



Problem Orientated Medicine for Advanced Practitioners Mini Series

Session 1: The Problem Orientated Approach to Medicine - What It Is and How It Can Help

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It can be difficult during a busy appointment list but an accurate clinical history and thorough physical examination are the lynch pin of a well directed approach to any case. Then based on the information you have obtained potential differentials can be identified with a well constructed problem list. At this point you can then create a plan of action which can allow you to tailor your diagnostics optimally. This plan should not just focus on the diagnostics, it should also include how you will monitor the patient and any provisional treatment that may be required.

Why a problem orientated approach??

- Well targeted diagnostics – maximising their potential
- Keep you open minded to more than one possibility
- Maintains a complete and thorough approach

Other option – problem spotting that can keep you narrow minded and trying to fit the case to the condition you think is most likely

A- History

The depth of the initial history obtained will depend, upon the clinical setting of the presentation i.e. Emergency treatment required vs. chronic recurrent problems.

1- The basics

- Breed
- Sex – If the animal is neutered or not. If the animal has been neutered was this routine? Was the neutering recent?
- Age - If the dog is young, are any litter mates affected
- Previous medical/surgical history - Previous operations, has this happened before?
- Duration and onset should be established
- Current therapy-
 - It may be some of the clinical signs are related to a drug side effect e.g. steroids e.g. pu/pd
 - Or it maybe that current medication may hinder diagnostics or therapeutic options

2- Questions directed towards the owners primary concern.

3- Never forget the other body systems

Sometimes owners can focus on what they consider to be the main concern and fail to mention other potentially more significant problems. e.g. A dog presented to me for investigations of incontinence. After a 30 minute consultation during which it seemed there was no other problems the owner patted the dog good bye and said “Look after her; she is a delicate girl she has had 3 seizures this week”.

This is an extreme example and obviously changed my plan considerably, but sometimes owners can miss out information that could be important during your diagnostics or therapeutics.

So it is a good habit to include a general list of questions that cover most body systems e.g. any pu/pd, dysuria, coughing/sneezing, etc. There is no harm in following these questions up with “is there anything else you think I should know about Tyson’s medical history”

B-Physical examination

As with any case complete your general full examination.

C-Create a Problem list

Creating a problem list is an easy way of giving you a brief overview of a case. The list should comprise of the main clinical signs or findings from diagnostics.

It can become too complicated if you list all the minor abnormalities found. In a complex case I list the main problems and then have a secondary list of minor problems that may /maynot become relevant later

D- Differentials

Using your problem list create potential differentials for all your main problems and look for potential common themes. When stuck creating these lists try using the VITAMIND or DAMNITV system).

E-The PLAN

1. Which tests should I do first to start narrowing my differentials
2. Any treatment required.
3. Don't forget Nutrition. It is frustrating after GA a dog for radiograph to suddenly think " I should have put a feeding tube in....."
4. How are you going to monitor your patient? What at what point will you change your plan etc how are you going to assess that your provisional treatment is working whilst you are waiting diagnostics

F- When you get any new information review your problems, differentials and treatment plan.

G-Finally – You reach a diagnosis – DOES IT ALL FIT ??.

Essentially can you explain all the problems you identified with your final diagnosis. Could something have been missed.

Using Diagnostic Tests Effectively and Efficiently

We are very fortunate to have an increasing number of accessible diagnostic tests available for our patients. Unfortunately there is no perfect test and to prevent over-interpretation and a subsequent misdiagnosis, results should be taken in like of the clinical picture and knowledge of a tests limitations.

By using a targeted problem orientated approach the performance of diagnostics can be optimised i.e. tests perform better when the incident of disease in a population is higher.

When requesting a test consider the following

- What am I asking the test to look
- How will the result influence management of the case; if thing wont change why perform the test
- Are there changes I would expect to see in this situation; if they are not present could this mean something else is going on
- Does the result explain all the problems

To improve our understanding of how tests perform a basic understanding of sensitivity and specificity is required.

Sensitivity and Specificity of Laboratory Tests

Ultimately which test and when is determined by the problem and action list generated by your clinical history and examination. In this section I have listed the laboratory based tests that can be used in practice and what information the test could give you when considering gastrointestinal disease.

Before discussing the specific tests it is a good idea to review some of the basic principles when evaluating the usefulness of a test. These principles won't be expanded onto the tests we will discuss later, but the principles are good to bear in mind. As these principles are important when considering the performance of the tests we implement

Definitions

- True positives – positive result in patient with disease X
- False positive – positive result in patient without disease X
- True negative – negative result in a patient without disease X
- False negative - negative result in a patient with the disease X

Sensitivity of a test

Diagnostic sensitivity = $\frac{\text{number of true positive}}{\text{Number with specified disease}}$

i.e. - Diagnostic sensitivity = $\frac{\text{number of true positive}}{\text{True positives + false negative}} \times 100$

In a nutshell - how likely the test will pick up a animal with the condition.

Specificity of a test

Specificity of a test = $\frac{\text{number of true negatives}}{\text{Number of animals without specified disease}}$

i.e. diagnostics specificity = $\frac{\text{number of true negatives}}{\text{True negatives + false positives}} \times 100$

In a nutshell- will this test only pick up the disease I am interested in or is there other conditions or normal animals that may give me a false result.

Sensitivity and specificity are useful but can be influenced further by the incidence of the disease in a set population which is demonstrated by the predictive value of a test. This should hopefully be outlined in an example below. Tests such as the TLI (which have a sensitivity and specificity of 100%) are not affected by this phenomenon.

Positive predictive values and negative predictive values.

PPV of a positive test = $\frac{\text{number of true positive}}{\text{True positive} + \text{false positive}}$

In a nutshell- So how reliable is your positive result

PPV of a negative test = $\frac{\text{number of true negative}}{\text{True negative} + \text{false negative}}$

In a nutshell - How reliable is your negative result.

A Fictional Example

To demonstrate the effects of disease prevalence on these tests we will create a fictional scenario. We have a test for condition X that has a sensitivity of 90% and a specificity of 90%. We have been fortunate in that we have groups of dogs from different parts of the country and we know that in population A that disease X has a prevalence of 30%. In population B disease X has a prevalence of 1%. Both population have 1000 dogs

Evaluating population A

1 - first of all we know 30% of 1000 dogs have condition X

	Disease present	Disease absent	
Positive test			
Negative test			
Total	300	700	

2- since the sensitivity of the test is 90%. So 90% of the dogs with condition X will have a positive result i.e. 270. We in the same manner 90% of disease free animal will have negative results.

	Disease present	Disease absent	
Positive test	270	70	
Negative test	30	630	
Total	300	700	

3- from here we can now identify the number of positive and negative results we would obtain in this population

	Disease present	Disease absent	
Positive test	270	70	340
Negative test	30	630	660
Total	300	700	1000

4- so positive predictive values of the test for disease X
Is

PPV of a positive test = $\frac{\text{number of true positive}}{\text{True positive} + \text{false positive}} = \frac{270}{340} \times 100 = 79\%$

So how reliable is your positive result

$$\text{PPV of a negative test} = \frac{\text{number of true negative}}{\text{True negative} + \text{false negative}} = \frac{630}{660} \times 100 = 91\%$$

Now if we do the same for population B

	Disease present	Disease absent	
Positive test	9	99	108
Negative test	1	891	892
Total	10	990	1000

$$\text{PPV of a positive test} = \frac{\text{number of true positive}}{\text{True positive} + \text{false positive}} = \frac{9}{108} \times 100 = 8.3\%$$

So how reliable is your positive result

$$\text{PPV of a negative test} = \frac{\text{number of true negative}}{\text{True negative} + \text{false negative}} = \frac{891}{892} \times 100 = 99.8\%$$

As you can see the positive predictive value of a test can dramatically change based on the disease prevalence.

The difficulty in evaluating the positive predictive values of the tests we have available in veterinary medicine is knowing the true disease prevalence and the dependence of a gold standard. So as there is a lack of large (and statistically powerful) epidemiological studies in veterinary medicine, this process is not always possible but it is important to grasp the principles.

Some of the papers discussed in the lectures in

- Diagnostic accuracy of the SNAP and Spec canine pancreatic lipase tests for pancreatitis in dogs presenting with clinical signs of acute abdominal disease Mark D. Haworth,; Giselle Hosgood; Katrin L. Swindells, and Caroline S. Mansfield. Journal of Veterinary Emergency and Critical Care 24(2) 2014, pp 135–143
- Enteropathogenic Bacteria in Dogs and Cats: Diagnosis, Epidemiology, Treatment, and Control : S.L. Marks, S.C. Rankin, B.A. Byrne and J.S. Weese Journal of Veterinary Internal Medicine 25, Issue 6, pages 1195–1208, November-December 2011