procaine penicillin, and it can easily be withdrawn from the bottle and injected into the patient with a 20 or 22 B.W.G. needle.

Side-effects.—During these trials some 120 intramuscular injections of benethamine penicillin were given without any immediate untoward effects beyond the complaint in a few instances of a slight stinging pain or of some mild stiffness or aching at the site of injection. In five instances a more pronounced local reaction occurred later. One volunteer developed a "T.A.B.-like" reaction 72 hours after the injection of 300,000 units into the deltoid. This persisted for about 24 hours and then subsided. Four other ambulant subjects developed a hard tender lump in the buttock or thigh after the injection of 600,000 units; from one of these a small quantity of sterile necrotic material was evacuated. No general reactions occurred.

We have not yet had enough experience to be able to give an accurate assessment of the incidence of reactions, but it would seem a wise precaution to inject benethamine penicillin deeply into the largest muscle available, and preferably into the buttock.

Discussion

Although no direct comparison was made, it is evident that in terms of blood levels benethamine penicillin falls between procaine penicillin (cf. Cohen, 1950) and benzathine penicillin (cf. Elias *et al.*, 1951; Fletcher and Knappett, 1953); that is to say, the levels are lower and more prolonged than those obtained with procaine penicillin but higher and of shorter duration than those that follow the injection of benzathine penicillin.

There was good agreement between the results at the three hospitals, but, as seems to occur with all repository preparations, there was considerable variation from patient to patient in the height and duration of the levels. The difference in the results of the three doses—300,000, 600,000, and 900,000 units—was surprisingly small, but on the whole the levels of the patients who received the larger doses were somewhat higher and more prolonged, and hence probably more efficient therapeutically. For instance, at 72 hours, 9 (27%) of 33 patients who received only 300,000 units had serum concentrations below 0.03 unit per ml., but none of the 22 patients who were given 600,000 or 900,000 units had levels below this figure at either 72 or 96 hours.

These results suggest that for the usual infections seen in everyday practice one injection, or possibly two, of 600,000 units for an adult or 300,000 units for a child should be adequate treatment. Although this investigation was not designed to test the therapeutic response to benethamine penicillin, our experience to date seems to indicate that this is the case. The salt has also obvious possibilities in the treatment of venereal diseases and yaws, for use before and after surgery, and in other forms of prophylaxis. It is clearly unsuitable for the treatment of infections that require a high concentration of penicillin, for which sodium penicillin remains the preparation of choice.

Summary

Benethamine penicillin is a new relatively insoluble penicillin salt. After a single injection a bacteriostatic level of penicillin is maintained in the blood for three to six days, depending on the dose and the individual response. It is best administered by deep intramuscular injection into the buttock or thigh, where it is less likely to provoke any reaction than in the arm.

From a consideration of the blood levels it is suggested that one injection, possibly two, of 600,000 units for an adult or 300,000 units for a child should be adequate to treat the more sensitive and accessible infections seen in everyday practice, and our experience so far suggests that this is in fact the case.

We are grateful to Dr. A. F. Mohun for allowing us to include the results of his assays, and to him and to Dr. A. C. Cunliffe

for their valuable criticism and advice. We also wish to thank Mr. Todd and Mr. Fleming for their technical assistance. Glaxo Laboratories Ltd. kindly supplied the benethamine penicillin. Finally, we should like to record our gratitude to the patients and volunteers who co-operated so willingly during this investigation.

REFERENCES

- Cohen, R. I. (1950). *Lancet*, 1, 622.
Elias, W., Price, A. H., and Merriam, H. J. (1951). *Antibiot. and Chemother.*, 1, 491.
Fletcher, A. P., and Knappett, C. R. (1953). *British Medical Journal*, 1, 188.
Gaddum, J. H. (1953). *J. Pharm. Pharmacol.*, 5, 345.

ASSESSMENT OF 1,011 PATIENTS IN A MENTAL DEFICIENCY HOSPITAL

BY

GEORGE McCOLL, M.D.

AND

LEON SLUPINSKI, M.A.

(From Prudhoe and Monkton Hospital, Northumberland)

Research into various aspects of mental deficiency is in process at Prudhoe and Monkton Hospital. Our work is far from complete, but certain data are already available, and these may be compared with the results obtained by O'Connor and Tizard (1954) in their survey of patients in 12 mental deficiency institutions. Our classification of 1,011 mentally defective patients on clinical and psychometric grounds is at such variance with their figures that we think it may be of some interest.

In order to make it easy to follow and compare both sets of results at a glance we have arranged them exactly according to the pattern given by O'Connor and Tizard in Table II of their survey. We also attempted to follow their line of thought and took a group of 60 males and 24 females whose ages were between 16 and 30 years and who had been previously classified as feeble-minded, and we found their respective mean I.Q.s. Again the discrepancy between results is too wide to be ignored.

Findings

The figures in Table I are based on clinical and psychometric findings. For clinical assessment the medical superintendent was responsible, and for psychometric assessment the clinical psychologist. In most cases clinical and psychological findings have been complementary; in a very few cases when discrepancy occurred, after full discussion of our findings, past history, social aspect, and behaviour of the case, the final classification was agreed upon.

TABLE I.—Distribution of Patients by Sex, Grade, and Age

Age	Male				Female				Totals			
	Idiot	Imbecile	F.-M.	Totals	Idiot	Imbecile	F.-M.	Totals	Idiot	Imbecile	F.-M.	Totals
0-4 ..	3	0	0	3	1	0	0	1	4	0	0	4
5-9 ..	25	14	4	43	9	7	6	22	34	21	10	65
10-14 ..	29	29	10	68	23	17	3	43	52	46	13	111
15 ..	3	10	2	15	5	2	2	9	8	12	4	24
Total (children)	60	53	16	129	38	26	11	75	98	79	27	204
16-19 ..	16	23	10	49	18	7	5	30	34	30	15	79
20-29 ..	30	49	50	129	31	28	19	78	61	77	69	207
30-39 ..	16	73	38	127	15	46	17	78	31	119	55	205
40-49 ..	6	70	38	114	6	45	18	69	12	115	56	183
50+ ..	6	46	14	66	4	43	20	67	10	89	34	133
Total (adults)	74	261	150	485	74	169	79	322	148	430	229	807
Total ..	134	314	166	614	112	195	90	397	246	509	256	1,011

The initial assessment was usually made on the admission of the patient to hospital, and was enlarged during routine examinations and examination before recertification. If necessary the matron or the chief male nurse and nursing staff were consulted with regard to the patient's social behaviour.

Every certified patient in the hospital was submitted to psychological testing; also, most of the licence cases were recalled to hospital for a short period so as to complete their assessment. Unfortunately, we were unable to get the assessment of all patients who were on the hospital books. Our list of exceptions includes 30 patients: 13 males and 3 females on licence, living over 100 miles from the hospital, one male patient who absconded from the hospital two years ago; one male and two female patients with whom we were unable to make any contact owing to superimposed psychosis from which they suffer; six male and two female blind patients; and one male and one female with gross speech defect. We have omitted the blind and speech-disorder patients purposely, as, although they have been assessed, we do not regard their assessment as fully valid, because of their physical disabilities. So out of a total number of 1,041 patients we have been able to secure data of 1,011 patients of both sexes who were on the hospital books on December 31, 1953. We have not included in our table data obtained from 68 patients who have been transferred or discharged, or have died since the beginning of our inquiry.

For the routine testing we used the revised Stanford-Binet intelligence scale F.L., the Alexander performance scale, the progressive matrices, and occasionally the Kent oral and Rorschach test.

We found the revised Stanford-Binet test, with all its shortcomings, still most useful when dealing with low-grade patients and children. The Alexander performance scale, beginning with 7 years' practical ability, was not so often used as the revised Stanford-Binet because of its limited range.

We found the progressive matrices of very limited value with mental defectives. We obtained only a few significant results with patients whom we would prefer to call socially or morally defective rather than mentally defective. However, we would like to mention that the behaviour and reactions of a patient when he is tested individually on matrices, irrespective of scores, can sometimes throw light on his personality. The Kent oral test we used very infrequently, and then mostly with blind patients.

Table II shows the results obtained on testing 84 feeble-minded patients by the revised Stanford-Binet intelligence scale F.L.; this particular test was chosen for our purposes because it agrees in most cases with the clinical assessment.

TABLE II.—*Distribution of I.Q.s of a Group of 84 Feeble-minded Patients Between 16 and 30 Years of Age*

I.Q.	Male	Female
50-54	22	8
55-59	11	4
60-64	11	3
65-69	4	4
70-74	3	2
75-79	1	1
80-84	4	1
85-89	1	1
90-94	3	
Total	60	24
Mean I.Q.	62.50	61.91

Comparison with Another Series

Our results are compared with those of O'Connor and Tizard with regard to the classification of mentally defective patients and with regard to I.Q.s of a group of feeble-minded between 16 and 30 years of age (Tables III and IV). There may, of course, be quite a number of factors which are responsible for the discrepancy between two sets of results.

TABLE III.—*Difference in Classification and Percentage of Mental Defectives*

	No. of Cases under Investigation	Idiots		Imbeciles		Feeble-minded	
		No.	%	No.	%	No.	%
O'Connor and Tizard ..	592	35	5.9	247	41.7	310	52.3
Present series ..	1,011	246	24.3	509	50.3	256	25.3

TABLE IV.—*Difference of Method and Numbers and I.Q. Mean of Two Groups of Feeble-minded, Whose Ages are Between 16 and 30*

	No. of Patients under Investigation	F.-M. Group Ages 16-30 Selected Group	F.-M. Group Ages 16-30 Actually Tested	Mean I.Q. Ages 16-30
O'Connor and Tizard ..	592	102	49 (group matrices)	74-75 boys only
Present series ..	1,011	84	84 (on R. Stanf.-Bin.)	62.2 both sexes

If the "sample" figures produced by O'Connor and Tizard give a true account of the actual population of the 12 mental deficiency hospitals under review, then it would appear that there are marked differences in approach to the question of mental defectives in hospital and perhaps different criteria concerning the function which a mental deficiency hospital is supposed to serve.

Summary

The preliminary findings from the assessment of 1,011 patients in a mental deficiency hospital are discussed.

Comparison with the figures given in a similar survey, recently published, shows a wide variance in the results obtained.

REFERENCE

O'Connor, N., and Tizard, J. (1954). *British Medical Journal*, 1, 16.

TREATMENT OF TETANUS WITH SUCCINYLCHOLINE

BY

A. T. T. FORRESTER, M.B., B.S.

Medical Registrar, Royal Hampshire County Hospital

The first report on the use of muscular relaxant drugs in the treatment of tetanus was by Spencer Wells (1858-61), who in 1858 treated three cases with woorara (a crude preparation containing curarine). With the development of modern anaesthesia more such drugs have been introduced for the treatment of tetanus. Among these are curare (Godman and Adriani, 1949), gallamine triethiodide (Smith and Thorne, 1952), mephensin (Hamilton Smith, 1953), and succinylcholine (Woolmer and Cates, 1952).

The case reported here was treated with continuous intravenous infusion of succinylcholine for five and a half days. For much of the time spontaneous respiration was so reduced that oxygenation had to be artificially maintained, and the case was dealt with in a manner very similar to that advocated by Lassen (1953) for the treatment of poliomyelitis with respiratory paralysis.

Technique

Tracheotomy was performed as soon as it became obvious that the degree of relaxation required to overcome the spasms made artificial respiration necessary; the tracheotomy tube selected was fitted with a side-arm through which the gases used were delivered. Respiration was assisted by the