CORRESPONDENCE

Requirements and Assessment of Laboratory Tests

Part 5 of a Series on Evaluation of Scientific Publications

by Prof. Dr. med. habil. Dr. rer. nat. Wilfried Bautsch in volume 24/2009

Inpatient Admission Screening

The author is opposed to using laboratory screening to detect diseases; however, this might put many patients' lives at risk. I have two comments relating to inpatient admission screening:

- In patients who are not known to the doctor, serious comorbidities need to be excluded in a timely fashion before medical treatment is initiated. Bautsch reports, initially correctly, that a single positive laboratory measurement does not confirm a definite diagnosis for any disease. However, he concludes from this, incorrectly, that laboratory screening should not be performed. His reasoning gives away a one-dimensional perspective (inferring pathology y from laboratory value x). Any responsible physician will correlate abnormal laboratory values with further laboratory chemical and clinical parameters, so that such a one-dimensional model does not apply. On the contrary, computer aided diagnostic cascades should become mandatory in order to ascertain diagnoses that are as definite as possible and obtained in as little time as possible. From reading the activity reports from the assessors' committees from court cases dealing with medical malpractice, it becomes obvious that it is mostly too few or too late diagnostic tests that resulted in a fatal outcome.
- In patients with a minimum age of 70, computed tomography screening of the brain, thorax, and abdomen should therefore be advocated so as to rule out frequent life threatening diseases (for example, tumors, aneurysms). The selective irradiation phobia that is endemic in Germany (radiation from nuclear power stations and within medicine attract criticism, whereas radiation from coal power stations and in cigarette smoke are ignored) makes rational discussion impossible. By extrapolating down the number of deaths due to radiation in Hiroshima the conclusion is reached that exposure to x-rays causes many deaths every year. The natural exposure to radiation in the total population (including pregnant women and toddlers) in some parts of Iran is 200 mSv, but no raised death rates or incidence rates of cancer have been found and this is often kept quiet and is equivalent to a whole series of CT investigations.

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PD Dr. med. Ernst Eising

Elper Weg 66
45657 Recklinghausen
e-g-e@web.de

A Good Example

Borreliosis seems a good example to use in furthering this discussion. Professor Bautsch gives a probability of borreliosis of about 85% after a positive test result in cases where an indication for a blood test is given (for example, facial paresis).

The range of symptoms that is associated with borreliosis by doctors, patients, and self help groups is extremely broad, however, and many symptoms are also reported for diseases with a psychosomatic origin. For this reason, the question is how these individual symptoms are weighted when an indication is defined. Spontaneously, “hard” indicators that spring to mind include particular dermatological changes (erythema migrans, benign lymphocytoma, acrodermatitis chronica atrophicans), arthritis, and cardiomyopathy, as well as individual neurological disorders (for example, meningo radiculitis and paresis of the facialis muscle, although the latter is rare in adults). If other indicators are selected then the assessment of the result may more closely resemble that of a “population screening,” because often no consensus exists about whether individual symptoms are considered to be associated with borreliosis. In everyday clinical practice, it is easy to lose sight of this.

Epidemiological studies assume that 35% of the population will come into contact with borreliosis depending on the region, but mostly this population never develops apparent signs of illness. If it is true that no clear distinction is possible between active and cured borreliosis (p 405, right hand column) then that makes it even more difficult to reach reliable conclusions. Even if such conditions can be included in the statistical estimates, just which conclusions could possibly be drawn?

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Univ.-Prof. em. Dr. med Hanns Christian Hopf

Langenbeckstraße 1
55131 Mainz
Hopf@neurologie.klinik.uni-mainz.de

In Reply:

I can only agree with Professor Hopf. The indication to conduct a test for borreliosis seems uncontroversial for

the “hard” indicators that he lists. Statements that the borreliosis test may be helpful in unclear clinical presentations (I assume that these are the so called „soft“ indicators), as occasionally heard, should, however, be considered as highly problematic. In this scenario, the available serological tests are inappropriate, in my opinion, and should therefore not even be ordered.

Seroprevalence data can of course be included in estimating the positive predictive value (and would lower this value in such a scenario). However, such data are scarce in Germany; their geographical distribution is heterogeneous, and they change over time (after all, borreliosis seems to be on the increase). Serodiagnostics can yield more information than just “positive”/“negative”: the class of antibodies (IgM/IgG), the species of borrelia, and band pattern on the immunoblot test show a certain degree of correlation to the clinical signs of borreliosis, so that I am currently not able to provide a generally valid, quantitative answer here.

In response to Eising’s correspondence, I wish to clarify that my position as expressed in my article is by no means one of general opposition to screening tests. Neonatal screening or screening blood specimens for markers of infection are often useful or even unavoidable. In my article I wanted to draw attention to a general problem that applies to any investigation: the higher the number of healthy subjects in the study, the higher the number of false positive results. Without having more precise details about the specificity and sensitivity of the testing procedure and the prevalence of the disease that is being tested for, it is impossible to assess rationally the clinical value of suggested screening measures. This also holds true for the suggested inpatient computed tomography screening of patients older than 70, of course..

Whether “serious comorbidities” need to be ruled out rapidly in inpatients strongly depends on the definition of comorbidities. Naturally, this goes without say-

ing if these are associated with the underlying disease (for example, cytomegalovirus in AIDS), as their prevalence in the study cohort would be high. However, it would undoubtedly be highly controversial to conduct extensive investigations to rule out tumors in a 20 year old female patient with appendicitis without corresponding symptoms—especially as the question would then arise why such investigations are performed only in patients and not in the entire population.

I very much doubt whether it will become possible in the near future to distinguish genuine positive results from false positive results by using computer aided evaluation of the results of a laboratory screening test, independently of what information is available on the prevalence of possible pathologies. I am not aware of any good examples of such an approach. The only thing that springs to mind in this context are artificial neural networks (1,2), although as far as I am aware these have thus far been used only in symptomatic patients.

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Prof. Dr. med. habil. Dr. rer. nat. Wilfried Bautsch

Institut für Mikrobiologie, Immunologie
und Krankenhaushygiene
Celler Straße 38
38814 Braunschweig
w.bautsch@klinikum-braunschweig.de

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