

Teaching Spectrum of Care Case Management



Instruction in spectrum of care (SOC) case management can be integrated in veterinary curricula through lectures, seminars, laboratory sessions, case-based learning, and clinical rotations. This section features case management examples developed by primary care educators. It also features a selection of additional resources for teaching SOC case management. The case examples introduce students to an SOC approach for managing surgical and nonsurgical diagnoses, regardless of the instructor's familiarity with SOC practice. Cases developed for this guide are accompanied by examples of assessments and learning experiences that instructors can consider using to develop the specific knowledge and skills that students need to manage each case.

The diagnoses for the developed cases were selected based on the most common canine diagnoses reported by nonacademic primary care practitioners across the United States serving a socioeconomically diverse clientele. For each diagnosis, these practitioners also provided input on care options for clients with different budgets and the skills that students should learn to provide those care options. Primary care educators used this information when developing SOC case management examples. The range of care options and references for each case were reviewed by specialists from the appropriate specialty familiar with SOC practice.

Featured Resources

Canine recurrent/chronic otitis externa

By Lindsey Harland, Tara Paterson, Rebecca Ruch-Gallie, and Michelle Wisecup

Care options and references reviewed by Paul Bloom

Canine parvovirus

By Elizabeth E. Alvarez, Lauren A. Bernstein, Elizabeth Montgomery, Tara Paterson, and Michelle Wisecup

Care options and references reviewed by Erin Lashnits

Canine pyometra

By Elizabeth E. Alvarez, Lauren A. Bernstein, Elizabeth Montgomery, Tara Paterson, and Michelle Wisecup

Care options and references reviewed by Emily McCobb

Canine foreign body ingestion +/- acute gastrointestinal obstruction

By Melanie Blevins, Joyce Carnevale, Kathryn Kuehl, and Gene Pavlovsky

Care options and references reviewed by Erin Gibson

A selection of additional resources for teaching SOC case management

Teaching Spectrum of Care Case Management: Canine Recurrent/Chronic Otitis Externa



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Care options and references reviewed by
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Component 1: A learning objective aligned with competencies in the Spectrum of Care (SOC) Education Model

Learning objective: Managing a canine patient with recurrent/chronic otitis externa (OE).

Alignment with competencies in the SOC Education Model:

- *SOC Subcompetency 1.3.5.* Integrates information about the patient with client circumstances to identify a range of appropriate care options and to adjust the care plan.
- *SOC Subcompetency 1.4.4.* Offers a range of care options that are tailored to the unique circumstances of each patient and client.
- *SOC Subcompetency 1.4.5.* Facilitates client decision-making regarding care by presenting the costs, risks, benefits, and evidence-base of care options.
- *SOC Subcompetency 7.3.4.* Acknowledges and considers the context of previous care decisions made by colleagues and clients.
- *SOC Subcompetency 7.3.5.* Reflects on one's own professional identity in relation to providing a spectrum of care.
- *SOC Subcompetency 7.4.4.* Pursues opportunities to expand skill set to offer a broader range of care options.
- *SOC Subcompetency 8.1.4.* Provides a range of care and payment options in a manner that fosters financial viability of the practice and a positive working environment.

Component 2: The range of care options identified by primary care educators and practitioners

There are multiple care options for *managing a canine patient with recurrent/chronic otitis externa (OE)*. Funds are prioritized for managing pain, inflammation and treating secondary infection while attempting to address underlying etiology. The care options are described in detail below and then summarized in **Table 1**. A flowchart depicting the decision-making process for managing the case is presented in **Figure 1**. Students can develop the knowledge and skills to identify, communicate, and perform these care options (Component 4) via the learning experiences in Component 5.

Please Note:

- The care options below are **NOT** intended to be comprehensive, both in terms of capturing all the options and all the components of the options. Instead, the care options focus on the main components of care options that a student is expected to consider and be able to communicate and perform in their practice.
- When using these case management materials, educators should emphasize for students the importance of clinical reasoning and reassessment with adjustment of care options.
- The primary care educators and practitioners working on this project come from different geographic regions, which means that the specific costs for care options vary. Therefore, the care options presented here are organized into three budget categories rather than by specific dollar amounts.

FOR ALL CARE OPTIONS:

- **Consultation:** Use part of the budget to cover the veterinary consultation. This includes communicating with the owner to obtain a thorough dermatological history, including identifying previous therapies, previous skin problems, dietary trials, and additional factors beyond financial constraints that may affect care options (such as patient temperament, client ability to medicate, and severe stenosis). A comprehensive physical exam would be performed.

- **Treatment:** Compounded topical therapies can be considered which may allow for improved antimicrobial stewardship, however, local regulations must be considered.
- **Note:** Primary factors underlie cases of recurrent otitis externa. Identification and management of underlying conditions which contribute is always indicated (Ngo et al., 2018; O'Neill et al., 2021; Saridomichelakis et al., 2007) but may not be possible in all cases based on financial constraints and logistics.
- **Additional considerations for all care options:** Humane euthanasia may be the best option depending on the patient's condition, comorbidities, and client circumstances. This option was identified by both educators and practitioners.

CARE OPTION 1 (LOW BUDGET):

Diagnosics:

- Otoscope examination of the ear canal where possible.
- Ear cytology, if budget allows.

Treatment:

- Short course of oral glucocorticoids to address pain and inflammation to make cleaning and examination of ear better tolerated by patient. This may be required prior to definitive topical medication.
- Topical ear cleaners containing ingredients like TrizEDTA, chlorhexidine or salicylic acid to help remove debris, control bacterial and fungal growth, and may increase efficacy of topical antibiotics in some cases (Buckley et al., 2013). Cleaner alone may be appropriate therapy to prevent or clear mild secondary infections in some patients (Fregeneda-Grandes et al., 2020; Moog et al., 2022; Mueller et al., 2023).
- Topical ear medications containing anti-inflammatory (steroid) and/or antibiotics and/or antifungal agents to address secondary infections and inflammation if appropriate based on physical exam findings and cytology (if performed).
- Client education and demonstration of correct application of treatments and discussion of patient tolerance will impact treatment success/failure and ongoing management needs to prevent recurrence.
- One of the most common causes for recurrent otitis externa is incomplete resolution so emphasize the importance for recheck appointments when possible.

Additional considerations for Care Option 1: Identification and management of the underlying etiology of otitis externa may be limited due to budgetary constraints. Nevertheless, discussion of the predisposing, primary, and perpetuating factors is important and the likelihood of recurrence when these factors are not addressed must be emphasized. Consider long-term low-dose steroid therapy (ideally topical) for management of suspected allergy.

CARE OPTION 2 (MODERATE BUDGET):

Diagnosics:

- Otoscopic examination of the ear canal where possible.
- Ear cytology.
- Culture and sensitivity may be helpful where precise identification is needed to select appropriate therapy (Nuttall, 2023).

Treatment:

- Short course of oral glucocorticoids to address pain and inflammation to make cleaning and examination of ear better tolerated by patient. This may be required prior to definitive topical medication.
- Topical ear cleaners containing ingredients like TrizEDTA, chlorhexidine or salicylic acid to help remove debris, control bacterial and fungal growth, and may increase efficacy of topical antibiotics in some cases (Buckley et al., 2013). Cleaner alone may be appropriate therapy to prevent or clear mild secondary infections in some patients (Fregeneda-Grandes et al., 2020; Moog et al., 2022; Mueller et al., 2023).
- Topical ear medications containing anti-inflammatory (steroid) and/or antibiotics and/or antifungal agents to address infection and inflammation if appropriate based on physical exam and results of cytology. Culture may be helpful where precise identification is needed to select appropriate therapy (Nuttall, 2023).
- Client education and demonstration of correct application of treatments and discussion of patient tolerance will impact treatment success/failure and ongoing management needs to prevent recurrence.
- One of the most common causes for recurrent otitis externa is incomplete resolution so emphasize the importance for recheck appointments to be scheduled until complete resolution when possible.
- If infection is severe, involving deeper anatomical structures, or if anatomical abnormalities preclude topical treatments reaching target sites, oral antibiotics or antifungal medications may be prescribed (with limited efficacy).
- Sedated ear cleaning can be considered.
- Optional: Early referral to a veterinary dermatologist for further evaluation and management can have cost savings (Logas & Maxwell, 2021).
- In cases of end-stage ear disease or other patient/client barriers to effective treatment, surgical intervention such as lateral ear canal resection or total ear canal ablation and lateral bulla osteotomy (TECA-BO) may be considered as a salvage procedure (Doyle et al., 2004). While surgery can be expensive, the cost may be lower if performed by primary care surgeons. Surgery may be considered earlier for moderate budgets than high budgets due to funding restrictions.

Additional considerations for Care Option 2: Discussion of the predisposing, primary, and perpetuating factors is important to reduce the likelihood of recurrence. Consider initiating work-up for allergies based on client's budget- at a moderate budget level this is likely to represent diet trials and steroids. Consideration may be made for more costly anti-inflammatory/antipruritic medications such as cyclosporine, oclacitinib, and/or lokivetmab depending on case presentation.

CARE OPTION 3 (HIGH BUDGET):

Diagnostics:

- Ooscopic examination of the ear canal where possible.
- Ear cytology.
- Culture and sensitivity may be helpful where precise identification is needed to select appropriate therapy (Nuttall, 2023).
- Deep ear flushing under general anesthesia where needed for removal of excess debris and thorough evaluation of ear canals and integrity of tympanic membrane +/- myringotomy, if indicated.
- Advanced imaging, if indicated.

Treatment:

- Short course of oral glucocorticoids to address pain and inflammation to make cleaning and examination of ear better tolerated by patient. This may be required prior to definitive topical medication.
- Topical ear cleaners containing ingredients like TrizEDTA, chlorhexidine or salicylic acid to help remove debris, control bacterial and fungal growth, and may increase efficacy of topical antibiotics in some cases (Buckley et al., 2013). Cleaner alone may be appropriate therapy to prevent or clear mild secondary infections in some patients (Fregeneda-Grandes et al., 2020; Moog et al., 2022; Mueller et al., 2023).

- Topical ear medications containing anti-inflammatory (steroid) and/or antibiotics and/or antifungal agents to address infection and inflammation if appropriate based on results of cytology. Culture may be helpful where precise identification is needed to select appropriate therapy (Nuttall, 2023).
- Deep ear flush under general anesthesia +/- myringotomy, if indicated.
- Customized treatment plan based on diagnostic testing, concurrent conditions (e.g. allergies), and other case factors.
- Early referral to a veterinary dermatologist for further evaluation and management can have cost savings (Logas & Maxwell, 2021).
- Regular follow-up appointments for monitoring progress and adjusting treatment as necessary.
- Daily appointments to administer medication may be considered dependent on patient temperament and owner ability to medicate.
- In cases of end-stage ear disease or other patient/client barriers to effective treatment, surgical intervention such as lateral ear canal resection or total ear canal ablation and lateral bulla osteotomy (TECA-BO) may be considered as a salvage procedure (Doyle et al., 2004).

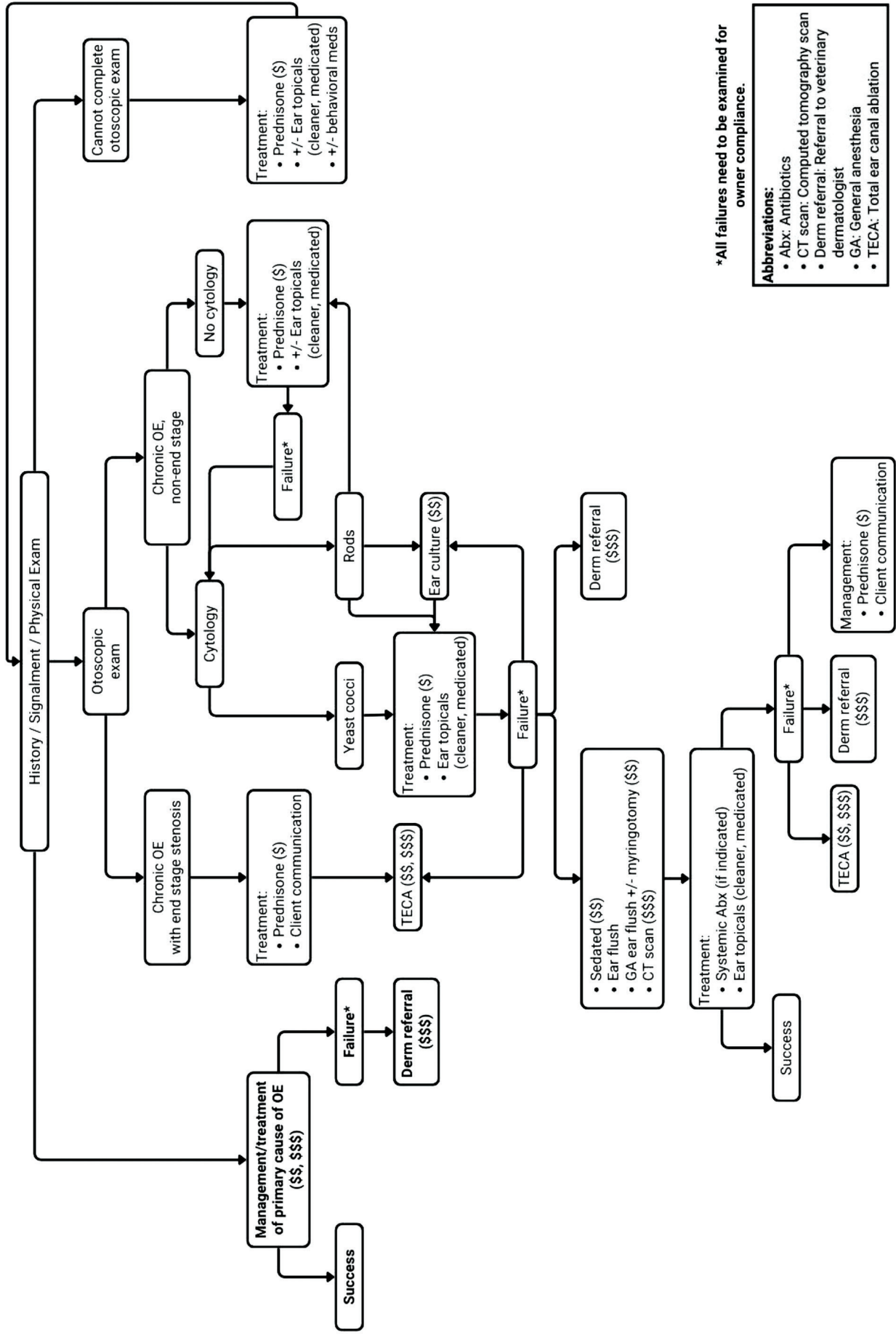
Additional considerations for Care Option 3: Discussion of the predisposing, primary, and perpetuating factors is important to reduce the likelihood of recurrence. Thorough work-up for underlying allergies should be pursued with symptomatic therapy as indicated. Early referral to a dermatologist has been associated with better patient outcomes, overall improved client satisfaction, and ultimate treatment cost savings (Hanna, 2022; Logas & Maxwell, 2021; Miller et al., 2023).

Table 1. Care options and prognoses based on budget for canine recurrent/chronic otitis externa.

	EUTHANASIA	LOW (\$)	MODERATE (\$\$)	HIGH (\$\$\$)
Diagnostics	NA	<ul style="list-style-type: none"> • Otoscopy • +/- Cytology 	<ul style="list-style-type: none"> • Otoscopy • Cytology • +/- C&S (if indicated) • +/- Food trial 	<ul style="list-style-type: none"> • Otoscopy • Cytology • C&S (if indicated) • Myringotomy (if indicated) • CT (if indicated) • Food trial • Intradermal allergy test • CBC/Chemistry • Thyroid panel
Treatment	NA	<ul style="list-style-type: none"> • Prednisone • Ear cleaner • Topical medication (antibacterial and/or antifungal) 	<ul style="list-style-type: none"> • Prednisone • Ear cleaner • Topical medication (antibacterial and/or antifungal) • +/- Systemic antimicrobial • +/- Sedated ear flush • +/- Referral to veterinary dermatologist • +/-Surgery* 	<ul style="list-style-type: none"> • Prednisone • Ear cleaner • Topical medication (antibacterial and/or antifungal) • +/- Systemic antimicrobial • Sedated ear flush • Deep ear flush (under GA) • Antipruritic medication (ocloclitinib, lokivetmab) for suspected cases of allergy • Referral to veterinary dermatologist • Surgery*
Prognosis	NA	Variable	Variable	Prognosis improved with effective management of the primary cause of otitis externa

*Surgery includes lateral ear canal resection or total ear canal ablation + bulla osteotomy (TECA-BO) which are reserved for cases of end-stage stenotic ear disease or in cases where patient/client barriers preclude successful treatment/management of disease.

Figure 1. Flowchart of care options and prognoses with cost annotations for canine recurrent/chronic otitis externa.



*All failures need to be examined for owner compliance.

- Abbreviations:**
- Abx: Antibiotics
 - CT scan: Computed tomography scan
 - Derm referral: Referral to veterinary dermatologist
 - GA: General anesthesia
 - TECA: Total ear canal ablation

Component 3: References to research literature that provides evidence for the care options

Buckley, L. M., McEwan, N. A., & Nuttall, T. (2013). Tris-EDTA significantly enhances antibiotic efficacy against multidrug-resistant *Pseudomonas aeruginosa* in vitro. *Veterinary Dermatology*, 24(5), 519–e122. <https://doi.org/10.1111/vde.12071>

Doyle, R. S., Skelly, C., & Bellenger, C. R. (2004). Surgical management of 43 cases of chronic otitis externa in the dog. *Irish Veterinary Journal*, 57(1), 22–30. <https://doi.org/10.1186/2046-0481-57-1-22>

Fregeneda-Grandes, J. M., Nicolás-González, J. J., Rejas-López, J., & Carvajal-Urueña, A. (2020). Preliminary evaluation of two commercial ear solutions in the treatment of canine otitis externa. *Journal of Small Animal Practice*, 61(9), 547–553. <https://doi.org/10.1111/jsap.13177>

Hanna, B. (2022, May 18). *Earlier dermatology referral rewards primary care practice (part 1): Easing client expenses and enhancing patient care*. dvm360. <https://www.dvm360.com/view/earlier-dermatology-referral-rewards-primary-care-practice-part-1-easing-client-expenses-and-enhancing-patient-care>

Logas, D., Maxwell, E. A. (2021). Collaborative care improves treatment outcomes for dogs with chronic otitis externa: A collaborative care coalition study. *Journal of the American Animal Hospital Association*, 57(5), 212–216. <https://doi.org/10.5326/JAAHA-MS-7167>

Miller, J., Simpson, A., Bloom, P., Diesel, A., Friedeck, A., Paterson, T., Wisecup, M., & Yu, C. (2023). 2023 AAHA management of allergic skin diseases in dogs and cats guidelines. *Journal of the American Animal Hospital Association*, 59(6), 255–284. <https://doi.org/10.5326/JAAHA-MS-7396>

Moog, F., Miville, J., Brun, J., Dumitrache, M. O., Amalric, N., Lecru, L., Pressanti, C., Kondratjeva, J., Combarros, D., Fantini, O., & Cadiergues, M. C. (2022). Clinical and microbiological performances and effects on lipid and cytokine production of a ceruminolytic ear cleaner in canine erythematous-ceruminous otitis externa. *Veterinary Sciences*, 9(4), 185. <https://doi.org/10.3390/vetsci9040185>

Mueller, R. S., Baumann, K. N., Boehm, T., Dörfelt, S., Kasper, B., & Udraitė-Vovk, L. (2023). Evaluation of hypochlorous acid as an ear flush in dogs with chronic otitis externa. *Veterinary Dermatology*, 34(2), 134–141. <https://doi.org/10.1111/vde.13142>

Ngo, J., Taminau, B., Fall, P. A., Daube, G., & Fontaine, J. (2018). Ear canal microbiota – a comparison between healthy dogs and atopic dogs without clinical signs of otitis externa. *Veterinary Dermatology*, 29(5), 425–e140. <https://doi.org/10.1111/vde.12674>

Nuttall, T. (2023). Managing recurrent otitis externa in dogs: What have we learned and what can we do better? *Journal of the American Veterinary Medical Association*, 261(S1), S10–S22. <https://doi.org/10.2460/javma.23.01.0002>

O'Neill, D. G., Volk, A. V., Soares, T., Church, D. B., Brodbelt, D. C., & Pegram C. (2021). Frequency and predisposing factors for canine otitis externa in the UK - a primary veterinary care epidemiological view. *Canine Medicine and Genetics*, 8(1), 7. <https://doi.org/10.1186/s40575-021-00106-1>

Saridomichelakis, M. N., Farmaki, R., Leontides, L. S., & Koutinas, A. F. (2007). Aetiology of canine otitis externa: A retrospective study of 100 cases. *Veterinary Dermatology*, 18(5), 341–347. <https://doi.org/10.1111/j.1365-3164.2007.00619.x>

Component 4: Examples of specific case management knowledge and skills students need to develop to identify, communicate, and provide the care options (identified by both primary care educators and practitioners)

KNOWLEDGE AND CLINICAL REASONING SKILLS

1. Utilize knowledge of the pathophysiology and clinical signs of otitis externa and synthesize pertinent details from the history and physical exam parameters to develop a working diagnosis.
2. Select and interpret appropriate diagnostic tests for cases of recurrent otitis externa, including a diagnostic plan for suspected cases of allergy, while considering patient, client, clinic, and clinician factors and resources.
3. Use evidence-based knowledge to establish an appropriate treatment plan considering patient, client, clinic, and clinician factors and resources, and demonstrate the ability to recognize changes in patient status and adapt accordingly. Recognize when referral to a veterinary dermatologist is appropriate.
4. Identify financial support options/resources available to clients and clinics locally, regionally, and nationally when clients have very limited finances.
5. Recognize the 3Ps of otitis externa (predisposing, primary, and perpetuating factors) and synthesize the pertinent information from the history and physical exam to identify these factors.

PROFESSIONAL / COMMUNICATION SKILLS

1. Effectively communicate with clients about the pros and cons of each diagnostic and treatment option and their associated costs, and demonstrate regard for clients' factors, budget, and resources.
2. Demonstrate empathy and compassion when communicating with clients, including when euthanasia is most appropriate for the family's and pet's circumstances.
3. Consider the impact of treatment options while balancing the overall business profitability, availability of staff and doctors, and overall client satisfaction.
4. Thoroughly document all communications with the client, including diagnostic and treatment options, potential risks, and known client barriers. Include use of against medical advice (AMA) forms if indicated.
5. Educate clients on the importance of identifying and treating/managing primary causes of otitis externa to minimize the risk of recurrence and on the importance of appropriate techniques for medicating and treating the ears.

CLINICAL SKILLS

1. Demonstrate proficiency in obtaining a history and performing a thorough physical examination to identify clinical signs of otitis externa.
2. Interpret relevant diagnostics (ear cytology, culture & susceptibility, advanced diagnostic imaging where appropriate).
3. Perform an otoscopic examination of the ear, including assessment of tympanic membrane integrity.
4. Collect samples from the ear and prepare samples for microscopic evaluation. Identify common pathogens infecting the ear.
5. Utilize applied medical math for calculation of systemic medication dosages.
6. Demonstrate effective ear cleaning in a non-sedated patient, and safely perform a deep ear flush and otoscopic exam on a patient under general anesthesia.

Component 5: Examples of assessments and learning experiences that educators can use to develop the case management knowledge and skills that students need to provide the care options

LEARNING EXPERIENCES	ASSESSMENTS	
<p>Didactic (Lectures and Seminars)</p>	<p>Veterinary students attend lectures and seminars covering the pathogenesis, presentation and treatment of acute and chronic otitis and related topics such as allergic skin disease and microbiology. These sessions provide foundational knowledge about the factors that can predispose, cause and perpetuate otitis and their diagnosis, management and/or treatment. They also cover secondary pathogens and their effective diagnosis and treatment, as well as considerations regarding antimicrobial stewardship and surgical management of end-stage disease.</p>	<p>Consider use of formative and/or summative assessment to gauge understanding of key concepts. Specific assessment tools should be at the educator’s discretion based on the case’s intent.</p>
<p>Laboratory Sessions (Clinical & Communication Skills)</p>	<p>Hands-on laboratory sessions allow students to practice clinical and communication skills related to evaluating patients with otitis externa, including physical examination techniques, otoscopy, microscopy/cytology, taking a detailed history, and dealing with difficult conversations.</p>	<p>Consider use of formative and/or summative assessment to assess proficiency in performing clinical skills relevant to the case. These could include in-the-moment feedback and/or an objective structured clinical exam (OSCE). Mock interviews could be considered for assessment of communication skills. Specific assessment tools should be at the instructor’s discretion based on the case’s intent.</p>
<p>Case-Based Learning</p>	<p>Case-based learning exercises present students with clinical scenarios involving dogs presenting with chronic/recurrent otitis externa (see Box 1 for example clinical scenario). Students analyze patient history, clinical signs, and diagnostic results to develop differential diagnoses and treatment plans under the guidance of faculty members. Students work together to critically evaluate clinical cases, research relevant literature, and develop evidence-based treatment plans.</p>	<p>Consider use of formative and/or summative assessment to assess proficiency in clinical reasoning. Consider the use of exams, written assignments, or case presentations. Specific assessment tools should be at the instructor’s discretion based on the case’s intent.</p>
<p>Clinical Rotations</p>	<p>Clinical rotations in community practice/primary care and dermatology allow students to observe and participate in the initial consultation, diagnosis and ongoing case management of patients with chronic/recurrent otitis externa under the supervision of experienced clinicians. Students learn to perform physical examinations, perform and interpret diagnostic tests, formulate treatment plans, and provide client communication and support.</p>	<p>Consider use of formative and/or summative assessment to evaluate student’s ability to integrate clinical reasoning, communication and clinical skills, and ability to collaborate within the veterinary team. Use of direct observation of procedural skills (DOPS) would be applicable in this context. Specific assessment tools should be at the instructor’s discretion based on the case’s intent.</p>

Box 1. Example clinical scenario for teaching case management for canine recurrent/chronic otitis externa.

Mrs. Martin called earlier today requesting a refill on antibiotics prescribed 3 months prior for an ear infection. Given the time lapse, it was necessary to see Diesel again to reassess his condition.

Signalment: Diesel, a 4-year-old, male castrated, Staffordshire terrier

History: Three months ago, Diesel presented with a history of itchy ears, thinning hair and reddened skin, salivary staining on his feet and perianal region, and anal sacculitis. At that visit, allergies (food vs. atopy) and weight management were discussed with the client, and an estimate for a full dermatologic workup, including a CBC, chemistry panel, thyroid panel and fungal culture was provided.

The client declined everything but cytology of ears and skin:

- Ears: 3+ cocci bilaterally, neutrophils present.
- Skin: 2-3+ cocci, neutrophils present with intracellular cocci.

At that time, Diesel's infections were treated as follows. Mrs. Martin reports he did well following treatment:

- Otomax ointment (steroid + antibiotic + antifungal): Apply small amount between toes & on bottom of feet. Place 6-8 drops AU every 12 hours for 10 days.
- Cephalexin (oral antibiotic) 500 mg #84: Give 2 capsules PO every 12 hours for 21 days.
- Prednisone (oral steroid) 20 mg tab #8: Give 1 tab PO every 24 hours for 4 days, then ½ tab every 24 hours for 4 days, then ½ tab every other day for 8 days. Give with food.
- Chlorpheniramine (antihistamine) 4 mg tabs: Give 3 tabs PO every 8-12 hours OR Benadryl (antihistamine) 25 mg tab: Give 3 to 4 tabs PO every 8 hours.
- Client declined topical therapy due to lack of ability to apply to ears.

Today's Physical Exam Findings:

- Ears: Mild to moderate erythema of inner pinna with a moderate amount of tan-brown debris AU. Otoscopy revealed mild to moderate inflammation in both vertical & horizontal ear canals and mild "cobblestone" appearance of the canal walls AU. Integrity of the tympanic membrane could not be assessed AU due to the presence of debris. Patient was uncomfortable during otoscopy but tolerated it sufficiently for a brief exam. During the visit, he was shaking his head frequently.
- Skin: Mild erythema noted in the axilla and inguinal regions bilaterally. Mild interdigital erythema affecting all paws with ongoing salivary staining (improved since last visit). Ongoing, mild erythema in perianal region. Hair coat is unremarkable – previous areas of alopecia resolved.
- Eyes: mild mucoid ocular discharge OU.
- Physical exam otherwise normal

RECOMMENDED CITATION

Harland, L., Paterson, T., Ruch-Gallie, R., & Wisecup, M. (2024). Teaching spectrum of care case management: Canine recurrent/chronic otitis externa. In AAVMC Spectrum of Care Initiative Task Force, H. N. Fedesco, & J. E. Brodsky (Eds.), *Enhancing spectrum of care preparation in veterinary education programs: An implementation strategies guide* (pp. 103–111). American Association of Veterinary Medical Colleges. <https://doi.org/10.17605/OSF.IO/AHWQE>

Teaching Spectrum of Care Case Management: Canine Parvovirus



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Component 1: A learning objective aligned with competencies in the Spectrum of Care (SOC) Education Model

Learning objective: Managing a stable canine patient with vomiting and diarrhea and case history consistent with parvovirus.

Alignment with competencies in the SOC Education Model:

- *SOC Subcompetency 1.3.5.* Integrates information about the patient with client circumstances to identify a range of appropriate care options and to adjust the care plan.
- *SOC Subcompetency 1.4.4.* Offers a range of care options that are tailored to the unique circumstances of each patient and client.
- *SOC Subcompetency 1.4.5.* Facilitates client decision-making regarding care by presenting the costs, risks, benefits, and evidence-base of care options.
- *SOC Subcompetency 3.1.5.* Provides a range of appropriate care options for animal populations that consider animal welfare, lifestyle, economics, societal interests (e.g., food animal industry, animal activism) and public and environmental health concerns.
- *SOC Subcompetency 8.1.4.* Provides a range of care and payment options in a manner that fosters financial viability of the practice and a positive working environment.

Component 2: The range of care options identified by primary care educators and practitioners

There are multiple care options for *managing a stable canine patient with vomiting and diarrhea and case history consistent with parvovirus infection*. The care options are described in detail below and then summarized in **Table 1**. Students can develop the knowledge and skills to identify, communicate, and perform these care options (Component 4) via the learning experiences in Component 5.

Please Note:

- The care options below are **NOT** intended to be comprehensive, both in terms of capturing all the options and all the components of the options. There are many subtleties in deciding when to use which diagnostic tools and when to consider empirical treatment over additional diagnostics. Instead, the care options below focus on the main components of care that a student is expected to consider and be able to communicate and perform in their practice.
- When using these case management materials, educators should emphasize for students the importance of clinical reasoning and reassessment with adjustment of care options.
- The primary care educators and practitioners working on this project come from different geographic regions, which means that the specific costs for care options vary. Therefore, the care options presented here are organized into three budget categories, rather than by specific dollar amount.

FOR ALL CARE OPTIONS:

- **Consultation:** Use part of the budget to cover the veterinary consultation. This includes communicating with the owner to obtain a thorough history and identifying factors that, in addition to financial constraints, may affect care options. These may include differences in understood and spoken languages between provider and owner, transportation/ability to return to clinic for follow ups, ability to administer a home care plan, and personal goals, preferences, or beliefs about care. Key historical information should include clinical signs (*duration and*

extent of diarrhea and vomiting episodes, patient appetite, etc.), vaccination status, potential exposure points, and signalment. A comprehensive physical exam would be performed.

- Recovered parvovirus dogs should have a parvovirus vaccine booster and other dogs in the litter and household should also be vaccinated.
- Despite initial recovery, a discussion with owners about the potential for chronic GI issues later in life is also recommended as it has been found that dogs that previously had parvo were significantly more likely to have reported chronic GI signs later in life (Kilian et al., 2018).
- Humane euthanasia may be the best option depending on the patient's condition, comorbidities, and client circumstances.
- Despite initial judgment on a client's ability (whether financial or otherwise) to pursue treatment, owners of any parvovirus infected patient should be advised of all options available, including to seek treatment at a local specialty or inpatient practice. If declined, the option of an outpatient treatment program may be discussed by clearly explaining the risks and benefits of each option below (i.e., with the Low Budget option, the risk of worsening disease or death is higher, but with the High Budget option, the risk of spending more money than you have is higher). Consider utilizing a spectrum of care diagnostic tool, such as the SCOPE tool, to help clarify client and patient contextual issues impacting the care plan (Hohenhaus & Provost, 2024). For example, would bringing a patient into the clinic for an outpatient protocol twice daily be more difficult (taking time off work, etc.) than inpatient care? Resources such as a waiver acknowledging that clients have been informed of these risks and wished to pursue a certain treatment anyways may be indicated.
- **For this case example, a stable** 16-week-old puppy presents after having diarrhea for 2-3 days and began vomiting this morning. On presentation, the puppy is quiet, alert and responsive, ambulatory, mildly to moderately dehydrated, normothermic, normotensive and tests **positive for parvovirus** on a point of care test. The patient in this case is deemed suitable for outpatient treatment.

CARE OPTION 1 (LOW BUDGET): SYMPTOMATIC TREATMENT AND MONITORING

Additional Diagnostics: If client has the financial resources, consider +/- blood glucose (BG), +/- blood smear evaluation (estimate WBC), +/- blood pressure, +/- PCV/TS, +/- fecal analysis vs. empirical deworming, depending on patient clinical signs and client goals. However, funds are primarily focused on the treatment.

Treatment:

- **Medical management:** In a stable patient (if isolated hospitalization is not feasible), outpatient medical management is warranted. Administer supportive care as indicated (e.g., subcutaneous fluids [SQ], injectable antibiotics, injectable antiemetics, etc.). Additionally, advise owners on the importance of hygiene, isolation and vaccination practices, as

well as feeding a highly digestible and low-fat diet (this may need to be syringe-fed depending on appetite).

- **Close monitoring:** Owner to monitor at home. Follow-up phone calls by the veterinary healthcare team are necessary to assess the dog's overall condition and response to supportive care. Recheck as needed, keeping the owner's availability and funds in consideration. Consider recheck consultation and treatment outdoors in a designated area or in the owner's vehicle if isolation is unavailable in clinic.
- **Special note:** Outpatient medical management resulted with 83% of parvo positive dogs surviving when outpatient treatment involved SQ fluids every 12 hours, SQ antibiotics, SQ antiemetics every 24 hours and oral electrolyte support (glucose, potassium, etc.) when indicated for an average of 3.8 days (+/- 2 days). When the clinic was closed, owners were taught how to give SQ fluids and SQ antiemetics at home until the clinic re-opened (Perley et al., 2020). This is based on the Colorado State University Outpatient Treatment Protocol for parvoviral gastroenteritis (Venn et al., 2017).

CARE OPTION 2 (MODERATE BUDGET): DAYTIME HOSPITALIZATION AND OUTPATIENT SYMPTOMATIC TREATMENT AND MONITORING

Additional Diagnostics: If the client has the financial resources, +/- blood pressure, +/- CBC, +/- chemistry profile, +/- fecal analysis vs. empirical deworming can be considered, however, funds are primarily focused on the treatment rather than diagnostics (Sarpong et al., 2017). See above for the most targeted, high yield diagnostic tests to consider.

Treatment:

- **Medical management:** Hospitalization in isolation (referral may be indicated), including a broader range of medications (e.g., injectable antibiotics, antiemetics, antacids, dextrose and/or electrolytes if indicated), more efficient rehydration (e.g., IV fluid therapy), and nutritional support (e.g., syringe feeding vs nasoesophageal [NE] or nasogastric [NG] feeding tube) as financial resources allow. At-home care requires continued supportive care, pending condition when discharged (see above for outpatient therapy) and consideration of continued oral medications and nutritional support (e.g., subcutaneous fluids, oral antibiotics, and oral antiemetics, highly digestible, low fat nutritional support, probiotics, etc.). Additionally, advise owner on continued isolation and vaccination practices to prevent spread to other dogs in the home or outside.
- **Close monitoring:** Owner to monitor at home. Follow-up phone calls by the veterinary healthcare team are necessary to assess the dog's overall condition and response to supportive care. Recheck as needed (including serial lab work as indicated) keeping the owner's availability and funds in consideration. Consider recheck consultation and treatment outdoors in a designated area or in the owner's vehicle if isolation is unavailable in clinic.

- **Special note:** Canine Parvovirus Monoclonal Antibody treatment may be indicated as studies have shown that it reduces mortality in parvo patients, but the cost may limit its use (Larson et al., 2024).

CARE OPTION 3 (HIGH BUDGET): INPATIENT HOSPITALIZATION (REFERRAL AND/OR MONITORED 24-HOUR CARE FACILITY)

Additional Diagnostics: If the client has the financial resources, include (in order of priority) bloodwork (CBC and Chemistry), blood pressure, abdominal radiographs and/or ultrasound (if intussusception is suspected), fecal analysis, and/or thoracic radiographs if indicated.

Treatment:

- **Medical management:** Comprehensive treatment while hospitalized in isolation (referral may be indicated), including a broader range of injectable medications (e.g., antibiotics, antiemetics, antacids, dextrose and/or electrolytes if indicated based on serial lab work), and more efficient rehydration (e.g., IV fluid therapy). Advanced nutritional support (e.g., NE or NG feeding tube) may be necessary. Use of Canine Parvovirus Monoclonal Antibody treatment and/or fecal microbiota transplant (via enema; Pereira et al., 2018) could be considered as financial resources allow.

- **Close monitoring:** Once patient has recovered and is discharged, ongoing monitoring and adjustment to therapeutic plan is essential. Recheck as needed keeping the owner’s availability and funds in consideration.
- **Special note:** Despite intensive therapy, survival is not guaranteed, and this should be communicated to the owner. Inpatient medical management resulted with 90% of parvo positive dogs surviving when inpatient treatment involved IV fluids, IV antibiotics, IV antiemetics and IV electrolyte support (glucose, potassium, etc.) when indicated for an average of 4.6 days (+/- 2 days; Venn et al., 2017).

Component 3: References to research literature that provides evidence for the care options

Hohenhaus, A. E., & Provost, D. C. (2023). A unique spectrum of care tool provides a self-regulated learning opportunity and facilitates client communication. *Journal of Veterinary Medical Education*, e20230144. <https://doi.org/10.3138/jvme-2023-0144>

Kilian, E., Suchodolski, J. S., Hartmann, K., Mueller, R. S., Wess, G., & Unterer, S. (2018). Long-term effects of canine parvovirus infection in dogs. *PLoS One*, 13(3), e0192198. <https://doi.org/10.1371/journal.pone.0192198>

Table 1. Care options and prognoses for canine parvovirus based on budget.

	EUTHANASIA	LOW (\$) (SIMPLE OUTPATIENT CARE)	MODERATE (\$\$) (MORE ADVANCED OUTPATIENT CARE AND DIAGNOSTICS)	HIGH (\$\$\$) (HOSPITALIZATION AND ADVANCED DIAGNOSTICS)
Diagnostics	+/- Parvovirus Point of Care Test	Parvovirus Point of Care Test +/- BG*, +/- Blood smear, +/- BP*, +/- Fecal/Deworming	Parvovirus Point of Care Test +/- BG, +/- Blood smear, +/- BP, +/- electrolytes +/- Fecal/Deworming and serial lab work as indicated	Parvovirus Point of Care Test CBC, Chemistry, Abdominal radiograph/ultrasound, Fecal/Deworming, and serial lab work as indicated
Treatment	Euthanasia	Outpatient therapy with (ideally twice) daily visits to the hospital, with or without diagnostics: • SQ* fluids, long-acting antibiotics (cefovecin), and antiemetic (maropitant) injections • Nutritional support	Outpatient therapy with (ideally twice) daily visits to hospital with minimal diagnostics: • SQ fluids, long-acting antibiotics (cefovecin), antiemetic (maropitant +/- metoclopramide), and antacid (famotidine) injections • Oral glucose or electrolyte support, pending serial lab results • Nutritional support	Hospital admission in isolation: • IV fluid therapy, including IV antibiotics, antiemetics, antacids, dextrose/electrolytes if indicated pending serial lab results • NE or NG tube as needed for nutritional support • Canine Parvovirus Monoclonal Antibody and/or Fecal Microbiota Transplant can be considered.
Prognosis	N/A	Unknown	80% survival (Venn et al., 2017) up to 83% survival (Perley et al., 2020) with potential addition of rescue therapies**	90% survival to discharge (Venn et al., 2017)

*BG: blood glucose, BP: blood pressure, SQ: Subcutaneous

Reference the Pennsylvania Society for the Prevention of Cruelty to Animals outpatient parvovirus protocol (Perley et al., 2020). The **flow chart demonstrating the protocol used in the clinic analyzed in the retrospective study is on page 204.

Larson, L., Miller, L., Margiasso, M., Piontkowski, M., Tremblay, D., Dykstra, S., Miller, J., Slagter, B. J., Champ, D., Keil, D., Patel, M., & Wasmoen, T. (2024). Early administration of canine parvovirus monoclonal antibody prevented mortality after experimental challenge. *Journal of the American Veterinary Medical Association*, 262(4), 506–512. <https://doi.org/10.2460/javma.23.09.0541>

Pereira, G. Q., Gomes, L. A., Santos, I. S., Alfieri, A. F., Weese, J. S., Costa, & M. C. (2018). Fecal microbiota transplantation in puppies with canine parvovirus infection. *Journal of Veterinary Internal Medicine*, 32(2), 707–711. <https://doi.org/10.1111/jvim.15072>

Perley, K., Burns, C. C., Maguire, C., Shen, V., Joffe, E., Stefanovski, D., Redding, L., Germanis, L., Drobatz, K. J., & Watson, B. (2020). Retrospective evaluation of outpatient canine parvovirus treatment in a shelter-based low-cost urban clinic. *Journal of Veterinary Emergency and Critical Care (San Antonio)*, 30(2), 202–208. <https://doi.org/10.1111/vec.12941>

Sarpong, K. J., Lukowski, J. M., & Knapp, C. G. (2017). Evaluation of mortality rate and predictors of outcome in dogs receiving outpatient treatment for parvoviral enteritis. *Journal of the American Veterinary Medical Association*, 251(9), 1035–1041. <https://doi.org/10.2460/javma.251.9.1035>

Venn, E. C., Preisner, K., Boscan, P. L., Twedt, D. C., & Sullivan, L. A. (2016). Evaluation of an outpatient protocol in the treatment of canine parvoviral enteritis. *Journal of Veterinary Emergency and Critical Care (San Antonio)*, 27(1), 52–65. <https://doi.org/10.1111/vec.12561>

Component 4: Examples of specific case management knowledge and skills students need to develop to identify, communicate, and provide the care options (identified by both primary care educators and practitioners)

KNOWLEDGE AND CLINICAL REASONING SKILLS

1. Utilize knowledge of the pathophysiology and clinical signs of parvovirus and synthesize pertinent details from the history and physical exam parameters to develop a working diagnosis.
2. Select and interpret appropriate diagnostic tests to confirm the diagnosis of parvovirus.
3. Use evidence-based knowledge to establish an appropriate treatment plan considering patient, client, clinic, and clinician factors and resources, and demonstrate the ability to recognize changes in patient status and adapt accordingly.

4. Identify financial support options/resources available to clients and clinics locally, regionally, and nationally when clients have very limited finances.
5. Recognize the infectious considerations for cases of parvovirus, including risks to other pets and in-hospital isolation protocols.

PROFESSIONAL / COMMUNICATION SKILLS

1. Effectively communicate with clients about the pros and cons of each diagnostic and treatment option and their associated costs, and demonstrate regard for clients' factors, budget, and resources.
2. Demonstrate empathy and compassion when communicating with clients, including when euthanasia is most appropriate for the family's and pet's circumstances.
3. Communicate about infectious disease, including parvovirus prevention through timely vaccination, exposure risks, time from exposure to infection, sanitation protocols, and interactions with other pets and family members.
4. Consider the impact of treatment options while balancing the overall business profitability, availability of staff and doctors, and overall client satisfaction.
5. Thoroughly document all communications with the client, including diagnostic and treatment options, potential risks, and known client barriers. Include use of against medical advice (AMA) forms if indicated.

CLINICAL SKILLS

1. Demonstrate proficiency in obtaining a history and performing a thorough physical examination to identify clinical signs of parvovirus.
2. Interpret relevant diagnostics (fecal analysis, parvovirus point of care test, CBC, etc.).
3. Perform blood sample collection from jugular or saphenous sites.
4. Utilize applied medical math for calculation of medication dosages, nutritional requirements and fluid rate (SQ or IV).
5. Demonstrate skills relevant to rehydration including placement of IV catheter and administration of subcutaneous fluids.

Component 5: Examples of assessments and learning experiences that educators can use to develop the case management knowledge and skills that students need to provide the care options

LEARNING EXPERIENCES	ASSESSMENTS	
<p>Didactic (Lectures and Seminars)</p>	<p>Veterinary students attend lectures and seminars covering gastrointestinal physiology, anatomy, immunology, preventive care, and common gastrointestinal disorders, including parvovirus. These sessions provide foundational knowledge about the gastrointestinal system, infectious disease, and management of parvovirus.</p>	<p>Consider use of formative and/or summative assessment to gauge understanding of key concepts. Specific assessment tools should be at the instructor’s discretion based on the case’s intent.</p>
<p>Laboratory Sessions (Clinical & Communication Skills)</p>	<p>Hands-on laboratory sessions allow students to practice clinical and communication skills related to evaluation of the gastrointestinal system, including physical examination techniques, and effective client communication.</p>	<p>Consider use of formative and/or summative assessment to assess proficiency in performing clinical skills relevant to the case. These could include in-the-moment feedback and/or an objective structured clinical exam (OSCE). Mock interviews could be considered for assessment of communication skills. Specific assessment tools should be at the instructor’s discretion based on the case’s intent.</p>
<p>Case-Based Learning</p>	<p>Case-based learning exercises present students with clinical scenarios involving young dogs presenting with parvovirus (see Box 1 for example clinical scenario). Students analyze patient history, clinical signs, and diagnostic results to develop differential diagnoses and treatment plans under the guidance of faculty members. Students work together to critically evaluate clinical cases, research relevant literature, and develop evidence-based treatment plans.</p>	<p>Consider use of formative and/or summative assessment to assess proficiency in clinical reasoning. Consider the use of exams, written assignments, or case presentations. Specific assessment tools should be at the instructor’s discretion based on the case’s intent.</p>
<p>Clinical Rotations</p>	<p>Clinical rotations in community practice/primary care, small animal medicine, and emergency/critical care allow students to observe and participate in the diagnosis and management of parvoviral cases under the supervision of experienced clinicians. Students learn to perform physical examinations, interpret diagnostic tests, formulate treatment plans, and provide client communication and support.</p>	<p>Consider use of formative and/or summative assessment to evaluate student’s ability to integrate clinical reasoning, communication and clinical skills, and ability to collaborate within the veterinary team. Use of direct observation of procedural skills (DOPS) would be applicable in this context. Specific assessment tools should be at the instructor’s discretion based on the case’s intent.</p>

Box 1. Example clinical scenario for teaching case management for canine recurrent/chronic otitis externa.

A puppy and their owner present for an illness exam.

Signalment: 12-week-old, male intact, mixed breed dog

History: The puppy has not received any prior vaccinations. Owner reports a sudden onset of severe vomiting and diarrhea. They report that the consistency of the diarrhea is watery with evidence of blood. The owner notes that the puppy is lethargic, depressed, and has a decreased appetite. The puppy often has playdates with other puppies in the neighborhood and the owner is uncertain of the vaccination status of the playmates.

Physical Exam Findings:

- General Appearance: The puppy appears weak, lethargic, and depressed. Dehydration is evident due to mildly sunken eyes and dry mucous membranes.
- Temperature: 103.5 degrees Fahrenheit.
- Heart Rate: 160 beats per minute
- Respiratory Rate: 42 breaths per minute
- Abdominal Pain: Guarded abdomen
- Mucous Membranes: Pale and tacky
- Capillary Refill Time (CRT): Prolonged CRT (>2 seconds)

RECOMMENDED CITATION

Alvarez, E. E., Bernstein, L. A., Montgomery, E., Paterson, T., & Wisecup, M. (2024). Teaching spectrum of care case management: Canine parvovirus. In AAVMC Spectrum of Care Initiative Task Force, H. N. Fedesco, & J. E. Brodsky (Eds.), *Enhancing spectrum of care preparation in veterinary education programs: An implementation strategies guide* (pp. 112–117). American Association of Veterinary Medical Colleges. <https://doi.org/10.17605/OSF.IO/AHWQE>

Teaching Spectrum of Care Case Management: Canine Pyometra



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Component 1: A learning objective aligned with competencies in the Spectrum of Care (SOC) Education Model

Learning objective: Managing an intact female canine patient presenting with case history and clinical signs consistent with pyometra requiring surgery.

Alignment with competencies in the SOC Education Model:

- *SOC Subcompetency 1.3.5.* Integrates information about the patient with client circumstances to identify a range of appropriate care options and to adjust the care plan.
- *SOC Subcompetency 1.4.4.* Offers a range of care options that are tailored to the unique circumstances of each patient and client.
- *SOC Subcompetency 1.4.5.* Facilitates client decision-making regarding care by presenting the costs, risks, benefits, and evidence-base of care options.
- *SOC Subcompetency 7.3.4.* Acknowledges and considers the context of previous care decisions made by colleagues and clients.
- *SOC Subcompetency 7.3.5.* Reflects on one's own professional identity in relation to providing a spectrum of care.
- *SOC Subcompetency 8.1.4.* Provides a range of care and payment options in a manner that fosters financial viability of the practice and a positive working environment.

Component 2: The range of care options identified by primary care educators and practitioners

There are multiple care options for **managing an intact female canine patient presenting with case history and clinical signs consistent with pyometra requiring surgery**. The care options are described in detail below and then summarized in **Table 1**. Students can develop the knowledge and skills to identify, communicate, and perform these care options (Component 4) via the learning experiences in Component 5.

Please Note:

- The care options below are **NOT** intended to be comprehensive, both in terms of capturing all the options and all the components of the options. Instead, the care options below focus on the main components of care that a student is expected to consider and be able to communicate and perform in their practice.
- When using these case management materials, educators should emphasize for students the importance of clinical reasoning and reassessment with adjustment of care options.
- The primary care educators and practitioners working on this project come from different geographic regions which means that the specific costs for care options vary. Therefore, the care options presented here are organized into three budget categories, rather than by specific dollar amount.

FOR ALL CARE OPTIONS:

- **Consultation:** Use part of the budget to cover the veterinary consultation. This includes communicating with the owner to obtain a thorough history, inquiring about additional factors beyond financial constraints that may affect care options. These may include differences in understood and spoken languages between provider and owner, transportation/ability to return to clinic for follow ups, ability to administer a home care plan, and personal goals, preferences, or beliefs about care. Key historical information should include signalment (especially reproductive status) and date and duration of

the most recent heat cycle. A comprehensive physical exam should be performed.

- Humane euthanasia may be the best option depending on the patient's condition, comorbidities, and client circumstances.
- **Surgical management:** If surgical costs at your clinic exceed a client's financial ability, consider options such as referral for low-cost surgery, usage of internal good Samaritan funds, internal/external payment plans, etc.
- **Note:** Medical management is not considered a definitive treatment for pyometra as it is likely to recur in the absence of surgical intervention. Surgical avoidance due to cost will likely lead to overall greater expense over the long term. The use of medical management alone is reserved for cases where surgery is not possible due to personal or religious beliefs, or there is intention to use the dog for breeding purposes. Administration of antibiotics and injectable prostaglandins over multiple days to help open the cervix and promote uterine clearance is not a definitive treatment but may help manage the symptoms. Hospitalization and close monitoring by a veterinarian are essential. Spaying before or breeding on the subsequent estrus cycle is recommended after medical treatment to avoid recurrence (Hagman, 2023).

CARE OPTION 1 (LOW BUDGET): OUTPATIENT WITH NON-URGENT TO URGENT SURGERY

1A. Outpatient: Symptomatic treatment with surgery (non-urgent*) – STABLE patient

*Non-urgent refers to planning for surgery within a reasonable time frame (based on clinical judgment). This allows the client time to source low-cost options for the surgical procedure. Although prompt surgical treatment remains a goal, in cases where limitations to performing surgery exist, delaying surgery beyond the day of presentation is still associated with a high degree of success (McCobb et al., 2022).

Clinical Presentation: Intact female, stable, mucopurulent vaginal discharge (open pyometra).

Additional Diagnostics: If client has the financial resources, consider diagnostic imaging (focused ultrasound or single lateral abdominal radiograph) to confirm diagnosis of pyometra.

Treatment:

- **Supportive care:** Treat with an appropriate course of empirical antibiotic therapy +/- analgesics, if financially feasible (Hagman, 2023).
- **Close monitoring:** Owner to closely monitor at home until time of surgery with regular communication with veterinary healthcare team.
- **Ovariohysterectomy (OVH) - delayed:** Surgery is the most effective and commonly recommended treatment.

1B. Outpatient: Symptomatic treatment with surgery (urgent*) – SICK patient

*In this case, urgent refers to more timely surgery as compared to Outpatient Option 1A while still offering the client the opportunity to source a more economical surgery.

Clinical Presentation: Intact female, lethargic, anorexic, febrile, PU/PD, +/- mucopurulent vaginal discharge (open or closed pyometra).

Additional Diagnostics: If client has the financial resources, consider diagnostic imaging (focused ultrasound or single lateral abdominal radiograph) to confirm diagnosis of pyometra.

Treatment:

- **Supportive care:** Treat with an appropriate course of empirical antibiotic therapy +/- analgesics +/- anti-nausea medication, if financially feasible (Hagman, 2023).
- **Close monitoring:** Owner to closely monitor at home for signs of deterioration until time of surgery with regular communication with veterinary healthcare team. Should the patient's condition worsen, more urgent care is recommended.
- **Ovariohysterectomy (OVH) - delayed:** Surgery is the most effective and commonly recommended treatment.

CARE OPTION 2 (MODERATE BUDGET): OUTPATIENT WITH URGENT* SURGERY

*In this case, urgent refers to more timely surgery compared to Care Options 1A & 1B (low budget) while still offering the client the opportunity to source a more economical surgery.

Clinical Presentation: Intact female, either stable or lethargic, anorexic, febrile, PU/PD, +/- mucopurulent vaginal discharge (open or closed pyometra).

Additional Diagnostics: If client has the financial resources, consider diagnostic imaging (focused ultrasound or single lateral abdominal radiograph) to confirm diagnosis of pyometra and bloodwork (CBC/Chemistry) for prognostic indicators (Hagman, 2023).

Treatment:

- **Ovariohysterectomy (OVH):** Surgery is the most effective and commonly recommended treatment.

- **Supportive care:** Administer supportive care as indicated based on clinical presentation and prognostic indicators (i.e., empirical antibiotic therapy, fluid therapy [IV or subcutaneous], analgesia, anti-nausea, etc.).
- **Close monitoring:** Postoperative recovery at home with follow-up phone calls by the veterinary healthcare team when necessary. Recheck as needed, considering the owner’s availability and funds.
- **Special note:** Outpatient OVH resulted in a 94% survival 1-week post-surgery and the duration of hospitalization did not affect survival (McCobb et al., 2022). Although prompt surgical treatment remains a goal, in cases where limitations to performing surgery exist, delaying surgery or discharging patients the same day is still associated with a high degree of success (McCobb et al., 2022).

CARE OPTION 3 (HIGH BUDGET): INPATIENT WITH SURGERY: SURGICAL INTERVENTION AND HOSPITALIZATION

Clinical Presentation: Intact female, either stable or lethargic, anorexic, febrile, PU/PD, +/- mucopurulent vaginal discharge (open or closed pyometra).

Additional Diagnostics: Diagnostic imaging (focused ultrasound +/- abdominal radiographs to confirm diagnosis of pyometra. Perform bloodwork (CBC/Chemistry) for prognostic indicators and to determine baselines +/- culture of vaginal discharge for appropriate antibiotic selection (Jitpean et al., 2014). If doing surgery that day, ideally collect samples for culture aseptically from the uterus once it has been surgically removed.

Treatment:

- **Ovariohysterectomy (OVH):** Surgery is the most effective and commonly recommended treatment.
- **Supportive care:** Administer antibiotic therapy and supportive care as indicated based on clinical presentation and bloodwork (i.e., IV fluid therapy, analgesia, anti-nausea therapy, etc.).
- **Hospitalization:** Post-operative care and monitoring in a veterinary hospital to monitor for postoperative complications.

Additional considerations for Care Option 3: Postoperative hospitalization has not been shown to reduce the incidence of postoperative surgical complications, however with close veterinary supervision, complications may be recognized sooner. Patients with poor prognostic indicators (presenting with shock, elevations in blood urea nitrogen [BUN] or creatinine, a ruptured uterus) should be hospitalized for supportive care and monitoring.

Table 1. Care options based on budget for canine pyometra.

	EUTHANASIA	LOW (\$)	MODERATE (\$\$)	HIGH (\$\$\$)
Diagnostics	N/A	<ul style="list-style-type: none"> • +/- focused ultrasound OR single lateral radiograph 	<ul style="list-style-type: none"> • Focused ultrasound OR single lateral radiograph • +/- Blood work (CBC & Chemistry) 	<ul style="list-style-type: none"> • Focused ultrasound and/or abdominal radiographs • Blood work (CBC & Chemistry) • +/- Culture vaginal discharge
Treatment	N/A	<ul style="list-style-type: none"> • OVH (outpatient) • Empirical antibiotics • Analgesia • +/- SQ fluids • +/- Anti-nausea 	<ul style="list-style-type: none"> • OVH (outpatient) • Empirical antibiotics • Analgesia • Fluid therapy (IV or SQ) • +/- Anti-nausea 	<ul style="list-style-type: none"> • OVH (inpatient) • Antibiotic therapy +/- changed based on culture results • Analgesia • Fluid therapy (IV or SQ) • +/- Anti-nausea
Prognosis	N/A	<ul style="list-style-type: none"> • Unknown 	<ul style="list-style-type: none"> • 97% survival to discharge, 94% survival rate at 1 week after surgery (McCobb et al., 2022) 	<ul style="list-style-type: none"> • 97% survival to discharge (non-specialized setting) (Pailler et al., 2022)

Component 3: References to research literature that provides evidence for the care options

Hagman, R. (2023). Pyometra in small animals 3.0. *Veterinary Clinics of North America: Small Animal Practice*, 53(5), 1223–1254. <https://doi.org/10.1016/j.cvs.2023.04.009>

Jitpean, S., Ström-Holst, B., Emanuelson, U., Höglund, O. V., Pettersson, A., Alneryd-Bull, C., & Hagman, R. (2014). Outcome of pyometra in female dogs and predictors of peritonitis and prolonged postoperative hospitalization in surgically treated cases. *BMC Veterinary Research*, 10(6). <https://doi.org/10.1186/1746-6148-10-6>

McCallin, A. J., Hough, V. A., & Kreisler, R. E. (2021). Pyometra management practices in the high quality, high volume spay-neuter environment. *Topics in Companion Animal Medicine*, 42(100499). <https://doi.org/10.1016/j.tcam.2020.100499>

McCobb, E., Dowling-Guyer, S., Pailler, S., Intarapanich, N. P., & Rozanski, E. A. (2022). Surgery in a veterinary outpatient community medicine setting has a good outcome for dogs with pyometra. *Journal of the American Veterinary Medical Association*, 260(S2), S36–S41. <https://doi.org/10.2460/javma.21.06.0320>

Pailler, S., Slater, M. R., Lesnikowski, S. M., Gayle, J. M., Duvieusart, C. B. C. A., Ledesma, E. J., Lee, M. L., Stevens, J. D., & DeClementi, C. (2022). Findings and prognostic indicators of outcomes for bitches with pyometra treated surgically in a nonspecialized setting. *Journal of the American Veterinary Medical Association*, 260(S2), S49–S56. <https://doi.org/10.2460/javma.20.12.0713>

Turner, J. W. C., McCallin, A. J., & Kreisler, R. E. (2024). Promoting access to care in pyometra treatment: Pathways to collaboration between high-quality, high-volume spay-neuter clinics and private practices. *Journal of the American Veterinary Medical Association*, 262(7), 909–916. <https://doi.org/10.2460/javma.23.12.0694>

Component 4: Examples of specific case management knowledge and skills students need to develop to identify, communicate, and provide the care options (identified by both primary care educators and practitioners)

KNOWLEDGE AND CLINICAL REASONING SKILLS

1. Utilize knowledge of the pathophysiology and clinical signs of pyometra (both open and closed) and synthesize pertinent details from the history and physical exam parameters to develop a working diagnosis.

2. Select and interpret appropriate diagnostic tests to confirm the diagnosis of pyometra.
3. Use evidence-based knowledge to establish an appropriate treatment plan considering patient, client, clinician, and clinic factors and resources, and demonstrate the ability to recognize changes in patient status and adapt accordingly.
4. Identify financial support options/resources available to clients and clinics locally, regionally, and nationally when clients have very limited finances.
5. Recognize and manage emergency situations associated with pyometra, such as uterine rupture or systemic infection.

PROFESSIONAL / COMMUNICATION SKILLS

1. Effectively communicate with clients about the pros and cons of each diagnostic and treatment option and their associated costs, and demonstrate regard for clients' factors, budget, and resources.
2. Demonstrate empathy and compassion when communicating with clients, including when euthanasia is most appropriate for the family's and pet's circumstances.
3. Educate clients on measures to prevent pyometra (spaying) and/or to reduce the risk of pyometra in intact female dogs, like breeding before the next heat cycle.
4. Consider the impact of treatment options while balancing the overall business profitability, availability of staff and doctors, and overall client satisfaction.
5. Thoroughly document all communications with the client, including diagnostic and treatment options, potential risks, and known client barriers. Include use of against medical advice (AMA) forms if indicated.

CLINICAL SKILLS

1. Demonstrate proficiency in obtaining a history and performing a thorough physical examination to identify clinical signs of pyometra.
2. Perform blood sample collection from jugular or saphenous sites.
3. Interpret relevant diagnostics (CBC/Chemistry, imaging [ultrasound/radiographs]).
4. Utilize applied medical math for calculation of medication dosages, nutritional requirements and fluid rate (SQ or IV).
5. Demonstrate skills relevant to rehydration including placement of IV catheter and administration of subcutaneous fluids.
6. Demonstrate proficiency in basic surgical and anesthetic skills, including appropriate tissue handling, asepsis, hydration status, and anesthesia administration and monitoring.

Component 5: Examples of assessments and learning experiences that educators can use to develop the case management knowledge and skills that students need to provide the care options

LEARNING EXPERIENCES	ASSESSMENTS	
<p>Didactic (Lectures and Seminars)</p>	<p>Veterinary students attend lectures and seminars covering reproductive physiology, anatomy, and common reproductive disorders, including pyometra. These sessions provide foundational knowledge about the female reproductive system, the estrous cycle, and the development, diagnosis, and management of pyometra.</p>	<p>Consider use of formative and/or summative assessment to gauge understanding of key concepts. Specific assessment tools should be at the instructor’s discretion based on the case’s intent.</p>
<p>Laboratory Sessions (Clinical & Communication Skills)</p>	<p>Hands-on laboratory sessions allow students to practice clinical and communication skills related to reproductive health, including physical examination techniques, diagnostic imaging interpretation, anesthesia and spay surgery, and effective client communication.</p>	<p>Consider use of formative and/or summative assessment to assess proficiency in performing clinical skills relevant to the case. These could include in-the-moment feedback and/or an objective structured clinical exam (OSCE). Mock interviews could be considered for assessment of communication skills. Specific assessment tools should be at the instructor’s discretion based on the case’s intent.</p>
<p>Case-Based Learning</p>	<p>Case-based learning exercises present students with clinical scenarios involving intact female dogs presenting with pyometra (see Box 1 for example clinical scenario). Students analyze patient history, clinical signs, and diagnostic results to develop differential diagnoses and treatment plans under the guidance of faculty members. Students work together to critically evaluate clinical cases, research relevant literature, and develop evidence-based treatment plans.</p>	<p>Consider use of formative and/or summative assessment to assess proficiency in clinical reasoning. Consider the use of exams, written assignments, or case presentations. Specific assessment tools should be at the instructor’s discretion based on the case’s intent.</p>
<p>Clinical Rotations</p>	<p>Clinical rotations in community practice/primary care, small animal medicine, emergency/critical care, and surgery allow students to observe and participate in the diagnosis and management of pyometra cases under the supervision of experienced clinicians. Students learn to perform physical examinations, interpret diagnostic tests, formulate treatment plans, and provide client communication and support.</p> <p>Veterinary students receive surgical training, including ovariohysterectomy, which is the primary treatment for pyometra. Through supervised surgical rotations, students practice surgical techniques, anesthesia administration, and perioperative care for canine patients with pyometra.</p>	<p>Consider use of formative and/or summative assessment to evaluate student’s ability to integrate clinical reasoning, communication and clinical skills, and ability to collaborate within the veterinary team. Use of direct observation of procedural skills (DOPS) would be applicable in this context. Specific assessment tools should be at the instructor’s discretion based on the case’s intent.</p>

Box 1. Example clinical scenario for teaching case management for canine pyometra.

An adult dog presents to your general practice for an illness exam.

Signalment: 8-year-old, female intact, Bernese Mountain Dog

History: Owner reports recent onset of anorexia, lethargy, and vaginal discharge. The appetite has been gradually worsening over the last two weeks and, yesterday, she was much more lethargic than normal. Upon further questioning she is polyuric/polydipsic, not vomiting or having diarrhea, and her last heat cycle was approximately two months ago.

Physical Exam Findings:

- Temperature: 104.5 degrees Fahrenheit
- Mucous Membranes: Pink and moderately tacky
- Heart Rate: 145 beats per minute
- Respiratory Rate: 40 breaths per minute
- Physical Exam Findings: The patient is ambulatory but lethargic, mildly painful on caudal abdominal palpation, mucopurulent vaginal discharge

RECOMMENDED CITATION

Alvarez, E. E., Bernstein, L. A., Montgomery, E., Paterson, T., & Wisecup, M. (2024). Teaching spectrum of care case management: Canine pyometra. In AAVMC Spectrum of Care Initiative Task Force, H. N. Fedesco, & J. E. Brodsky (Eds.), *Enhancing spectrum of care preparation in veterinary education programs: An implementation strategies guide* (pp. 118–123). American Association of Veterinary Medical Colleges. <https://doi.org/10.17605/OSF.IO/AHWQE>

Teaching Spectrum Of Care Case Management: Canine Foreign Body Ingestion +/- Acute Gastrointestinal Obstruction



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- *SOC Subcompetency 7.3.4.* Acknowledges and considers the context of previous care decisions made by colleagues and clients.
- *SOC Subcompetency 7.3.5.* Reflects on one's own professional identity in relation to providing a spectrum of care.
- *SOC Subcompetency 7.4.4.* Pursues opportunities to expand skill set to offer a broader range of care options.
- *SOC Subcompetency 8.1.4.* Provides a range of care and payment options in a manner that fosters financial viability of the practice and a positive working environment.

Component 1: A learning objective aligned with competencies in the Spectrum of Care (SOC) Education Model

Learning objective: Managing a canine patient with suspected foreign body ingestion and/or clinical signs suggestive of an acute gastrointestinal obstruction.

Alignment with competencies in the SOC Education Model:

- *SOC Subcompetency 1.3.5.* Integrates information about the patient with client circumstances to identify a range of appropriate care options and to adjust the care plan.
- *SOC Subcompetency 1.4.4.* Offers a range of care options that are tailored to the unique circumstances of each patient and client.
- *SOC Subcompetency 1.4.5.* Facilitates client decision-making regarding care by presenting the costs, risks, benefits, and evidence-base of care options.
- *SOC Subcompetency 3.1.5.* Provides a range of appropriate care options for animal populations that considers animal welfare, lifestyle, economics, societal interests (e.g., food animal industry, animal activism) and public and environmental health concerns.

Component 2: The range of care options identified by primary care educators and practitioners

There are multiple care options for **managing a canine patient with suspected foreign body ingestion and/or clinical signs suggestive of an acute gastrointestinal obstruction**. The care options are described in detail below and then summarized in **Table 1**. A flowchart depicting the decision-making process for managing the case is presented in **Figure 1**. Students can develop the knowledge and skills to identify, communicate, and perform these care options (Component 4) via the learning experiences in Component 5.

Please Note:

- The care options below are **NOT** intended to be comprehensive, both in terms of capturing all the options and all the components of the options. Instead, the care options below focus on the main components of care that a student is expected to consider and be able to communicate and perform in their practice.
- When using these case management materials, educators should emphasize for students the importance of clinical reasoning and reassessment with adjustment of care options.

- The primary care educators and practitioners working on this project come from different geographic regions which means that the specific costs for care options vary. Therefore, the care options presented here are organized into three budget categories, rather than by specific dollar amount.

FOR ALL CARE OPTIONS:

- **Consultation:** Use part of the budget to cover the veterinary consultation. This includes communicating with the owner to obtain a thorough history, including additional factors beyond financial constraints that may affect care options. Such factors could include knowledge and timing of ingestion of a foreign body, nature of the foreign material, history of chronic GI disease or suspected neoplasia, comorbidities and presence of consistent clinical signs suggesting a GI obstruction, e.g., persistent vomiting, lethargy and hyporexia. History of prior abdominal surgeries and whether the animal has a gastropexy should be obtained. A comprehensive physical exam would be performed.

CARE OPTION 1 (LOW BUDGET): SYMPTOMATIC TREATMENT AND MONITORING

1A. Outpatient: Symptomatic treatment and monitoring – stable patient/unlikely full obstruction

Patient Presentation: Stable patient with possible history of ingestion of foreign material, may have vomited up foreign material but still eating, is not lethargic/pyrexia and not overtly painful on abdominal palpation.

Diagnostics:

- History of ingestion of foreign material: Focus on timing of possible ingestion and nature of foreign material. Consider history of dietary indiscretion as well as history of stool production +/- diarrhea.
- Limit diagnostics to comprehensive physical examination to screen for signs suggestive of a GI obstruction (lethargy, nausea, abdominal pain/discomfort, palpable foreign body etc.) and assess for signs of dehydration or hypovolemia which may indicate severity.

Treatment: Outpatient medical management if patient is stable and further diagnostics are not feasible.

- If indicated by history (timing of ingestion, suspected size of foreign material relative to patient size, non-caustic or sharp foreign objects) can induce emesis after discussion of potential risks and outcomes with owner.
- Subcutaneous fluid administration to provide/improve hydration and improve intestinal motility.

- Potentially injectable and/or oral antiemetics and/or anti-nausea drugs (e.g., maropitant, ondansetron) prescribed for 1-2 days.
- Oral or injectable analgesics, as indicated (avoiding NSAIDs if vomiting).
- Easily digestible bland, low-fat or high-fiber diet (commercial vs. home-cooked) to encourage resolution of clinical signs and/or promote motility.
- Close monitoring for improvement, worsening or recurrence of clinical signs (Miles et al., 2021). Educating owner for signs of deterioration and encouraging them to book recheck appointment in 24-48 hours if no improvement in clinical signs.

1B. Outpatient: Symptomatic treatment and monitoring – compromised/unwell/obstructed patient

Patient Presentation: Lethargy, vomiting and hyporexia, dehydration, painful abdomen on palpation.

Diagnostics:

- Prioritize lateral abdominal radiograph to check for GI tract obstruction/identify radiopaque foreign material, lack of serosal detail to assist in decision-making/prognosis. Additional views may be needed and taken as indicated.
- Consider limited blood work if additional funds are available and indicated by radiographic findings – PCV/TS, blood smear for estimated WBC and presence of band neutrophils/left shift.

Treatment: If patient has signs consistent with a poor response to outpatient therapy including (significant lethargy/depression, abdominal pain, significant dehydration, poor perfusion, abnormal WBC/bands, and/or radiograph with obstructive signs):

- Discuss the need for more aggressive diagnostics and treatment including surgery and/or depending on status, humane euthanasia.
- Other options may include use of good Samaritan funds, third party payment options, crowdsourcing or referral to charity, low-budget shelter, local/regional/national funding options.
- Trial symptomatic outpatient therapy outlined in option A while awaiting outcomes of any funding options.
- Close monitoring for worsening or of clinical signs (Miles et al., 2021). Educating owner on signs of deterioration and clearly communicating requirement for intervention, including humane euthanasia, if observed.

Additional considerations for Care Option 1:

- Care option 1 is only likely to be successful in cases where the foreign body is relatively recent, small and not causing full obstruction.
- Client should sign an AMA (against medical advice) form in the following scenarios:
 - If diagnostic and/or treatment costs are above the financial constraints/declined by the client.
 - Additional options such as referral to low-cost/community outreach clinics, good Samaritan funds, internal/external payment plans or funding, or crowdsourcing are not available/unsuccessful.
 - Humane euthanasia is refused.
- Client communications should be clearly documented at all times to avoid liability.
- Humane euthanasia may be the best option depending on the patient's condition, comorbidities, and client circumstances.

CARE OPTION 2 (MODERATE BUDGET): DIAGNOSTICS WITH INPATIENT TREATMENTS OR DAYTIME HOSPITALIZATION + OUTPATIENT TREATMENTS

Patient Presentation: Lethargy, vomiting and hyporexia, dehydration, painful abdomen on palpation or stable patient, not responding to symptomatic treatment for 24-48 hours.

Diagnostics: Prioritize survey abdominal radiograph(s): Screens for presence of radiopaque foreign material and identifies GI patterns consistent with mechanical (vs. functional) ileus suggestive of an obstruction (Drost et al., 2016).

Based on results of survey radiographs further diagnostics and treatment options outlined below.

2A. Radiographs consistent with complete GI obstruction

Additional Diagnostics: If funding is available, baseline blood testing: CBC, chemistry, electrolytes to assess overall health status and prognostic indicators for surgery.

Treatment:

- Surgical intervention depending on cause of obstruction (e.g., foreign body, intussusception, intestinal mass, etc.) and location.
- If funds allow, and clinically indicated, hospitalization with preoperative stabilization and/or post-surgical recovery care.

- Outpatient/inpatient fluid therapy – subcutaneous or intravenous, depending on status.
- Injectable and/or oral antiemetics (e.g., maropitant, ondansetron).
- Oral or injectable analgesics, as indicated (avoiding NSAIDs if vomiting or if surgical incision made into GI tract).
- Easily digestible bland, low-fat or high-fiber diet (commercial vs. home-cooked) to encourage resolution of clinical signs and/or promote motility.
- Clear communication of requirement for intervention, surgery or humane euthanasia, if deterioration or no resolution of clinical signs following treatment.

2B. Radiographs not indicative of complete GI obstruction or inconclusive

Additional Diagnostics:

- Potentially serial radiographs to see if any improvement of GI patterns following symptomatic treatment if funds allow.
- Consider abdominal US to screen for further causes of clinical signs and confirm presence of obstruction.
- If funding is available, baseline blood testing: CBC, chemistry, electrolytes to assess overall health status and prognostic indicators for surgery.

Treatment:

- Outpatient/inpatient fluid therapy – subcutaneous or intravenous, depending on status.
- Discharge with instructions to return within 24 hours for re-evaluation including a repeat of radiographs if clinically indicated. (Miles et al., 2021).
- If funds allow, hospitalization for observation, to monitor for changes in clinical signs.
- Injectable and/or oral antiemetics (e.g., maropitant, ondansetron).
- Oral or injectable analgesics, as indicated (avoiding NSAIDs if vomiting).
- Easily digestible bland, low-fat or high-fiber diet (commercial vs. home-cooked) to encourage resolution of clinical signs and/or promote motility.
- Clear communication of requirement for intervention, surgery or humane euthanasia, if deterioration or no resolution of clinical signs following treatment.

Additional considerations for Care Option 2:

- Endoscopy may be a more economical/less invasive option for some foreign body retrievals based on location, history and nature of foreign material if known. Clear communication is required of potential risks and outcome of unsuccessful retrieval and requirement for follow-up surgical intervention.
- In the case of surgical intervention, client communication prior to surgery must include the following topics and their associated additional costs:
 - Potential adverse outcomes (negative explore, decompensation during/after surgery leading to death, discovery of neoplasia).
 - Potential for more advanced surgical interventions based on the nature of the obstruction and condition of the gastrointestinal tract during surgery (ex. resection and anastomosis vs. gastrotomy/enterotomy).
 - Potential postoperative complications requiring additional intervention/treatment (ileus, dehiscence, sepsis).
- It is important to note that earlier surgical intervention has been shown to involve fewer complex procedures and faster recovery (Maxwell et al., 2021). This would have a direct impact on the total cost.

CARE OPTION 3 (HIGH BUDGET): DIAGNOSTICS, INPATIENT TREATMENTS AND SURGICAL TREATMENTS TO REMOVE/RESOLVE OBSTRUCTION

Diagnostics:

- Comprehensive and serial physical examination.
- Abdominal radiographs (Drost et al., 2016) and serial radiographs.
- Baseline blood and urine testing (CBC, chemistry, UA, electrolytes, blood gas/lactate) to screen for secondary problems and establish overall health status.
- If indicated:
 - Abdominal ultrasonography.
 - Additional imaging (e.g., CT, contrast radiography) to further characterize the gastrointestinal tract (Drost et al., 2016).
 - Thoracic imaging if concern of neoplasia or aspiration pneumonia.

Treatment:

- Endoscopic or surgical intervention depending on availability, cause of obstruction (e.g., foreign body, intussusception, intestinal mass, etc.) and location.
- Hospitalization with IV fluid therapy, preoperative stabilization and post-surgical care.
- Injectable and/or oral antiemetics (e.g., maropitant, ondansetron).
- Injectable analgesics, as indicated (avoiding NSAIDs if vomiting or if surgical incision made into GI tract).
- Post-surgery, feeding tube or parenteral nutrition as required, with transition to easily digestible bland, low-fat or high-fiber diet (commercial vs. home-cooked).
- Monitoring for, diagnosis and treatment of any potential postoperative complications such as ileus, dehiscence or sepsis.

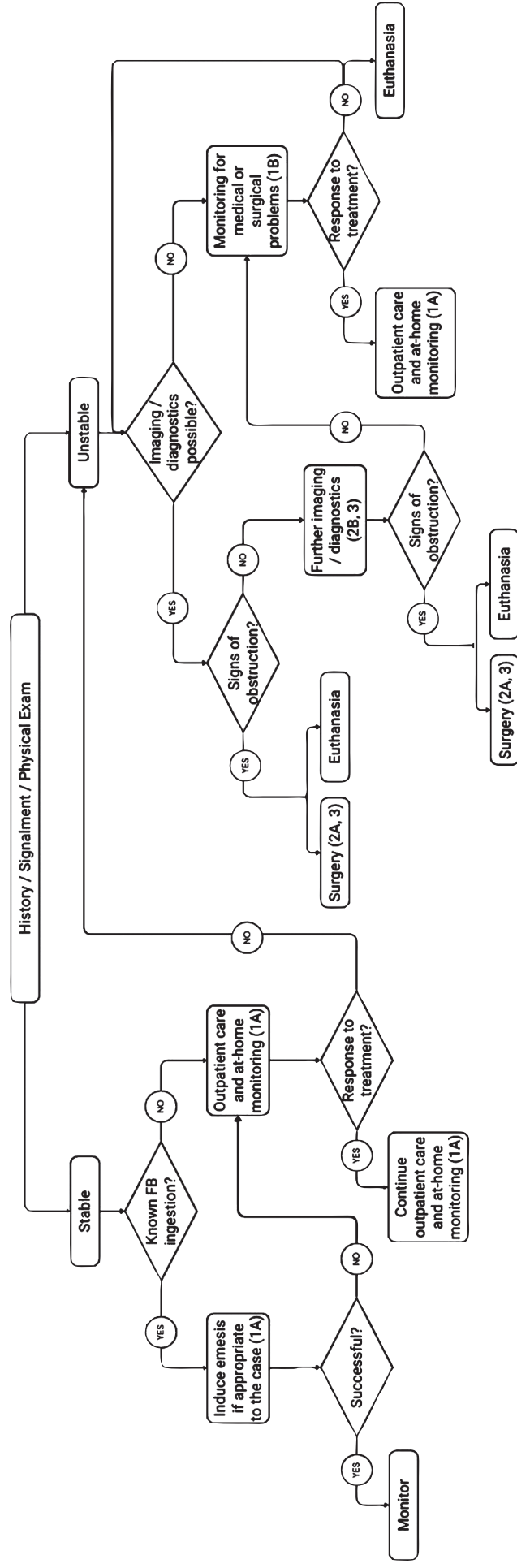
Additional considerations for Care Option 3:

- See notes above for Care Option 2.
- Consider offering gastropexy at time of surgery if indicated for the breed/conformation.
- Following diagnostics, including exploratory laparotomy, humane euthanasia may still be the best option depending on the patient's condition, comorbidities, and client circumstances. This option was identified by both educators and practitioners.

Table 1. Care options and prognoses based on budget for canine foreign body ingestion +/- acute GI obstruction.

	EUTHANASIA	LOW (\$) [Symptomatic Treatment And Monitoring – Compromised/ Unwell/Obstructed Patient]	MODERATE (\$\$) [Diagnostics with inpatient treatments or daytime hospitalization + outpatient treatments]	HIGH (\$\$\$) [Diagnostics, inpatient treatments and surgical treatments to remove/resolve obstruction]
Diagnostics	PE indicating some signs of shock, Radiographs (if taken) indicate complete obstruction, No response to symptomatic treatment	PE +/- lateral abdominal radiograph if funds allow	PE + Abdominal radiographs +/- CBC/Chemistry, electrolytes, PCV/TS	PE + Abdominal radiographs (single or serial) + CBC/ Chemistry, electrolytes, blood gas/lactate, PCV/TS If indicated: Abdominal US, other imaging (CT, contrast studies), thoracic radiographs
Treatment	Euthanasia	SQ fluids, injectable antiemetics (e.g., maropitant, ondansetron), analgesia, prescribed for 1-2 days, easily digestible bland, low-fat or high-fiber diet, revisit booked in 24 hours if no improvement.	Radiographs show obstruction: Proceed to surgery with supportive care as outlined in Care Option 2A Radiographs are inconclusive: Treatments as outlined in Care Option 2B If funds allow, hospitalization for observation, serial PEs/ radiographs, IV fluid therapy, Injectable antiemetics (e.g., maropitant, ondansetron), Injectable analgesics (opioids, no NSAIDs with vomiting)	Hospitalization with IV fluid therapy, correction of electrolyte and acid base abnormalities, injectable analgesia, antiemetics (e.g., maropitant, ondansetron), analgesics (no NSAIDs with vomiting or with GI incision), endoscopic or surgical intervention depending on cause of obstruction and location, post-surgical recovery care and monitoring for, diagnosis and treatment of any postoperative complications (e.g., ileus, dehiscence and sepsis)
Prognosis	N/A	Conservative management successful in 15/17 (88.2%) cases, with no complications reported for metallic sharp-pointed straight gastrointestinal foreign bodies (Crinò et al., 2023).		With surgical intervention: 91% survival rate, better for discrete FB (94%) versus linear FB (80%) (Hayes, 2009).

Figure 1. Flowchart of care options for canine foreign body ingestion +/- acute GI obstruction.



Component 3: References to research literature that provides evidence for the care options

Barash, N. R., Lashnits, E., Kern, Z. T., Tolbert, M. K., & Lunn, K. F. (2022). Outcomes of esophageal and gastric bone foreign bodies in dogs. *Journal of Veterinary Internal Medicine*, 36(2), 500–507. <https://doi.org/10.1111/jvim.16383>

Drost, W. T., Green, E. M., Zekas, L. J., Aarnes, T. K., Su, L., & Habing, G. G. (2016). Comparison of computed tomography and abdominal radiography for detection of canine mechanical intestinal obstruction. *Veterinary Radiology & Ultrasound*, 57(4), 366–375. <https://doi.org/10.1111/vru.12353>

Crinò, C., Humm, K., & Cortellini, S. (2023). Conservative management of metallic sharp-pointed straight gastric and intestinal foreign bodies in dogs and cats: 17 cases (2003-2021). *Journal of Small Animal Practice*, 64(8), 522–526. <https://doi.org/10.1111/jsap.13606>

Hayes, G. (2009). Gastrointestinal foreign bodies in dogs and cats: A retrospective study of 208 cases. *Journal of Small Animal Practice*, 50(11), 576–583. <https://doi.org/10.1111/j.1748-5827.2009.00783.x>

Maxwell, E. A., Dugat, D. R., Waltenburg, M., Upchurch, D., Soto-Elias, P., Duffy, D. J., Spector, D., Petrovsky, B., & Payton, M. (2021). Outcomes of dogs undergoing immediate or delayed surgical treatment for gastrointestinal foreign body obstruction: A retrospective study by the Society of Veterinary Soft Tissue Surgery. *Veterinary Surgery*, 50(1), 177–185. <https://doi.org/10.1111/vsu.13520>

Miles, S., Gaschen, L., Presley, T., Liu, C., & Granger, L. A. (2021). Influence of repeat abdominal radiographs on the resolution of mechanical obstruction and gastrointestinal foreign material in dogs and cats. *Veterinary Radiology & Ultrasound*, 62(3), 282–288. <https://doi.org/10.1111/vru.12953>

Component 4: Examples of specific case management knowledge and skills students need to develop to identify, communicate, and provide the care options (identified by both primary care educators and practitioners)

KNOWLEDGE AND CLINICAL REASONING SKILLS

1. Utilize knowledge of the pathophysiology and clinical signs of gastrointestinal (GI) obstruction and synthesize pertinent details from the history and physical exam parameters to develop a working diagnosis.

2. Select and interpret appropriate diagnostic tests to confirm the diagnosis of GI obstruction considering patient, client, clinic and clinician factors and resources.
3. Use evidence-based knowledge to establish an appropriate treatment plan considering patient, client, clinic, and clinician factors and resources, and demonstrate the ability to recognize changes in patient status and adapt accordingly.
4. Identify financial support options/resources available to clients and clinics locally, regionally, and nationally when clients have very limited finances.

PROFESSIONAL / COMMUNICATION SKILLS

1. Effectively communicate with clients about the pros and cons of each diagnostic and treatment option and their associated costs, and demonstrate regard for clients' factors, budget, and resources.
2. Demonstrate empathy and compassion when communicating with clients, including when euthanasia is most appropriate for the family's and pet's circumstances.
3. Consider the impact of treatment options while balancing the overall business profitability, availability of staff and doctors, and overall client satisfaction.
4. Thoroughly document all communications with the client, including diagnostic and treatment options, potential risks, and known client barriers. Include use of against medical advice (AMA) forms if indicated.

CLINICAL SKILLS

1. Demonstrate proficiency in obtaining a history and performing a thorough physical examination to identify clinical signs of GI obstruction.
2. Perform blood sample collection from jugular or saphenous sites.
3. Interpret relevant diagnostics (radiographs, other imaging modalities, CBC/chemistry/electrolytes/lactate).
4. Utilize applied medical math for calculation of medication dosages, nutritional requirements and fluid rate (SQ or IV).
5. Demonstrate skills relevant to rehydration including placement of IV catheter and administration of subcutaneous fluids.
6. Demonstrate proficiency in basic surgical and anesthetic skills, including appropriate tissue handling, asepsis, hydration status, and anesthesia administration and monitoring.

Component 5: Examples of assessments and learning experiences that educators can use to develop the case management knowledge and skills that students need to provide the care options

LEARNING EXPERIENCES	ASSESSMENTS
<p>Didactic (Lectures and Seminars)</p>	<p>Veterinary students attend lectures and seminars covering gastrointestinal anatomy, physiology and pathology including disorders such as acute gastrointestinal obstruction. These sessions provide foundational knowledge about the gastrointestinal system and the presentation, diagnosis and management of gastrointestinal obstructions.</p>
<p>Laboratory Sessions (Clinical & Communication Skills)</p>	<p>Hands-on laboratory sessions allow students to practice clinical and communication skills related to evaluation of the gastrointestinal system, including physical examination techniques, diagnostic imaging including radiography, ultrasonography or endoscopy and effective client communication.</p>
<p>Case-Based Learning</p>	<p>Case-based learning exercises present students with clinical scenarios involving animals presenting with gastrointestinal obstruction (see Box 1 for example clinical scenario). Students analyze patient history, clinical signs, and diagnostic results to develop differential diagnoses and treatment plans under the guidance of faculty members. Students work together to critically evaluate clinical cases, research relevant literature, and develop evidence-based treatment plans.</p>
<p>Clinical Rotations</p>	<p>Clinical rotations in community practice/primary care, small animal medicine, surgery and emergency/critical care allow students to observe and participate in the diagnosis and management of gastrointestinal obstruction under the supervision of experienced clinicians. Students learn to perform physical examinations, perform and interpret diagnostic tests, formulate treatment plans, and provide client communication and support.</p> <p>Veterinary students receive surgical training, including exploratory laparotomy and basic principles of gastrointestinal surgery. Through supervised surgical rotations, students practice surgical techniques, anesthesia administration, and perioperative care for canine patients with gastrointestinal obstruction.</p>

Box 1. Example clinical scenario for teaching case management for canine foreign body ingestion +/- acute GI obstruction.

“Alfred” is presented for an illness exam.

Signalment: 3-year-old, male castrated, Labrador retriever

History: Alfred is presented for acute onset of vomiting, lethargy and hyporexia of about 36 hours duration. Alfred has vomited approximately 7 times over this period of time and has been progressively more lethargic and inactive. The last time he vomited was approximately 2 hours ago. His appetite decreased acutely in the last 24 hours and the last meal he had was about 12 hours ago, and it was partial.

Alfred is an otherwise healthy dog that eats a commercial dry dog food. He is normally very active and is allowed to go out in a fenced-in yard unobserved, in addition to being taken on leashed walks. He is known to be indiscriminate in his eating behavior and has chewed up sticks and pinecones outside as well as multiple objects (usually dog toys) in the home in the past. He has never had repeated vomiting of this duration and severity before. Alfred has had normal bowel movements with the last being about 12 hours ago.

Physical Exam Findings:

- Mentation: QAR
- Mucous membranes: Pink and semi-dry/tacky
- Skin turgor: normal
- Heart rate: 150 beats per minute
- Respiratory rate: panting
- Peripheral pulses: regular, strong and synchronous
- Abdominal palpation: moderately tense, especially on deeper palpation, but not distended
- Temperature: 102.1 degrees Fahrenheit
- Patient is ambulatory but lethargic
- PE otherwise normal

RECOMMENDED CITATION

Blevins, M., Carnevale, J., Kuehl, K., & Pavlovsky, G. (2024). Teaching spectrum of care case management: Canine foreign body ingestion +/- acute gastrointestinal obstruction. In AAVMC Spectrum of Care Initiative Task Force, H. N. Fedesco, & J. E. Brodsky (Eds.), *Enhancing spectrum of care preparation in veterinary education programs: An implementation strategies guide* (pp. 124–132). American Association of Veterinary Medical Colleges. <https://doi.org/10.17605/OSF.IO/AHWQE>

A Selection of Additional Resources for Teaching Spectrum of Care Case Management



The following articles offer examples of managing common canine conditions using a spectrum of care (SOC) approach. The articles illustrate the critical role of evidence-based veterinary medicine in SOC practice.

- Evason, M. (2021, November 17). Canine parvovirus and care (even on a budget). *Veterinary Practice News*. <https://www.veterinarypracticenews.com/canine-parvovirus-and-care-even-on-a-budget/>
- Evason, M. (2022, April 12). Canine heartworm and *Dirofilaria immitis* discourse. *Veterinary Practice News*. <https://www.veterinarypracticenews.com/canine-heartworm-and-dirofilaria-dollar-discourse/>
- Evason, M. (2023, August 4). In a “hot spot”? Apply spectrum of care. *Veterinary Practice News*. <https://www.veterinarypracticenews.com/affordable-spectrum-of-care/>

The following special collection features research articles, perspectives, and reviews on accessible veterinary care for feline patients using an SOC approach.

- Journal of Feline Medicine and Surgery (2024). *Accessible veterinary care*. https://journals.sagepub.com/topic/collections-jfm/jfm-1_accessible_veterinary_care/jfm

The following website collates resources for providing evidence-based contextualized care. The term “contextualized care” has emerged to address similar concerns within the profession as spectrum of care. The website’s resource collections cover contextualized care in practice, veterinary support and tools, and evidence from research.

- RCVS Knowledge. (n.d.). *Contextualised care*. <https://knowledge.rcvs.org.uk/evidence-based-veterinary-medicine/contextualised-care/>

The following articles include case studies illustrating a contextualized care approach to treating canine and feline patients:

- Futter, I., & Allen, C. (2024). Focus on contextualized care (Part 1). *BSAVA Companion*, 2024(3), 10–15. <https://doi.org/10.22233/20412495.0324.10>
- Allen, C., & Futter, I. (2024). Focus on contextualized care (Part 2). *BSAVA Companion*, 2024(4), 20–25. <https://doi.org/10.22233/20412495.0424.20>