

Neonatal chlamydial conjunctivitis

To the Editor—I read with interest the article by Chang et al “Neonatal haemorrhagic conjunctivitis: a specific sign of chlamydial infection”.¹ I found the information useful concerning the clinical characteristics and the prevalence of different forms of bacterial conjunctivitis. However, I noticed that the statistical methodology used to determine the sensitivity, specificity and predictive values is flawed and may mislead readers. I would like to make a brief comment on this aspect.

Firstly, I would like to revise the calculation of those values using a 2 by 2 contingency table, because this helps illustrate my comment clearly (Table 1).² In Chang et al’s study, the data for blood-stained discharge are tabulated in Table 2, and obviously, the sensitivity, specificity and predictive values were obtained by simple calculation. But the authors made a very critical mistake when recruiting cases for the statistical analysis. They committed a selection bias as they have only included those with positive bacterial cultures from the eye swabs, while omitting those with negative results. To make the statistical results valid and reliable, they should have included all the eye swab cultures taken within the study period, regardless of whether they were positive or negative. Presumably, there should have been a significant number of negative cultures added for statistical analysis. Hence the data tabulated should be as shown in Table 3.

We can notice that besides the sensitivity, other values including specificity and predictive values will change. This is especially so for the positive predictive value because of the small number of cases of chlamydial infection with blood-stained discharge ($n=6$). A small change in the value b will significantly affect the positive predictive value. For instance, if $b=6$, then the positive predictive value will decrease from 1.0 to 0.5. Hence, according to the above discussion, the conclusion drawn by the authors was not valid.

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Authors’ reply

To the Editor—We would like to thank Dr Hui for reading our paper critically and giving his excellent comments on the statistical calculations. Actually we gathered all the negative culture results even before we wrote our study and we would like to share them here.

According to the definitions suggested by Dr Hui, our data are as follows: $b=0$ (ie of all patients who presented with clinical conjunctivitis but negative bacterial culture, none had blood-stained conjunctivitis), $d=223$ (ie patients with eye discharge—clinical conjunctivitis—but negative culture results) [Table].

Only the negative predictive value changes slightly but the sensitivity, specificity and positive predictive value remain unchanged. The small discrepancy of results is due to different definition of ‘disease’. We defined ‘disease’ as ‘conjunctivitis with positive culture’, ie chlamydial conjunctivitis plus non-chlamydial bacterial conjunctivitis and Dr Hui would like to include all clinical conjunctivitis without positive culture results.

As suggested by our statistician, we used a stricter definition: (1) positive culture is the golden standard for diagnosing conjunctivitis,

Table 1. 2 by 2 contingency table*

Test	Disease		Total
	Present	Absent	
Positive	a	b	a+b
Negative	c	d	c+d
Total	a+c	b+d	

* Sensitivity=a/(a+c); specificity=d/(b+d); positive predictive value=a/(a+b); negative predictive value=d/(c+d)

Table 2. Blood-stained discharge data as presented in Chang et al’s study*

Blood-stained eye discharge	Chlamydial conjunctivitis, n=19	Non-chlamydial conjunctivitis, n=71	Total
Positive	6	0	6
Negative	13	71	84
Total	19	71	

* Sensitivity=6/19=0.32; specificity=71/71=1.0; positive predictive value=6/6=1.0; negative predictive value=71/84=0.85

Table 3. Adjustment of blood-stained discharge data in Chang et al’s study*

Blood-stained eye discharge	Chlamydial infection, n=19	Non-chlamydial infection, n=71	Total
Positive	6	0+b	6+b
Negative	13	71+d	84+d
Total	19	71+b+d	

* b and d are the number of negative eye swabs with or without blood-stained discharge

References

1. Chang K, Cheng VYW, Kwong NS. Neonatal haemorrhagic conjunctivitis: a specific sign of chlamydial infection. *Hong Kong Med J* 2006;12:27-32.
2. Fletcher RH, Fletcher SW, Wagner EH. Clinical epidemiology the essentials. 3rd edition. Philadelphia: Lippincott Williams & Wilkins; 1996.

Table. Blood-stained discharge data after adjustment

Blood-stained eye discharge	Chlamydial infection, n=19	Non-chlamydial infection, n=71	Total
Positive	6	0+0	6+0=6
Negative	13	71+223=294	84+223=307
Total	19	71+223+0=294	

(2) viral conjunctivitis is extremely rare in neonates (which may have negative culture), (3) some clinicians may confuse the eye discharge of ‘neonatal lacrimal duct obstruction’ with conjunctivitis which may account for the large number of negative culture cases and, more important, (4) our definition was widely accepted by most international studies of conjunctivitis.

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