

Risk Assessment

Category	Low	High	Severe	Critical
Build	Small, thin build, missing teeth	Medium	Large	Very muscular, especially around head and neck
Claw Strength	Weak, thin claws, missing teeth	Light claws	Moderate to heavy	Very muscular, especially around head and neck
Number of bites (only consider in context of location)	1 bite, back away	2 bites, back away	3 or more bites, one repeatedly, multiple bites in one incident	4 or more bites, one repeatedly, multiple bites in one incident
Timing of bites	No mark, minor bruising	Minor abrasions, moderate bruising	Fractures	Fracture, severe laceration, internal injury, death
Location of bites	Upper lip (closed mouth), lower lip	Body part (closed mouth), lower lip	Upper arm, thigh, abdomen, foot	Face, neck, chest, head
Triggers	1 predictable, able to avoid	2 predictable, able to avoid	3 unpredictable, not able to avoid all	More than 3 unpredictable, unavoidable
Intention	Play	Play, territorial	Protective, ci, predatory	Aggressive
Targets	1 predictable, able to avoid	2 predictable, able to avoid	3 unpredictable, not able to avoid all	More than 3 unpredictable, unavoidable
Warning signs	Do as usual, correct body language, growl, bark, snap	Growl, snarl, or snap, inhibited or play as large bite	No warning signs	No warning signs
History	History of aggression in current shelter environment only	History of aggression in 2 or more shelter environments, not in home	History of aggression in 1 or 2 environments (one home, one shelter)	History of aggression in more than 2 environments
Management	Can reasonably manage behavior in shelter and out of shelter	Can reasonably manage behavior out of shelter	Cannot reasonably manage behavior in shelter	Cannot reasonably manage behavior in or out of shelter

When to Prescribe

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 - Shelter's Resources
 - Can your organization manage this behavior problem?
 - Manpower
 - Time
 - Education
 - Money

When to Prescribe

- 9
 - Shelter's Community
 - Community willing to take on this problem in a pet?
 - Asilomar classification?
 - Community's perception on behavior medication in general

When to Prescribe

- 10
 - Requirements to Prescribe
 - VCPR/ VSPR
 - Medical evaluation
 - Diagnosis or working diagnosis
 - Always consider other treatments that can be implemented
 - Labwork?
 - Follow up plan
 - Outcome plan

Outcome Options/ Other Treatments

- 11
 - "Plan for the worst, hope for the best."
 - Best to have back up plan
 - Recommend ideal plan first, if declined, give 2nd option
 - Remember potential consequences for no option B for shelter pet
 - Is it fair for the options to be adopt or die?

Outline

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 - When to prescribe
 - **Monitoring**
 - Medication choices
 - Outcome considerations
 - Case examples

Monitoring

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- Designated person(s)
- Follow up plan
- Post-outcome plan
- Adoption
 - vs.
- Transfer

Monitoring

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- Designated person
 - DVM there daily? Tech handler/ caregiver?
- Daily rounds being performed
 - Monitor appetite, water
 - Urination, defecation
 - Level of activity
 - Level of anxiety/ stress
 - Level of positive and u



Monitoring

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- Follow up plan
 - Within organization
 - When do you want to hear back?
 - Who to contact? How?
 - Do they know when to contact you?
 - Side effects
 - Reassess plan and adjust
- Plan to go with pet- outcome

Outline

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- When to prescribe
- Monitoring
- Medication choices
 - Brief review of neurotransmitters
- Outcome considerations
- Case examples

Neurotransmitters

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- Chemical messengers
 - Glutamate
 - γ (gamma) aminobutyric acid (GABA)
 - Acetylcholine (Ach)
 - Monoamines
 - Dopamine (DA)
 - Norepinephrine (NE)
 - Serotonin (5-HT)



Glutamate

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- Amino acid
- Major excitatory neurotransmitter in brain
- Est. 60- 75 % of brain uses glutamate (Crowell-Davis, Murray 2006)
- Abnormal levels in impulsive, aggressive, and schizophrenic disorders in people (Overall 2001)

GABA

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- GABA- γ (gamma) aminobutyric acid
- Synthesized from glutamate
- Major inhibitory neurotransmitter in CNS
- Role in vigilance, anxiety, muscle tension, seizure activity, and memory (Crowell-Davis, Murray 2006)

Acetylcholine (Ach)

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- Synthesized from choline and acetyl coenzyme A (acetyl CoA)
 - Only neurotransmitter not directly synthesized from an amino acid
- Postganglionic parasympathetic synapses (muscarinic), autonomic ganglia/ brain/ adrenal medulla (**Nicotinic n**), and neuromuscular junctions (Nicotinic m)
 - Involve learning, memory, alertness
 - Reward and dependence systems activated

Neurotransmitters

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- Monoamines (biogenic amines)
 - Catecholamines:
 - **Dopamine**
 - **Norepinephrine** (noradrenaline)
 - Epinephrine (adrenaline)
 - Indolamines
 - **Serotonin**
 - Melatonin
 - Histamine

Catecholamines

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- Tyrosine → Dopa → **Dopamine** → **Norepinephrine**
 - DA and NE cell specific
- **DA**- phenothiazines, MAOIs, natural rewards
 - **Substantia nigra**
- **NE**- alpha and beta adrenergic
 - Agonist/antagonist activity at pre- or post-synaptic receptors
 - **Locus coeruleus**

Serotonin

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- Tryptophan → 5-hydroxytryptophan (5-HTP) → 5-hydroxytryptamine (5-HT, serotonin) → melatonin
- Midbrain raphe
- 14 + receptor types
 - Involved in medication side effects

Serotonin

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RECEPTOR	FUNCTIONS
5-HT 1A	Prereceptor: autoreceptor- inhibits firing of neuron, synthesis, and release of 5-HT; postreceptor
5-HT 1B	Autoreceptor- inhibits additional 5HT release
5-HT 2A	Platelet aggregation and smooth muscle contraction
5-HT 2B	Found on human heart valves
5-HT 2C	Regulates appetite
5-HT 3	In GIT, CRTZ (vomiting, nausea)
5-HT 4	GIT (secretion and peristalsis)
5-HT 6	Limbic system
5-HT 7	Limbic system

Medication Choices

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- What is your goal?
 - Kennel stress, immediate welfare control
 - Short onset medication
 - Benzodiazepines
 - Trazodone
 - Clonidine
 - Gabapentin

Medication Choices

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- What is your goal?
 - Anticipate long term management of behavior disorder
 - Separation anxiety
 - Generalized anxiety
 - Significant/ frequent fears
 - Compulsive disorders
 - Pet with anticipated long term stay
 - Longer term chronic daily dosing might be appropriate
 - SSRIs
 - TCAs
 - Azapirones

Medication Choices

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- Administration requirements
- Frequency
 - Does the organization have the manpower to medicate multiple times per day?
 - Lower frequency, better compliance
- Route- Most are oral
 - Mix in food, pill pockets, peanut butter, etc.
- Difficulty administering
 - Aggressive, fearful animals
 - Level of stress of administration worth the benefit of medication?
 - Cats

Medication Choices

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- Cost, availability
 - Money and time most often limiting factors
 - Not for profit
 - Rely on donations, grants
- Abuse potential
 - If you are not there to monitor, manage, who is?
 - Staff, volunteer diversion risk

Medication Choices

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- Legal constraints
 - Rabies observation
 - Behavioral side effects mimic neurologic changes?
 - Court ordered holds
 - Requirement to hold "evidence" in manner to prevent deterioration
 - Physical health but also mental health
 - Long term holds
 - Welfare concerns
 - Discuss concerns with officers involved

Back to the Medications...

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- Fast acting Short term medications



Medication Choices- Dogs

31 Fast acting- immediate stress and anxiety control				
Drug Class	Drug Name	Dose	Side Effects	Schedule
Benzodiazepine (GABA)	Clonazepam (Klonopin®)	0.1-1 mg/kg	Sedation, hypotension at high doses	PO PRN or q 8-12 hrs
Benzodiazepine (GABA)	Alprazolam (Xanax®)	0.01-0.1 mg/kg	Paradoxical excitation	PO PRN or q 8-12 hrs
Serotonin Antagonist and Reuptake Inhibitor (SARI)	Trazodone (Desyrel®)	2-10 mg/kg Maximum 300 mg per dose*	Sedation, GIT side effects especially with initial doses	PO PRN or q 8-12 hrs

Medication Choices- Dogs

32 Fast acting- immediate stress and anxiety control				
Drug Class	Drug Name	Dose	Side Effects	Schedule
α ₂ Adrenergic Agonist	Clonidine	0.01-0.05 mg/kg	Sedation, hypotension at high doses	PO PRN or q 6-8 hrs
Anticonvulsant/Neuropathic analgesic	Gabapentin (Neurontin®) * Not liquid	10-30 mg/kg	Sedation, ataxia	PO PRN or q 8-12 hrs
Phenothiazine (Dopamine, others)	Acepromazine	0.1-2.2 mg/kg	Tranquilizer, not an anti-anxiety agent	PO PRN

Medication Choices- Dogs

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- Medications
 - Phenothiazine
 - Acepromazine
 - Tranquilizer
 - Little to no anxiolytic effect
 - Can increase sensitivity to noise
 - **Inappropriate to use alone to manage noise aversions or in any environment where noise might be a problem**

Overall, K. 2013

Medication Choices- Cats

34 Fast acting- immediate stress and anxiety control				
Drug Class	Drug Name	Dose	Side Effects	Schedule
Benzodiazepine	Lorazepam (Ativan®)	0.025 – 0.08 mg/kg OR ¼ to ½ of 0.5 mg tablet (0.125-0.25 mg/ CAT)	Sedation, ataxia, hypotension at high doses	PRN or q 8-24 hrs
Benzodiazepine	Alprazolam (Xanax®)	0.01-0.1 mg/kg OR 0.125-0.25 mg/ CAT	Paradoxical excitation, behavioral disinhibition	PRN or q 8-24 hrs

Medication Choices- Cats

35 Fast acting- immediate stress and anxiety control				
Drug Class	Drug Name	Dose	Side Effects	Schedule
Anticonvulsant/Neuropathic analgesic	Gabapentin (Neurontin®)	5-20 mg/kg OR 50-100 mg/ CAT to facilitate handling	Sedation, ataxia; Human liquid contains xylitol	PO PRN or q 8-12 hrs (open capsule, mix with food) (Min 2+ hrs prior to effect)
Serotonin Antagonist and Reuptake Inhibitor (SARI)	Trazodone (Desyrel®)	12.5-100 mg/ CAT	Sedation, GIT side effects especially with initial doses	PO PRN or q 12 hrs (Min 2+ hrs prior to effect)

Medication Choices- Cats

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- Medications
 - Benzodiazepines
 - Diazepam (Valium®)
 - Case reports of fatal idiosyncratic hepatic necrosis after oral dosing
 - Clinical signs occur 5-11 days after beginning oral therapy
 - Anorexia, lethargy, vomiting, increased ALT/AST, hyperbilirubinemia
 - **Recc. baseline liver values prior to starting and repeated ~ 5 days after chronic dosing**

Center et al. JAVMA 1996

Longer Term Chronic Medications

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Antidepressants



Serotonin Syndrome

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- Concentration of serotonin too high, reach toxic levels
 - ▣ Nausea, confusion, agitation, muscle rigidity, tremors, salivation, hyperthermia
 - ▣ May lead to seizures, coma and death
- Occur when combine MAOI and another antidepressant (usually TCA or SSRI) concurrently
 - ▣ Inhibition of NT degradation coupled with reuptake inhibition

Serotonin Syndrome

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- Occur with other combinations as well
 - ▣ Multiple MAOIs
 - Amitraz- Mitaban, Preventic collars, Promeris, Certifact
 - ▣ Diets high in tryptophan (5-HT precursor)
 - ▣ OTC herbal supplements
 - St. John's Wort (act as MAOI or broad spectrum reuptake inhibitor) (Schwartz 2005)
 - Griffonia seed extract (5-HTP)
 - ▣ Other serotonergic medications
 - Trazodone, tramadol- lower risk

Medication Choices- Dogs

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Longer Term Chronic Anxiety Control				
Drug Class	Drug Name	Dose	Side Effects	Schedule
Selective Serotonin Reuptake Inhibitor (SSRI)	Fluoxetine (Reconcile, Prozac®)	1-2 mg/kg	Sleepiness or irritability, inappetence	PO q 24 hrs
Selective Serotonin Reuptake Inhibitor (SSRI)	Sertraline (Zoloft®)	1-4 mg/kg	Mild GIT side effects	PO q 24 hrs or divided q 12 hrs

Medication Choices- Dogs

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Longer Term Chronic Anxiety Control				
Drug Class	Drug Name	Dose	Side Effects	Schedule
Tricyclic Antidepressant (NE, 5-HT, α1, others)	Clomipramine (Clomicalm, Anafranil®)	2-4 mg/kg q 24h or 1-3 mg/kg q12h	Vomiting (give with food), sleepiness, anticholinergic effects	PO q 12 or 24 hrs (see dose)
Azapirone Anxiolytic (5-HT 1A)	Buspirone (Buspar®)	0.5-2 mg/kg	Side effects uncommon	PO q 8-12 hrs

Antidepressants- TCA's

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□ **Table 11.1**

Acute *in vitro* biochemical activity of selected tricyclic antidepressants

TCA	NE	5-HT	α-1	α-2	H1	Muscarinic
Amitriptyline	+/-	++	+++	+/-	++++	++++
Clomipramine	+	+++	++	0	+	++
Desipramine	+++	0	+	0	0	+
Doxepin	++	+	++	0	+++	++
Imipramine	+	+	+++	0	+	++
Nortriptyline	++	+/-	+	0	+	++

Source: Potter 1984; Potter et al. 1991; Richelson and Nelson 1984a; Richelson and Pfenning 1984b; Potter et al. 1995.

Crowell-Davis, Murray 2006

Medication Choices- Cats

43 Longer Term Chronic Anxiety Control				
Drug Class	Drug Name	Dose	Side Effects	Schedule
Selective Serotonin Reuptake Inhibitor (SSRI)	Fluoxetine (Prozac®)	0.5-1 mg/kg	Sleepiness or irritability, inappetence	PO q 24 hrs
Selective Serotonin Reuptake Inhibitor (SSRI)	Paroxetine (Paxil®)	0.25-1 mg/kg	Mild GIT side effects-watch inappetence, constipation	PO q 24 hrs
Azapirone Antidepressant	Buspirone (Buspar®)	0.5-1 mg/kg OR 2.5-7.5 mg/ CAT	Side effects uncommon; increased assertiveness, friendliness	PO q12-24 hrs

Outline

- When to prescribe
- Monitoring
- Medication choices
- **Outcome considerations**
- Case examples

Myths About Behavior Medication

- “It’s just going to drug my dog.”
 - ...sedate my dog...
 - ...mask the symptoms...
- “It’s going to change his personality.”
- “He’s going to become addicted.”
- “It will decrease his adoptability.”

Outcome Considerations

- Post-outcome plan
 - Who does adoption counseling/ advises next group of situation?
 - Requirements might vary from state to state
 - Management/ education plan to go with dog
 - Full disclosure a requirement
 - Give recommendation for who the next group should follow up with
 - Veterinarian, you, qualified training group

Adoption vs. Transfer

- Adoption
- New owner educated about medication
 - Goals, how to give, what to watch for, who to follow up with
- Plan for continuation or weaning
 - Importance of compliance
 - Discussion of risk of stopping medication abruptly
- Wean before adoption?

Adoption vs. Transfer

- Transfer to another organization
 - Shelter, rescue group, foster
- Organization’s philosophy/ policies on behavioral medications
- Plan for continuation or weaning
 - Discussion of risk of stopping medication abruptly
- Wean before transfer?

Conclusions

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- Several uses for behavior medications in shelter medicine
- Need to consider treatment goals, risk assessment, quality of life, shelter's resources and shelter's community before deciding to add behavior medication to treatment/ management plan
- Special consideration to different aspects of medications for use in shelter
 - Cost & availability, frequency & route of dosing, time to effect, abuse potential
- Need to have a plan for monitoring, follow up, and post-outcome management

Thank You for Your Time!

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Case Examples...

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Teddy

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- Signalment: 8 mo old M(I) German Shepherd Dog
 - 60 lb/ 27.3 kg, BCS: 4/9
- Medical history
 - Very thin, diarrhea
 - Housed at animal hospital prior to foster
 - EPI ruled out
 - Tylan powder 1/8 tsp PO q 12 hrs
- Behavioral history
 - Obtained by breed rescue 6-8 weeks ago from municipal animal control
 - Stray
 - Was noted to chase his tail while at animal control and animal hospital



Teddy

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- What do you think is going on with Teddy?
 - Differential diagnosis
 - Displacement/ stereotypic behavior due to Kennel stress
 - Compulsive disorder
 - Neurologic- atypical seizure disorder
 - Other medical? Anal glands, parasites, perianal fistulas
 - What the rescue thought
 - Kennel stress

Teddy

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- Where I came in...
 - 4 weeks after placement in foster home
 - Chase tail any time highly aroused-
 - At dog park before gets tennis ball
 - When tennis ball taken away
 - In the car
 - Any time goes into the bathroom (Teddy loves a bath)
 - In the exam room
 - Many times, with mouth wide open!

Teddy

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- Where I came in...
 - ▣ If not interrupted, do this indefinitely
 - ▣ Turn in both directions
 - ▣ Has caught tail but not injured it yet
 - ▣ Growl and snarl if other dog barks at him or someone reaches in to stop him
 - ▣ Ran into objects, animals and people while doing this, injuring his face

Teddy

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- Additional behavior history
 - ▣ Does not chase tail in crate
 - ▣ Teddy also constantly needs his tennis ball
 - Taking it away will trigger tail chasing
 - Will search for it once taken away
 - ▣ Will also weave back and forth in the curtains (trancing)
 - Foster feels that this is consistent with Teddy wanting to go outside

Teddy

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- Now what do you think?
- What I thought
 - ▣ Compulsive disorder
 - Did not resolve once out of stressful situation and medical treatment implemented
 - Triggered by high arousal- excitement, frustration, anxiety
 - Difficult to interrupt
 - Both directions
 - Other comorbid compulsive behaviors
 - ▣ tennis ball searching, trancing

Teddy

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- Treatment
 - ▣ Fluoxetine 20 mg- 2 PO q 24 hrs
 - ▣ Discontinue punishment and aversives
 - ▣ Consistent routine and interactions
 - ▣ Foundation training- alternate behaviors
 - Hand targeting, relax on mat
 - ▣ Response substitution
- Outcome
 - ▣ Diarrhea resolved
 - ▣ Tail chasing improved 70%
 - ▣ Adopted to new home
 - Experience with GSDs
 - Comfortable managing his behavior and medications

Conclusions

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- Special consideration to different aspects of medications for use in shelter
 - ▣ Cost & availability, frequency & route of dosing, time to effect, abuse potential
- Need to have a plan for monitoring, follow up, and post-outcome management

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