

## Exercise - clinical epidemiology

### Lameness in two dairy herds

Details of lameness events in two dairy herds over a 12-month period are shown below.

Age (years)	Herd A		Herd B	
	<i>n</i> lame	<i>n</i> in group	<i>n</i> lame	<i>n</i> in group
2	6	107	4	96
3	7	78	3	78
4 – 8	8	167	18	173
9+	12	19	14	35
Total	33	370	39	382

The following ‘standard’ age distribution can be used for dairy herds (based on 25% of the herd culled per year):

Age (years)	<i>n</i> in group
2	290
3	210
4 – 8	450
9+	50
Total	1,000

1. Compare the age structure of Herd A with Herd B.
2. What is the (crude) incidence risk of lameness in each herd for the 12-month period?
3. Use the standard age distribution data provided to directly adjust the incidence risk of lameness in each herd. What information does this provide in terms of managing lameness?  
An acceptable incidence risk of lameness in pasture-fed dairy herds is 10 cases per 100 cows.

Answer

### Distemper in Finland

It is 1995. An outbreak of canine distemper is occurring in parts of Finland that have a high density dog population. Vaccinated dogs are becoming ill and some have died. So far, 865 samples of epithelial cells (mostly conjunctival scrapings) from 3649 dogs collected over a 19-month

period have yielded positive test results for canine distemper virus on indirect immunofluorescence assay. You are consulted because local investigators suspect that the market-leading brand of vaccine may not have been providing adequate protection to recipients for some time. You are asked to design a study to determine whether the current outbreak has developed as a consequence of, or has been exacerbated by, failure of one or more of the commercially-available canine distemper vaccines to provide adequate protection.

Reference: Ek-Kommonen C, Sihvonen L, Pekkanen K, Rikula U, Nuotio L (1997) Outbreak of canine distemper in vaccinated dogs in Finland. *Veterinary Record* 141: 380 – 383.

1. Provide a concise summary of the epidemiological features of canine distemper.
2. Discuss and decide what you need to know right now to begin to tackle this task.
3. Decide on an suitable study design to investigate this problem further. What are the advantages and disadvantages of this approach?

Answer

### Canine hypothyroidism

You are presented with a dog with lethargy and exercise intolerance. You are suspicious of hypothyroidism and take a blood sample to measure basal serum thyroxine (T4). What is the pre-test probability that this dog is hypothyroid?

Answer

You're told that measuring serum T4 has a sensitivity of 0.89 and specificity of 0.82 for diagnosing hypothyroidism in the dog. Given this information, what is the likelihood ratio of a positive (i.e. low) T4 test? Interpret this figure, using your own words.

Answer

The laboratory reports a serum T4 concentration of 19.0 nmol/L (reference range 19.0 to 58.0 nmol/L). What is the post-test probability that your patient is hypothyroid? Hint: see Figure 1.

Answer

You now decide to measure endogenous serum TSH to confirm your diagnosis. The endogenous serum TSH level in this dog was 0.95 nmol/L (reference range 0.04 to 0.35 nmol/L). The sensitivity and specificity of TSH for diagnosing hypothyroidism is 0.76 and 0.93. Following this second test, what is the revised post-test probability of disease in your patient?

Answer

### Feline leukaemia virus

Over the past 5 years cats admitted to your clinic have been tested for feline leukaemia virus using the Duo Speed test kit (Bio Veto Test, France). The sensitivity and specificity of the Duo Speed test for FeLV antigen has been estimated to be 0.96 and 0.99, respectively (Hartmann et al. 2007). Cats tested are those presented for variety of reasons including illness, trauma, and routine procedures such as dentistry, vaccination, and desexing. Of 4278 samples, 15 have returned a positive result. You admit a desexed, 5 year old DSH cat for teeth cleaning and take a blood sample for FeLV testing. The test is positive. What is the post-test probability of FeLV in this cat, given the positive test result? How would your subsequent management of this animal differ if the prevalence of FeLV infection among the population of hospitalised cats was much higher, say 10%?

Reference: Hartmann K, Griessmayr P, Schulz B, Greene CE, Vidyashankar AN, Jarrett O, Egberink HF (2007) Quality of different in-clinic tests for feline immunodeficiency virus and feline leukaemia virus infection. *Journal of Feline Medicine and Surgery* 9: 439 – 445.

Answer

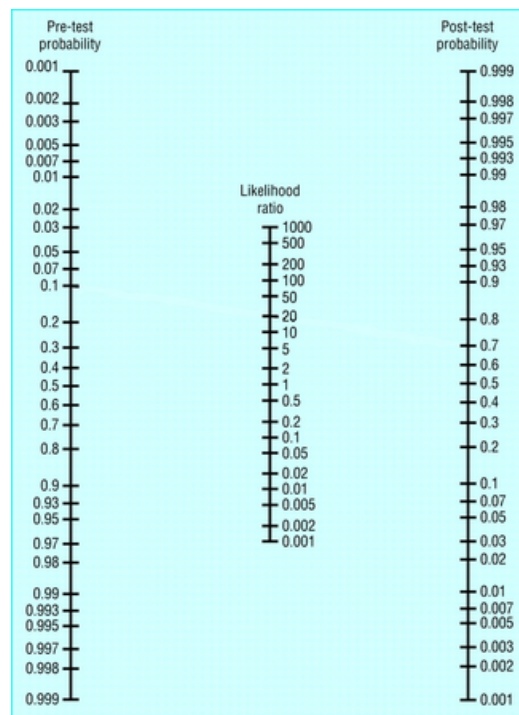


Figure 1: Nomogram for post-test probability calculations using likelihood ratios of a positive test result.

### Polioencephalomalacia

I received the following email from a practitioner in the South Island:

From: Joe Practitioner [j.p.practitioner@netspeed.net.nz]

Sent: Friday, 17 March 2006 12:06 p.m.  
To: Mark Stevenson  
Subject: PE

Mark

I am very interested in submitting an application for funding looking at the causes of PE (polioencephalomalacia) in calves - I am sure there is more to the picture than we think. It is now our most common disease in calves - and it doesn't appear to be linked to the text book explanation of change in diet from fibrous to lush (or sulphur content).

I am going to contact 4 - 5 other practices in the southern South Island, to see if they are experiencing the same increase in PE. I am a little unsure what data I should be trying to find out from them. I will need to know: the number of cases they deal with per year, the number of affected animals within the herd/mob affected - incidence? Number of deaths - mortality? Guesstimate on possible production loss. What they were grazing at the time - changes in diet associated with outbreak? Response to treatment (vitamin B1)? Has the farmer had the problem before? We are now seeing a number of farms that have PE outbreaks in dairy/dairy beef calves on an annual basis. I am currently doing a literature review.

Would you be able to give me a hand to ask/phrased the 5 - 6 questions that I need to ask veterinary colleagues - sorta information that they would be easily able to give me, so I can get a general picture of the significance of PE in other parts of the South Island. I see there was an article on PE in this month's Vetscript.

Thanks for your time.

Regards, Joe Practitioner

1. What questions need to be answered?
2. Once you have defined the question to be answered, what should you do next (recognising that you will be dealing with multiple practitioners making PE diagnoses)?
3. How would you go about calculating the incidence of PE?
4. What would be the use in identifying risk factors for PE? What study design would you use to identify risk factors for PE? What would be the advantages and disadvantages of your proposed study design?
5. Once you had identified factors associated with the presence of PE, what would be your next step?

Answer