved for only when necessary and rare instances.

In contrast, examples where environmental factors are less malleable include major life changes. Major life changes include but are not limited to the death of an owner (and therefore new ownership and/or going into foster care or the humane society), traumatic accidents, violent attacks, moving houses/cities, a baby is brought home, a new pet is brought home, etc. Due to the inflexible nature of most major life changes, therapeutic intervention, both pharmacological and nonpharmacological, is often utilized for dogs unable to cope well during the transitional phase and before the dog has fully acclimated to their new norm.

Signs of Psychiatric Disorders in Canines:

While psychiatric symptoms differ from dog to dog, various behaviors have been shown to be ubiquitous in the majority of psychiatric diagnosed cases. These symptoms include but are not limited to; overeating, loss of appetite, compulsive licking, elimination changes, excessive tail chasing, easily startled, lethargy, obsessive chasing behaviors, pacing, and atypical aggressive displays. Some dogs may innately exhibit these behaviors, while other dogs may acquire these behaviors with age when exposed to certain environmental factors.

Types of Psychiatric Disorders in Canines:

Anxiety Disorders:

Most anxiety disorders in canines evolve over time and are the result of separation from their owner(s) or other animals, social anxiety, and/or noise anxiety. Dogs with **separation anxiety** often exhibit behaviors such as frantic barking and destructive behavior (chewing shoes, furniture, getting into the trash, and elimination errors) when left alone. **Social anxiety** in dogs is most frequently seen in dogs that have been abused or neglected; such as dogs that were rescued from puppy mills or were strays. Dogs with social anxiety often display aggressive tendencies when exposed to other dogs or unfamiliar people. In addition, canines with social anxiety often avoid eye contact, excessive licking of their lips, sniffing the air, moving away from people who approach them, yawning when they are not tired, pacing back and forth or in circles, trembling, restless, and whimpering or whining. Loud noises can be the culprit of many dogs' angst especially when they are startled by an unfamiliar noise (such as thunder, fireworks, gunshots, etc.) in which they are unsure of the context of the chaos. As such, dogs with **noise anxiety** present many of the same symptoms as dogs with social or separation anxiety. Furthermore, dogs with noise anxiety often display trembling, hiding, attempts to leave or escape, compulsive licking and grooming, self-injury, and diarrhea or vomiting when exposed to loud noises.

When nonpharmacological therapies do not provide adequate alleviation of anxiety symptoms in dogs, medication is often utilized to help facilitate the optimal mental well-being state of the canine. SSRIs (selective serotonin-reuptake inhibitor) antidepressants are the most widely prescribed drugs for an anxiety diagnosis in dogs. Fluoxetine (Prozac) is an SSRI antidepressant that is the most commonly prescribed drug for anxiety in dogs. The most common side effects witnessed with Fluoxetine include; lethargy, decreased appetite, vomiting, diarrhea, shaking, restlessness, panting, whining/vocalization, incoordination, hypersalivation, and weight loss. Serious side effects are rare but include; seizures, aggression, and excessive and persistent vomiting. It is important to note that it takes up to a few weeks before the full effects of Fluoxetine are evident. Drug interactions with Fluoxetine include anticoagulants, aspirin, buspirone, cyproheptadine, diazepam, alprazolam, diuretics, flea/tick collars, insulin, isoniazid, monoamine oxidase inhibitors, methadone, NSAIDs, pentazocine, phenytoin, propranolol, metoprolol, St. John's wort, tramadol, tricyclic antidepressants, and trazodone. The dose for Fluoxetine in dogs is 1 to 2 mg/kg by mouth every 24 hrs.

Other medications approved for anxiety ridden canines include: Benadryl (antihistamine), Trazodone (serotonin receptor antagonist and reuptake inhibitor), Amitriptyline (tricyclic antidepressant), Buspirone (anxiolytic), Paroxetine (SSRI), Sertraline (SSRI), dexmedetomidine (selective alpha2-adrenergic receptor), and Clomipramine (tricyclic antidepressant).

In the event of noise anxiety, veterinarians will often prescribe a benzodiazepine in conjunction with an antidepressant to help dogs cope with noise elevations. Benzodiazepines facilitate the release of gamma-aminobutyric acid (GABA) activity in the CNS producing

calming, drowsy and sedating effects. Diazepam, Lorazepam, and Alprazolam are the most widely utilized drugs to relieve panic and anxiety symptoms during a noise anxiety exacerbation in canines. The side effects of benzodiazepines in dogs include; extreme sedation, drooling, incoordination, aggression, agitation, nausea, and vomiting. In extreme cases, respiratory and cardiovascular depression may be observed. Drug interactions include; amiodarone, antacids, antihypertensive agents, carbonic anhydrase inhibitors, CNS depressants, digoxin, fluoxetine, fluvoxamine, hepatic enzyme inducers or inhibitors, ifosfamide, lithium, phenytoin, rifampin, theophylline, tricyclic antidepressants, valproic acid or yohimbine. The dose for Lorazepam in dogs is 1 to 2 mg/kg by mouth every 12 hrs. The dose for Alprazolam in dogs is 0.02 to 0.1 mg/kg by mouth every 12 hrs. The dose of Diazepam in dogs is 0.12 to 1 mg/pound by mouth every 24 hours as needed.

CBD oil has gained popularity in the past few years with both veterinarians and pet owners with successfully treating dogs' anxiety by producing a calming and relaxing effect. CBD is a compound extracted from the cannabis plant and then diluted with a carrier oil. It is important to note that CBD products are not regulated yet, as such the purity and consistency vary from product to product. It is crucial to consult with a pharmacist or veterinarian before determining if CBD oil is right for one's dogs' anxiety and which CBD oil product to choose from.

TABLE 1 Relative Effects of Medications on Noradrenaline/Norepinephrine and Serotonin Receptors and for Sedation or Anticholinergic Effects⁸⁻¹⁰

PARENT COMPOUND	NA/NE	5-HT	POTENTIAL FOR SEDATION	POTENTIAL FOR ANTICHOLINERGIC EFFECTS
TCA's				
Imipramine	+++	++	Moderate	Moderate
Amitriptyline	++	++	High	High
Nortriptyline	+	+	Moderate	Moderate
Clomipramine	++	+++	High	High
SSRIs				
Fluoxetine	+	+++	Moderate	Low
Paroxetine		++	High	High
Sertraline	+	+++	Moderate	Moderate
Fluvoxamine		+++	Moderate	
Citalopram		+++	Moderate	Moderate
SARIs				
Trazodone		++	High	Low
Benzodiazepines				
Alprazolam			Low to moderate	
Lorazepam			Low to moderate	
Diazepam			High	
Clonazepam			Moderate	
α-Agonists				
Clonidine			Moderate	
OTM dexmedetomidine			Low	

+, some effect; ++, moderate effect; +++, large effect; 5HT, 5-hydroxytryptamine (serotonin); NA/NE, noradrenaline/norepinephrine; OTM, oral transmucosal; SARI, serotonin antagonist/reuptake inhibitor; SSRI, selective serotonin reuptake inhibitor; TCA, tricyclic antidepressant

<https://todaysveterinarypractice.com/wp-content/uploads/sites/4/2017/04/T1705C11Table01.jpg>

Hyperkinesia:

Hyperkinesia in dogs is analogous to Attention Deficit Hyperactivity Disorder (ADHD) in humans. Many parallels exist between ADHD in humans and hyperkinesia in dogs. A precursor of this diagnosis in adult dogs is that they were super excitable puppies. Often, dogs with a hyperkinesia diagnosis will be hard to train and socialize due to their distractibility. Symptoms of hyperkinesia in dogs include; hyperactivity, tachycardia, tachypnea, poor trainability, excessive vocalization, extreme sensitivity to sound and stimuli, unable to pay attention, impulsive, distractible, high energy, aggression associated with overstimulation, and excessive salivation.

It may seem counterintuitive, but stimulants are utilized for dogs that have uncontrollable hyperkinesia. D-amphetamine is prescribed for dogs that do not respond to nonpharmacological therapies for hyperkinesia. D-amphetamine blocks the reuptake of norepinephrine and dopamine in the presynaptic neuron. In addition, the release of norepinephrine and dopamine is increased in the extra-neuronal space. Side effects of D-amphetamine include; hyperactivity, restlessness, agitation, tachycardia, tachypnoea, mydriasis, decreased appetite, circling, dry mouth, and

muscle tremors/twitching. The dose of D-amphetamine in dogs for the indication of hyperkinesia is 0.1 to 1.3 mg/kg by mouth up to three times daily as needed.

Methylphenidate (Ritalin) is a stimulant that releases norepinephrine in the brain and can help a hyperkinetic dog become more focused and less distracted. The dose of methylphenidate for dogs exhibiting hyperkinesia is 0.25 to 0.5 mg/kg by mouth twice to three times day. Side effects of Methylphenidate include; increase in blood pressure, anorexia, increased nervousness, diarrhea, salivation, and insomnia. Drug interactions with Methylphenidate include; anticonvulsants, tricyclic antidepressants, MAO inhibitors, and selective serotonin reuptake inhibitors.

Canine Cognitive Dysfunction Syndrome:

Canine Cognitive Dysfunction Syndrome (CCD) is comparable to Dementia or Alzheimer's in humans. In most cases, this diagnosis is reserved for geriatric dogs. CCD is found in nearly one-third of dogs over the age of 11. While the exact cause of CCD is unknown, it is hypothesized that brain atrophy, strokes, and/or other accumulation of brain damage contribute to cognitive decline. CCD usually presents with behavioral alterations in canines including disorientation, altered interactions with familiar people and pets, sleep-wake cycle disturbances, fecal and urinary incontinence, loss of appetite, extreme irritability, anxiety/restlessness, slow to learn new tasks, inability to follow familiar routes, and changes in activity.

Veterinarians will often recommend diets rich in antioxidants, vitamin E and C, selenium, flavonoids, beta carotene, carotenoids, omega-3, and carnitine to improve cognitive functions. Research has shown that dietary management in canines has accounted for a 58% increase in learning abilities by geriatric patients. If a change in diets rich in the aforementioned substances proves to be a futile effort to increase cognitive function, pharmacological interventions are then explored. Prescription drugs are available to help slow cognitive decline in dogs. The mainstay of these drugs is to normalize neurotransmitter levels, increase blood supply, and protect against nerve cell deterioration.

Selegiline is the only FDA approved treatment for canines with cognitive dysfunction. Selegiline (Anipryl) is a human Parkinson's disease drug that is an irreversible enzyme blocker (MAO- monoamine oxidase inhibitor) that slows the breakdown of the dopamine, epinephrine, norepinephrine, and serotonin in the brain, which results in neuroprotective effects. In addition, L-amphetamine and L-methamphetamine are metabolites of selegiline that may contribute to the pharmacological effects of the drug. The result of the influx of these neurotransmitters and metabolites in the brain synapse results in CNS stimulatory effects which leads to cognitive acuteness. The response rate of Selegiline in dogs with cognitive decline was reported at 77% one month post initial dose (onset of action is variable- between 4-12 weeks). A dose of 0.5-1.0 mg/kg by mouth every 24 hours is appropriate for dogs with this indication. Morning administration is encouraged to aid with sleep-wake cycle disturbances. Side effects of Selegiline include; restlessness, hyperactivity, repetitive behaviors, salivation, vomiting, hallucinations, insomnia, confusion, depression, balance issues, diarrhea, and anorexia. Rare side effects include deafness, pruritus, shivering, and trembling. Selegiline should not be used with bupropion, tramadol, clomipramine, amitriptyline, and fluoxetine due to the potential of serotonin syndrome. Additionally, amitraz should not be used due to MOA inhibitor duplicate therapy. Ephedrine, pseudoephedrine, and phenylpropanolamine should have a two-week separation period due to the potential of hypertension and hyperpyrexia. Opioids (especially meperidine) should have a two-week separation with Selegiline as well.

An increase in glutaminergic activity has been correlated with neurotoxicity and thus suspected dementia in dogs. As such, memantine has been shown to produce desired therapeutic effects in canines with cognitive dysfunction as this drug binds to N-methyl-d aspartate receptors in the brain and thus blocks the activity of glutamate. A dose of 0.3 to 1.0 mg/kg every 12 hours has resulted in beneficial effects for the aforementioned indication.

Depression:

Like their human counterparts, canines experience depressive episodes for a multitude of factors that may be circumstantial, chemical imbalance, environmental, etc. It may be challenging to pinpoint the exact cause of a dog's depression as they are not able to verbalize their thought process. The good news is, depression is usually temporary and situational in dogs. Once the dog acclimates to its new environmental settings (whether that be a new home, new owner, new baby/pet, etc.), their depressive state usually subsides. Dogs may be prescribed interim pharmacological interventions to help them during the transitional stage. Other instances in which the dog's depression is not tied to environmental factors include if the dog has chronic pain, grief while mourning the loss of a loved one or animal companion, social isolation, and trauma (including injury or abuse). Underlying issues need to be addressed when a dog is experiencing pain. If chronic pain is the culprit of the canine's depression, then pain management tactics, whether it be pharmacological or nonpharmacological, need to be implemented to alleviate the dog's pain. Dogs with depression present as withdrawn, lethargic, drastic weight loss, refusal of water or treats, excessive shedding, sudden and drastic behavioral changes, and unmotivated to do activities they enjoyed in the past (walks, play fetch, tug-o-war, etc.).

The most commonly prescribed medication for dogs with depression is Fluoxetine. Fluoxetine is an SSRI (selective serotonin reuptake inhibitor). The most common side effects witnessed with fluoxetine include lethargy, decreased appetite, vomiting, diarrhea, shaking, restlessness, panting, whining/vocalization, incoordination, hypersalivation, and weight loss. Serious side effects are rare but include; seizures, aggression, and excessive and persistent vomiting. It is important to note that it takes up to a few weeks before the full effects of fluoxetine are evident. Drug interactions with fluoxetine include anticoagulants, aspirin, buspirone, cyproheptadine, diazepam, alprazolam, diuretics, flea/tick collars, insulin, isoniazid, monoamine oxidase inhibitors, methadone, NSAIDs, pentazocine, phenytoin, propranolol, metoprolol, St. John's wort, tramadol, tricyclic antidepressants, and trazodone. The dose for Fluoxetine in dogs is 1 to 2 mg/kg by mouth every 24 hrs.

Another popular antidepressant medications for dogs with diagnosed depression is amitriptyline. Amitriptyline (Elavil) belongs to the drug class tricyclic antidepressants (TCAs). Side effects of amitriptyline include drowsiness, sedation, constipation, dry mouth, and urinary retention. Serious and less common side effects of amitriptyline include hyperexcitability, irregular heart rhythms, decreased blood counts, vomiting, diarrhea, hormonal imbalances, and seizures. Drug interactions with amitriptyline are extensive and some include acetazolamide, alpha-2 adrenergic agonists, amantadine, ammonium chloride, anesthetic agents, antiarrhythmics, anticholinergic agents, antihypertensive agents, anthracyclines, apomorphine,azole antifungals, barbiturates, benzodiazepines, beta-2 agonists, bethanechol, bromocriptine, buspirone, carbamazepine, cetirizine, cimetidine, cisapride, clonidine, and others. It may take seven to ten days before the full effects of this medication are seen. The dose of amitriptyline in dogs for depression is 1 to 4 mg/kg po q 12-24 hrs.

Lastly, doxepin is another antidepressant drug utilized for a depression diagnosis in canines. Doxepin blocks dopamine receptors in the central nervous system (CNS). In addition, doxepin is a very potent antihistamine (H1 and H2 blocker) which is advantageous for dogs that exhibit both depressive and allergy symptoms. Side effects of doxepin include blood pressure fluctuations, rapid heart rate, constipation, and dry mouth. Doxepin drug interactions include; cimetidine, estrogens, fluoxetine, some sedative, enalapril, and verapamil. The dose of doxepin for dogs with depression is 0.5 to 1 mg/kg by mouth every 12 hours.

Canine Compulsive Disorder:

Canine Compulsive Disorder (CCD) disorder is characterized by excessively repeating manic behaviors which are often difficult to subdue (such as tail chasing, barking, digging, biting their food bowl, pacing, paw licking, chewing, snapping at the air, spinning, sucking on toys, etc.). Many of these ritualistic behaviors commence in a harmless setting, such as a dog sucking on a toy to soothe themselves during a thunderstorm. The problem surfaces when dogs repeat this behavior during everyday routines when there are not any triggering events that cause anxious or stressful responses. In addition, dogs with CCD may engage in self-mutilation. Many canines with CCD are so focused on the repetitive task at hand that they have a decrease in playfulness. CCD is correlated with the CDH2 gene on the canine chromosome 7. Dogs that exhibit this gene are at a high likelihood of developing CCD. In addition, CCD can be exacerbated by stress and/or boredom, anxiety, fear, frustration, and other negative emotions.

Research has shown that dogs with CCD have altered serotonin levels. Therefore, drugs that affect the absorption of serotonin can be beneficial in reducing the propensity of CCD symptoms. Fluoxetine and Clomipramine (TCA) are the two most commonly prescribed drugs for dogs with CCD. As aforementioned, fluoxetine is an SSRI (selective serotonin reuptake inhibitor). The most common side effects witnessed with fluoxetine include lethargy, decreased appetite, vomiting, diarrhea, shaking, restlessness, panting, whining/vocalization, incoordination, hypersalivation, and weight loss. Serious side effects are rare but include; seizures, aggression, and excessive and persistent vomiting. It is important to note that it takes up to a few weeks before the full effects of fluoxetine are evident. Drug interactions with fluoxetine include anticoagulants, aspirin, buspirone, cyproheptadine, diazepam, alprazolam, diuretics, flea/tick collars, insulin, isoniazid, monoamine oxidase inhibitors, methadone, NSAIDs, pentazocine, phenytoin, propranolol, metoprolol, St. John's wort, tramadol, tricyclic antidepressants, and trazodone. The dose for Fluoxetine in dogs is 1 to 2 mg/kg by mouth every 24 hrs.

Clomipramine is a tricyclic antidepressant (TCA) used to treat canine compulsive disorder. Side effects of clomipramine include lack of appetite, vomiting, diarrhea, constipation, dry mouth, elevated liver enzymes, difficulty urinating, and lethargy. Drug interactions of clomipramine are extensive, and some interactions include albuterol, anticholinergic agents,azole antifungals, bupropion, antipsychotic agents, cimetidine, cisapride, clonidine, CNS depressants, cyclobenzaprine, cyproheptadine, dextromethorphan, enalapril, fluoroquinolones, levothyroxine, linezolid, macrolides, MOA inhibitors, NSAIDs, ondansetron, phenytoin, SSRIs, rifampin, trazodone, etc. The dose of Clomipramine to treat CCD is 2 to 4 mg/kg by mouth every 12-24 hours.

Phobias:

The definition of phobia is an extreme or irrational fear of or aversion to something. Phobias typically have a rapid onset of fear and are usually present for greater than six months.

Phobias and irrational fear responses can be triggered by specific sounds, smells, or signs in dogs. Once a dog's phobia(s) have been identified, it is the responsibility of the owner to try and avoid such phobia(s) when in the presence of their canine companion. The most common phobia is sound phobia (fireworks, thunderstorms, gunshots, firecrackers). Evidence has indicated that sound phobias can be inherited. Another common phobia seen in dogs is blood injection phobias and visiting veterinarian offices. Dogs are not able to comprehend why they must go to the veterinarian's office and be subjected to potentially painful procedures (needles). Situational phobias occur when dogs are in an unfamiliar setting or are left alone for prolonged periods of time. Dogs are creatures of habit as well as social creatures that like to be in the comfort of their own home with their loved ones. When dogs are transported to an area that is new to them or in the presence of unfamiliar people or animals, this can ignite a situational phobia. Another example of a common phobia witnessed in dogs is fear of people/strangers. This is most commonly observed in dogs that have been abused. As such, these dogs will be untrusting of new people in fear that they will be abused again.

When nonpharmacological therapies are inadequate to remedy canine's phobia, drug therapies are introduced. The most common drugs used for phobia treatments in dogs include; benzodiazepines, propranolol, clonidine, and melatonin. Veterinarians will prescribe a benzodiazepine to be used intermittently to help dogs cope with their phobias. Benzodiazepines facilitate the release of gamma-aminobutyric acid (GABA) activity in the CNS producing calming, drowsiness, and sedating effects. Diazepam, lorazepam, and alprazolam are employed drug therapies during a phobia exacerbation. The side effects of benzodiazepines in dogs include; extreme sedation, drooling, in-coordination, aggression, agitation, nausea, and vomiting. In extreme cases, respiratory and cardiovascular depression may be observed. Drug interactions include; amiodarone, antacids, antihypertensive agents, carbonic anhydrase inhibitors, CNS depressants, digoxin, fluoxetine, fluvoxamine, hepatic enzyme inducers or inhibitors, ifosfamide, lithium, phenytoin, rifampin, theophylline, tricyclic antidepressants, valproic acid or yohimbine. The dose for lorazepam in dogs is 1 to 2 mg/kg by mouth every 12 hours. The dose for alprazolam in dogs is 0.02 to 0.1 mg/kg by mouth every 12 hours. The dose of diazepam in dogs is 0.12 to 1 mg/pound by mouth every 24 hours as needed.

Clonidine is an antihypertensive drug belonging to the class of drugs titled central alpha agonists. Clonidine use results in blood vessel relaxation and thus lowers blood pressure. In addition, clonidine affects the activity of the neurotransmitter norepinephrine in the CNS. Potential side effects with clonidine include dry mouth, ataxia, low blood pressure, constipation, and sedation. Drug interactions with clonidine include; epinephrine, narcotics, barbiturates, prazosin, prochlorperazine, acepromazine, blood pressure medications, propranolol, digoxin, amitriptyline, and clomipramine. The dose of clonidine to be used for acute phobias is 0.05 mg/kg by mouth up to twice daily as needed.

Propranolol belongs to a class of medications called beta blockers. Its mechanism of action includes relaxing blood vessels and slowing heart rate to improve blood flow and decreased blood pressure. Propranolol treats the physical symptoms exhibited when extreme phobias surface in dogs. Side effects that can be seen with propranolol administration include lack of energy, diarrhea, slowed heart rate, heart rhythm abnormalities, low blood sugar, narrowed airways, coughing, wheezing, trouble breathing, and lethargy. Drug interactions with propranolol include alpha-2 agonists, amiodarone, antacids, anticholinergics, digoxin, lidocaine, methimazole, NSAIDs, phenobarbital, quinidine, reserpine, TCAs, theophylline, etc. Propranolol dose in dogs is 0.3 to 1 mg/kg by mouth up to three times daily as needed.

Melatonin is a hormone supplement that produces calming and mild sedating effects in dogs when experiencing phobia triggers. Melatonin can be given prophylactically before the known phobia is present. Side effects of melatonin include sleepiness, altered sleep patterns, vivid dreams, itchiness, weight gain, and changes in fertility. Drug interactions include benzodiazepines, succinylcholine, and warfarin. The dose of melatonin in dogs is 0.45 mg/pound by mouth q 8-24 hours as needed.

Non-Pharmacological Interventions for Psychiatric Disorders in Dogs:

While pharmacological interventions are typically reserved for specific disease states and their indications therein, non-pharmacological therapies can often be extrapolated to most, if not all the psychiatric disorders in canines to improve their quality of life. Often pharmacological and non-pharmacological therapies are combined to provide a synergistic effect and improve the overall mental well-being of the dog.

Exercise:

A dog's most underserved need in most cases is exercise. Exercise creates a great bond and positive interaction between owner and pet. Even 15 minutes of exercise a day (walking, hiking, playing fetch, etc.) can have significant, long lasting beneficial effects on dogs. Lack of exercise can result in erratic or destructive behavior.

Mental Stimulation:

Mental stimulation can be as easy as taking your dog on a 15-minute walk. During the walk outside, dogs can see sights they do not see cooped up indoors, use their nose for unfamiliar smells, and many other advantageous sensory stimulation occurrences. Other mental stimulation suggestions include going to a dog park (for social interaction), riding in the car, playing games, obedience training, and enrichment toys/dog puzzles. All these examples contribute to the mental well-being of a dog and circumvent boredom. Just like lack of exercise can cause erratic, anxious, and destructive behavior, so can an insufficient amount of mental enrichment. Mental stimulation helps defer the progression of canine cognitive dysfunction by utilizing simple training routines, brain challenges and games, mental stimulating designated toys etc. Older dogs often are chronically bored, so providing mental stimulation allows for their brain to be activated and participate in youthful activities without overexerting themselves physically.

Massage & Acupuncture:

The utilization of massage and acupuncture have profound effects on dogs by decreasing anxiety, increase blood flow and circulation and promoting relaxation. In addition, massage creates a strong bond between owner and canine and encourages trustworthiness.

Space:

Contrary to our initial instinct of smothering our canine companions with TLC (tender loving care) when they are down in the dumps, studies have shown that giving space to canines showing signs of mental suffering expedites the recovery process. Helicopter parenting is applicable to dogs too and can have deleterious effects on dogs by increasing their anxiety levels. Dogs that do not do well in social settings should avoid busy, congested areas such as dog parks, farmer's market, outdoor events and concerts, social gatherings, etc. In addition, it is often

advised to have a designated area in the home for canines to retreat to. In events of over stimulation, dogs can go to their own designated space to have some mental reprieve.

Intentional about their interests:

Owners of canines with psychological issues should make deliberate attempts to create an uplifting environment for their pets. Dogs typically gravitate towards certain activities or excursions. For example, some dogs are play orientated whereas other dogs are affection and praise driven. Whatever their canine's personality type may be, owners should recognize these traits and purposefully concentrate on activities that encompass all their dog's favorite things. Pet owners will recognize a positive change in their dog's demeanor when they are intentional about including their dog's interests in their daily regimen. Canines thrive with a daily routine.

Lifestyle modifications:

In some instances, specific trigger events (thunderstorms, large social gatherings, children, etc.) may be able to be pinpointed that cause stress or anxiety in canines. Once these triggers have been identified, a modification in the dog's environment or routine should be implemented to circumvent any foreseeable adverse physiological reactions. In addition, certain products could be purchased that have been associated with addressing anxiety in dogs, such as weighted blankets or thunder jackets.

Desensitization:

The definition of desensitization from a psychology standpoint is a treatment or process to extinguish an emotional response (fear, anxiety, or guilt) to stimuli that formerly induced it. Desensitization is a technique of exposing a canine to a stimulus that formerly produced an undesirable reaction at an extremely low level so that there is no response. Over time, the dog will become less reactive through minute exposure to the stimulus. As such, gradually more intense levels of the stimulus can be presented to the dog without invoking a response, and thus desensitization would be achieved.

Behavior Modification:

Trained experts that have a sound knowledge base in psychological disorders of canines can be utilized to help one's dog overcome mental obstacles. Professionals with a Certified Applied Animal Behaviorist (CAAB) or Associate Certified Applied Animal Behaviorist (CAAB) are often utilized in the aforementioned mental health patient cases to help canines overcome their psychological disorder and improve their overall quality of life.

Product Utilization:

Many veterinarians will recommend psychological driven products before they prescribe medications (especially controlled substances). Often, these products will suffice to increase the quality of life and mental status of one's canine and thus pharmacological interventions are not needed. These products include thunder blankets, anxiety wraps, night light for canines with dementia, pheromones, aromatherapy, stuffed animals, relaxing sound machine, large comfortable dog bed, play pen for dogs to retreat, etc.

Conclusion:

Like physical disease states, psychological disorders in canines need to be treated with the utmost urgency and respect. Just like their human counterparts, dogs deserve to have optimal quality of life, and it is the responsibility of their owner to provide this. Nonpharmacological and pharmacological tactics should be utilized to help dogs achieve a state of normalcy regarding their mental health status.

CE QUIZ:

1. Which drug therapy used for anxiety in dogs is not considered an SSRI:
 - a. Fluoxetine
 - b. Clomipramine
 - c. Paroxetine
 - d. Sertraline
2. Hyperkinesia in dogs is analogous to what human disorder:
 - a. ADHD
 - b. Autism
 - c. ADD
 - d. OCD
3. What is the only FDA approved drug for canines with Canine Cognitive Dysfunction Syndrome:
 - a. Methylphenidate
 - b. Memantine
 - c. Doxepin
 - d. Selegiline
4. The dose of Fluoxetine for dogs diagnosed with depression is:
 - a. 10 to 20 mg/kg po q 24 hrs.
 - b. 1 to 2 mg/kg po q 24 hrs.
 - c. 10 to 20 mg/kg po q 12 hrs.
 - d. 1 to 2 mg/kg po q 12 hrs.
5. Besides being an antidepressant, what is an additional benefit Doxepin provides in dogs:
 - a. Alpha-2 agonist
 - b. Beta blocker
 - c. Antihistamine
 - d. ACE inhibitor
6. Research has shown that dogs with CCD have altered _____ levels:
 - a. Serotonin
 - b. Dopamine
 - c. Norepinephrine
 - d. GABA
7. What is not a potential side effect of Propranolol:
 - a. Low blood sugar
 - b. Wheezing
 - c. Diarrhea
 - d. Increased heart rate

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