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# The Use of Screening Investigations in Psychiatry

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**SUMMARY This is a study of the results of screening tests on all new psychiatric in-patients over a period of one year. Although none of the results indicated definite physical causes for the psychiatric illness, 10 per cent of the tests revealed abnormalities resulting from or co-incidental with the psychiatric illness. Of these abnormal results 61 per cent led to no further investigation or treatment, and the significance of this is discussed.**

Certain screening investigations are commonly performed on psychiatric patients for four main reasons. Firstly, they may be used to exclude certain physical disorders that may produce psychiatric illness, usually of an organic, schizophrenic or affective type. These disorders include syphilis, vitamin $B_{12}$ deficiency, cerebral space-occupying lesions (Davidson and Bagley, 1969; Slater and Roth, 1969), and hypothyroidism (Asher, 1949; Tonks, 1964). There is some evidence now that folate deficiency may also produce a variety of psychiatric symptoms (Reynolds, 1976). Secondly, screening investigations may be used to exclude physical conditions that may result from the psychiatric illness. Deficiencies in appetite and high alcohol intake may lead to detectable physical abnormalities. The third use of screening tests is for the detection of physical disorders co-incidental to the psychiatric illness; it has been shown that one third of psychiatric in-patients have a physical disorder, which in half the cases had been undiagnosed before admission (Maguire and Granville-Grossman, 1968), and in a day hospital survey (Burke, 1978) as many as 50 per cent of patients were found to have physical disorders. The fourth use of screening tests is for the detection of side effects of any drug therapy; this is likely to be increasingly common with today's polypharmacy.

The purpose of this present study is to estimate how often psychiatrists use screening tests, what information the tests provide, and whether this information is acted upon.

## Method

The case notes of all new in-patient admissions to the Psychiatric Unit of Withington Hospital from January 1st to December 31st, 1976 were retrospectively scrutinized. The results of routine screening investigations were studied; these included serology for syphilis (cardiolipin WR, Treponemal haemagglutination, VDRL test), thyroid function tests (serum thyroid-stimulating hormone, T3 and T4), vitamin $B_{12}$ and folate (estimated together), haemoglobin, erythrocyte sedimentation rate (ESR), electrolytes and urea, liver function tests, (bilirubin, aspartate transaminase and alkaline phosphatase) and a biochemical profile (calcium, phosphate, uric acid, cholesterol, and blood sugar). All results were returned from the laboratory on forms for filing in the notes. For all tests, except haemoglobin and ESR, the forms stated a normal range which had been estimated from previous surveys on normal populations using the same techniques of measurement. Abnormal results were any that fell outside the normal range provided by the laboratory. For the purpose of this study abnormal haemoglobins were those that fell below 11.0 gms/dl and abnormal ESRs those that were more than 30 mm in the first hour (Westegren). Routine radiology of the chest and skull were also considered.

If no prior cause was known for any abnormality, the case notes were examined to ascertain whether the abnormal result had led to further action being taken in the form of investigations, referral or treatment.

TABLE I

| | | Age | | Sex | | Psychiatric diagnosis | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Total | >65 | <65 | Male | Female | Schizophrenia | Affective | Neurosis | Personality disorder | Alcohol/drug abuse | Organic brain syndrome | Subnormal | No psychiatric diagnosis |
| All admissions | 613 | 77 | 536 | 232 | 381 | 89 | 158 | 138 | 59 | 111 | 46 | 2 | 10 |
| No investigations | 167 (27%) | 13 (17%) | 154 (29%) | 61 (26%) | 106 (28%) | 12 (13%) | 27 (17%) | 43 (31%) | 33 (56%) | 39 (35%) | 8 (17%) | 0 | 5 (50%) |
| Serology for syphilis | 202 (33%) | 26 (34%) | 176 (33%) | 83 (36%) | 119 (31%) | 40 (45%) | 60 (38%) | 34 (25%) | 9 (15%) | 35 (32%) | 22 (48%) | 0 | 2 (20%) |
| Thyroid function tests | 145 (24%) | 32 (42%) | 113 (21%) | 41 (18%) | 104 (27%) | 27 (30%) | 60 (38%) | 28 (20%) | 5 (8%) | 12 (11%) | 13 (28%) | 0 | 0 |
| Vitamin B12 and folate | 99 (16%) | 28 (36%) | 71 (13%) | 42 (18%) | 57 (15%) | 13 (15%) | 28 (18%) | 14 (10%) | 4 (7%) | 25 (23%) | 14 (30%) | 1 | 0 |
| Skull X-ray | 251 (41%) | 39 (51%) | 212 (40%) | 92 (40%) | 159 (42%) | 50 (56%) | 73 (46%) | 49 (36%) | 14 (24%) | 36 (32%) | 26 (57%) | 1 | 2 (20%) |

The figures in parenthesis are the percentage of patients in each category receiving the investigation.

## Results

There were 622 admissions, of which 9 case notes were unavailable (Table I). The initial rather than the final diagnosis was used, as it would be this that determined the investigation to be performed. Twenty-seven per cent of all admissions had no screening; of these over half had been admitted from other wards after investigations or had stayed in hospital less than 48 hours, when there had been insufficient time to investigate.

Table I also shows how often those tests that may reveal physical causes of psychiatric disorder are used (serology for syphilis, thyroid function tests, serum $B_{12}$ and folate, and skull X-ray). Except for serology for syphilis, all were more frequently performed on patients over the age of 65. Thyroid function tests were more frequently performed on females. All these tests were more commonly performed on those diagnosed as having schizophrenia, affective or organic illness. Vitamin $B_{12}$ and folate tests were also frequently performed on those with alcohol or drug abuse. Table II shows the abnormal results.

*Serology for syphilis* The 202 investigations revealed 6 abnormal results (3 per cent). Two patients were known to have had treated syphilis many years previously (1 organic, 1 schizophrenic). The other 4 results were all considered insignificant, 2 being biological false positive reactions and 2 being inactive syphilis (1 organic, 1 affective). None were considered aetiologically relevant to the psychiatric disorder or in need of treatment.

*Thyroid function tests* There were 145 investigations and these yielded 21 abnormal results (14 per cent). Of these, 5 were normal when repeated; 3 abnormal results (2 hypothyroid and 1 hyperthyroid) led to eventual treatment; and 13 abnormal results (9 in the hypothyroid range and 4 in the hyperthyroid range) led to

TABLE II

| Test | Total | % age of all admissions | Normal | Known abnormal | New information | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Insignificant | Normal on repeat | Action taken | No action taken |
| Serology for syphilis | 202 | 33% | 196 (97%) | 2 | 4 | 0 | 0 | 0 |
| Thyroid function tests | 145 | 24% | 124 (86%) | 0 | 0 | 5 | 3 | 13 |
| Vitamin B12 and folate | 99 | 16% | 79 (80%) | 0 | 0 | 3 | 8 | 9 |
| Skull X-ray | 251 | 41% | 241 (96%) | 0 | 7 | 1 | 1 | 1 |
| Chest X-ray | 326 | 53% | 260 (80%) | 25 | 22 | 0 | 10 | 9 |
| Haemoglobin | 417 | 68% | 400 (96%) | 3 | 0 | 0 | 9 | 5 |
| ESR | 329 | 54% | 274 (84%) | 12 | 0 | 0 | 17 | 26 |
| Electrolytes and urea | 332 | 54% | 286 (86%) | 1 | 6 | 17 | 5 | 17 |
| Liver function tests | 397 | 65% | 321 (81%) | 1 | 0 | 12 | 4 | 59 |
| Biochemistry | 397 | 65% | 339 (85%) | 7 | 0 | 12 | 4 | 35 |
| TOTAL | 2,895 | | 2,520 (87%) | 51 (1.7%) | 39 (1.4%) | 50 (1.7%) | 61 (2.1%) | 174 (6%) |

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no further action or repeated testing. The abnormal results were scattered amongst a wide variety of psychiatric disorders. The hypothyroid results were obtained from 3 patients with schizophrenic illness, 3 with affective illness, 3 with neuroses, 1 with alcoholism and 1 with organic illness. The hyperthyroid results were obtained from 2 patients with schizophrenia, 2 with neuroses and 1 with drug abuse. No abnormal results were considered aetiologically relevant to the psychiatric disorder.

*Vitamin $B_{12}$ and folate* There were 99 investigations which gave 20 abnormal results (20 per cent), of which 3 were normal when repeated. Eight patients with abnormal results (2 low $B_{12}$ and 6 low folate) received appropriate treatment, and 9 abnormal results (all low folate) led to no further action or repeated testing. The abnormal results were again from a wide variety of psychiatric diagnoses. The low $B_{12}$ levels were from 1 patient with schizophrenic illness and one with affective illness. The low folate levels were obtained from 6 patients with affective illnesses, 4 with neuroses, 3 with alcoholism, one with schizophrenic illness and one with organic illness. None were considered aetiologically relevant to the psychiatric disorder.

*Skull X-ray* Investigations had been made in 251 cases and gave 10 abnormal results (4 per cent), of which one was normal on repeat and 7 were insignificant. One abnormal result led to further investigation, which revealed a small pituitary tumour, not considered relevant to the psychiatric disorder. One abnormal X-ray that was reported as possibly being due to an underlying neoplasm led to no further action.

*Chest X-ray* Here 326 investigations gave 66 abnormal results (20 per cent), of which 25 were previously known and 22 considered insignificant. Ten patients with significant abnormalities underwent further investigation or treatment (4 chest infections, 2 neoplasms, one pneumothorax, one goitre, one pericardial cyst and one possible mitral valve disease). But 9 abnormal results led to no further action (3 congestive cardiac failures, 2 chest infections, 2 pulmonary opacities, one pleural effusion and one possible aortic aneurysm).

*Haemoglobin* There were 417 investigations, which produced 17 abnormalities (4 per cent), 3 of the patients were already known to be anaemic; 9 patients newly diagnosed received appropriate treatment, whereas 5 patients had no further investigation or treatment.

*Erythrocyte sedimentation rate* There were 329 investigations, which gave 55 results (16 per cent), of over 30 mm in the first hour, of which 12 could be adequately explained by known concurrent physical illness. Seventeen patients had other investigations which allowed the cause to be determined (7 alcoholic hepatitis, 6 infections, 3 neoplasms and one auto-immune disorder). Twenty-six patients with abnormal ESR had no further action taken to elucidate the cause.

*Electrolytes and urea* Here 332 investigations revealed 46 abnormal results (14 per cent), of which one was previously known, 6 were insignificant and 17 were normal when repeated. Five patients had appropriate treatment of the abnormality; 17 with significant abnormal results were neither retested, investigated or treated.

*Liver function tests* Investigations numbered 397 and revealed 76 abnormalities (19 per cent), of which one was previously known and 12 were normal on repeat. Four abnormal results led to further action to investigate and treat the cause; 59 abnormal results led to no further action—however 39 of these were due to alcoholism.

*Biochemical profile* This was established in 397 cases. There were 58 abnormalities (15 per cent), of which 7 were previously known and 12 were normal on repeat. Four abnormalities led to further investigations and treatment; 35 abnormal results led to neither repeat testing or any further action.

Of the total 2,895 screening tests on 613 patients, 375 abnormal results were obtained; of these, 39 were considered insignificant and 51 were due to abnormalities known prior to the test being performed. Thus, 285 abnormal results were potentially significant and gave information about possible clinical abnormalities not previously suspected and therefore possibly required further action. Of these 285 results, repeated testing in 50 cases gave normal results

and in a further 61 cases there was either further investigation, referral to appropriate specialists, or initiation of treatment for the abnormality. In 174 cases of new potentially significant abnormalities there was neither repeat testing nor any further action.

Of all the tests performed, 286 results (10 per cent) either confirmed known abnormalities or led to the definite or possible confirmation of new abnormalities.

## Discussion

This study shows that the majority (73 per cent) of new psychiatric in-patients at Withington Hospital are subjected to screening investigations. It appears as though psychiatrists use serology for syphilis, thyroid function tests, vitamin $B_{12}$ and folate and skull X-rays more often in patients diagnosed as schizophrenic, affective or organic, and presumably are screening for physical causes of these disorders.

In the 613 patients in this study, no definite physical cause of the psychiatric disorder was found. The low yield of significant positive results in screening for syphilis has been noted before (Banks, 1968), but the seriousness of the condition seems to warrant continued screening, although its value in patients over 65 years has been questioned as all positive results at this age appear to be due to inactive disease (Bell, 1959). Thyroid function tests revealed 3 definite cases of abnormality coincidental to the psychiatric illness and 13 abnormal results that were not followed up. The value of thyroid function tests in females over 40 years has been shown before (Nicholson *et al*, 1976), and it is interesting that all but one of the hypothyroid results in this study were females in this age group. A recent survey (McLarty *et al*, 1978) revealed 7.6 per cent of psychiatric in-patients with abnormal thyroid function tests. Further investigation, however, revealed that actual thyroid disease was much lower, 0.7 per cent having hyperthyroidism and 0.5 per cent hypothyroidism. All cases of hyperthyroidism, but only one out of 5 cases of hypothyroidism, were clinically obvious; this perhaps indicates that in patients with no obvious clinical manifestation only those with tests falling in the hypothyroid range need further investigations. Vitamin $B_{12}$ and folate levels again show a high number of abnormalities coincidental with the psychiatric illness, as has been shown in previous studies (Reynolds, 1976; Wu *et al*, 1975). The value of skull X-ray in psychiatry has been questioned (Delaney, 1976), and this study would appear to confirm that its use is limited. However, only 251 skull X-rays were studied, and it is possible that in a bigger series more significant abnormalities would be obtained.

Of all the screening tests performed in this study, 10 per cent indicated definite or possible physical abnormalities either as a result of or coincidental with the psychiatric illness; this would seem to indicate the value of screening tests in psychiatric patients. Although many of the abnormal results are coincidental, some abnormalities are likely to be a consequence of the underlying psychiatric illness. Electrolyte and urea disturbances, fall in haemoglobin, $B_{12}$ and folate levels may all reflect either acute or chronic changes in water and dietary intake which often occur in psychiatric illnesses, and liver function tests are likely to give abnormal results in some patients with alcoholism.

It should be pointed out that as many patients were subjected to a battery of screening investigations it might be expected that some results would fall outside a statistically defined normal range by chance alone.

Perhaps the most significant finding is that of the 285 abnormal results providing new information 61 per cent led to no further action either in repeat testing, further investigation or treatment. These findings are similar to those found in a study of an American Mental Hygiene Clinic (Shatin *et al*, 1978) which showed that clearly abnormal results occurred in 4.8 per cent of the patients but that no further action was taken in 52 per cent of the cases.

It is true that in this study some of the abnormalities were only slightly outside the normal range provided by the laboratories; however, many of the results not followed up were as abnormal or more so than those that led to a definite diagnosis and treatment of physical disorder. It is significant that those abnormal findings that did lead to further testing revealed high incidences of physical disorders which needed treatment. Even those

abnormalities just outside the normal range should at least require repeat testing to demonstrate eventual normality. Some of the results not followed up, such as the abnormal liver function tests in alcoholics, and abnormal electrolytes and ureas in dehydrated patients, as well as those abnormal by chance alone, could have been expected to return to normal, but unless a repeat investigation is carried out those with permanent damage will be missed.

Thus it would appear that psychiatrists do use screening tests to eliminate physical abnormalities; but in many instances they do not appear to use the results of these tests. It is possible that aetiologically relevant conditions are not being fully excluded, and certain physical conditions resulting or coincidental with the psychiatric conditions are not being fully investigated or treated. Any psychiatric patient admitted to hospital should expect from his doctors not only adequate psychiatric investigation and treatment but also that any physical condition revealed will be fully investigated and treated if necessary.

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