

Brief Communication

Cost utility analysis of diagnostic method of syphilis

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Abstract:

Presently, the diagnosis of syphilis is dependent mainly on serological tests. The most widely used screening tests for syphilis are the VDRL and the rapid plasma reagin (RPR) and for confirmation, the fluorescent treponemal antibody (FTA) and the treponema pallidum hemagglutination (TPHA) tests. The four alternative modes for diagnosis of syphilis can be a) VDRL + FTA, b) VDRL + TPHA, c) RPR + FTA and d) RPR + TPHA. Here the author reports an evaluation of cost utility of these tests in medical practice. It is shown that the cost per accurate diagnosis with VDRL + TPH is the least expensive choice. Therefore, this alternative is the best method for serological diagnosis for syphilis, based on medical laboratory economics principles.

Key Words: Serology, Diagnosis, Syphilis

Introduction:

Syphilis is a disease caused by a spiral organism, *Treponema pallidum*. It is systemic early from the outset, the primary pathology being vasculitis.[1] Acquired syphilis can be divided into primary, secondary, latent, and tertiary stages.[1] The infection can also be transmitted vertically resulting in congenital syphilis, and occasionally by blood transfusion and non-sexual contact.[1] Diagnosis is mainly by dark field microscopy in early syphilis and by serological tests.[1]

Presently, the diagnosis of syphilis is dependent mainly on serological tests. The most widely used screening tests for syphilis are the VDRL and the rapid plasma reagin (RPR) and for confirmation the fluorescent treponemal antibody (FTA) and the treponema pallidum hemagglutination (TPHA) tests.[2] Since the nonvenereal treponematoses have the same serological response as in syphilis [2] and the biological false positive is still an important in diagnosis of syphilis.[3] The confirmation test for any cases with positive screening test is recommended. Here the author reports an evaluation of cost utility of those tests in medical practice.

Materials and Methods:

Diagnostic methods

As described, there are two main screening methods and two confirmation methods for diagnosis of syphilis. Hence, the four alternative modes for diagnosis of syphilis can be a) VDRL + FTA, b) VDRL + TPHA, c) RPR + FTA and d) RPR + TPHA.

Cost analysis

The cost in Baht (1 US dollar = 41 Baht) for performing each test was reviewed. The cost used was set as the price of each test at the reference laboratory in Thailand (Special Laboratory, Bangkok Thailand)

Cost utility analysis

The cost for each alternative node for diagnosis of syphilis is calculated. The utility of each method is defined as the rate of ability to detect a case, which varies on the prevalence of disease in each path. The cost utility analysis is then performed. The operative definition of cost utility is cost divided by the utility similar to other cost utility study.

Results:

Cost and utility of each alternative method for diagnosis of syphilis are presented in Table 1. The cost and utility of each method are shown in Table 2. The cost/utility of RPR + FTP is the highest and VDRL + TPH is the lowest.

Table 1. Cost and utility of each alternative node for diagnosis of syphilis

Alternative node	Path	Prevalence (rate)	Cost (baht)
VDRL + FTA	VDRL -	0.98	40
	VDRL + (must FTA)	0.02	240
VDRL + TPHA	VDRL -	0.98	40
	VDRL - (must TPHA)	0.02	190
RPR + FTA	RPR -	0.98	50
	RPR + (must FTA)	0.02	240
RPR + TPHA	RPR -	0.98	50
	RPR + (must TPHA)	0.02	190

Table 2 Cost utility analysis

Alternative	Cost (baht)	Utility (rate)	Cost/utility (baht)
VDRL + FTA	44.0	0.02	2200
VDRL + TPHA	43.0	0.02	2150
RPR + FTA	53.8	0.02	2690
RPR + TPHA	52.8	0.02	2640

Discussion:

At present, medicine has made tremendous inroads against syphilis chiefly owing to the introduction of penicillin and vigorous public health initiatives [4]. However, the world continues to be burdened by this disease [4]. Since 2000, overall rates of syphilis have risen in the US and throughout the world [4]. Accurate interpretation of syphilis test results is essential for staging of disease and

appropriate treatment. Furthermore, through its association with an increased risk of HIV infection, syphilis has acquired a new potential for morbidity and mortality [4].

For diagnosis, Darkfield examination is the most important laboratory method for diagnosis of primary syphilis [5]. However, this test is not easily available and depends on special dark field microscope. Therefore, the serologi-

cal test is the standard at present. Concerning the routine practice, syphilis serology is an important tool for diagnosis of syphilis.

Although VDRL and RPR tests are excellent screens for syphilis, false-positive reactions do occur. A positive VDRL or RPR test must be confirmed with FTA test or TPHA test [6]. Patients with positive serologic tests should have a thorough physical examination to determine the stage of syphilis. A patient with a low-titer VDRL or RPR may have active disease and need further confirmation by confirmation test and may require lumbar puncture to rule out neurosyphilis [6].

Here, the author performed an economical analysis for the four common serological tests widely used for diagnosis of syphilis. Indeed, the VDRL and FTA-ABS are the most common serologic tests used for diagnosis and follow-up [5]. Here, it can be shown that the cost per accurate diagnosis for VDRL + TPH is the least expensive choice. Therefore, this alternative is the best method for serological diagnosis for syphilis, based on medical laboratory economics principles.

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