

# ECT: History

## THE USE OF SHOCK THERAPY IN 305 MENTAL HOSPITALS<sup>1</sup>

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The Mental Hygiene Division of the United States Public Health Service, in conjunction with its consultation and survey service for state mental hospitals, frequently receives inquiries concerning the use of shock therapy in the treatment of patients with mental disease. We are asked how many hospitals are using shock therapy, whether its use is increasing or decreasing, and what the users think of its value. The literature does not answer these questions although there are many published reports

recently.<sup>2</sup> It was undertaken to answer the question, "What hospitals are using shock therapy and what do they think of it?" Some of the carefully considered replies based on representative samples of cases are doubtless more valid than the aggregate opinion. Thus, while this paper is based on data from 305 mental institutions,<sup>3</sup> the weight of numbers does not necessarily indicate where the truth lies, and conclusions should be made or accepted with caution.

To secure the data upon which the study

TABLE I  
MENTAL HOSPITALS REPORTING THE USE OF SHOCK THERAPY, OCTOBER, 1941

Type of control	Receiving questionnaire, No.	Hospitals			
		Responding <sup>1</sup>		Using shock therapy	
		No.	Per cent	No.	Per cent
State hospitals .....	183	160	87.4	150	93.8
Federal hospitals <sup>2</sup> .....	34	34	100.0	27	79.4
City and county hospitals <sup>3</sup> .....	26	21	80.8	14	66.7
Private hospitals .....	99	77	77.8	57	74.0
Psychiatric wards in selected general hospitals .....	14	13	92.9	12	92.3
Total .....	356	305	85.7	260	85.2

<sup>1</sup> Additional late replies from five state hospitals, two county hospitals, one private hospital, and two psychiatric wards in selected general hospitals were received; they have not been included in any of the tabulations.

<sup>2</sup> Includes 30 veterans administration facilities; St. Elizabeths Hospital, Washington, D. C.; Medical Center for Federal Prisoners, Springfield, Missouri; psychiatric wards in Walter Reed General Hospital, Washington, D. C. and U. S. Marine Hospital, Ellis Island, New York.

<sup>3</sup> Includes 5 hospitals in Pennsylvania which have been reclassified as state hospitals; since the data for the majority of these institutions responding are for a period prior to their reclassification, they have been included in county institutions.

of limited series of cases and the experience of single institutions.

The present study was not undertaken to determine conclusively the absolute and relative merits of the various forms of shock therapy nor to review the voluminous literature, a task which has been done very well

has been based, questionnaires were sent to all known state, federal, city and county mental hospitals, general hospital psychiatric wards, and to 99 selected private institutions. Eighty-six per cent of all hospitals receiving forms returned them in time for tabulation.

Table I shows the extent of response from the various classes of mental hospitals receiving questionnaires as well as the percentage of each class of responding mental

<sup>1</sup> Read at the ninety-eighth annual meeting of The American Psychiatric Association, Boston, Massachusetts, May 18-21, 1942.

Appreciation is extended to the hospital administrators who returned the questionnaire upon which this study is based.

From the Division of Mental Hygiene, United States Public Health Service.

<sup>2</sup> Jessner and Ryan: Shock Therapy in Psychiatry. Grune and Stratton, New York, 1941.

<sup>3</sup> Ten additional late replies are not included in the tabulations.

hospitals which have used or are continuing to use some kind of shock therapy. Eighty-five per cent of all responding institutions have used some form of shock therapy. The state hospitals with 94 per cent lead the list; the city and county hospitals have the lowest figure of 67 per cent. This confirms the belief that shock therapy has aroused wide interest and at least clinical trial.

The questionnaire elicited a wide range of opinions concerning the general value of shock therapy. Some typical comments are:

I would like to see further and more extensive use of shock therapy throughout the United States. Frankly, I feel shock treatment will go the way of many other vaunted cures.

I do not believe shock therapy offers us any real benefit. It certainly is not a specific. It does not in any way help the patient to understand his own problems or to change his attitude towards his problems. It certainly in no way assists the psychiatrist in understanding the patient, his problems or his makeup. From the cases I have seen treated by shock therapy, I believe better results could have been obtained by devoting the time and energy towards a more constructive program. To be bluntly, I do not believe that we can scramble brains and expect to have anything left but scrambled brains.

We have been having quite a lot of discussion over the receipt of your inquiry concerning shock treatment, and I have delayed my answers in order to get the staff to formulate the experience here. I must admit, however, that these discussions do not get very far. Most of the staff have been favorably impressed by the promptness of improvement after shock. I am probably the most skeptical one regarding the value of the treatments. Our records show a considerable tendency to lose their improvement. Furthermore, in the cases I have seen (here and elsewhere) where shock did not bring improvement, I have been strongly impressed by the hindrance to psychotherapy. In spite of testations to the contrary, the staff does not continue psychotherapeutic efforts with the same interest and zeal on a patient who is under shock treatment.

I realize that there are authorities who speak very highly of the shock treatments. But there are some of us who see the end results of the treatment, particularly in that group of cases which transfer from sanitarium to sanitarium. Frequently shock treatment has been given by one sanitarium; the patient improves for a short while, is released, and lands in another sanitarium. The first sanitarium reports satisfactory results. Statistics will be difficult to collect, especially with the group of patients which improve for a short period and swing into a manic phase. There are many

things that I could say against this treatment, but since I cannot say anything for it, despite some people's enthusiasm for the electric shock treatment, I shall close by saying that this sanitarium does not give the shock treatment.

All methods of shock therapy are extremely valuable.

None will be used until proven safe and effective.

In general the danger of damage outweighs the benefits if any. Small private hospitals cannot afford to take chances until such treatment has proved reliable, which so far it has not.

Table II shows the number of patients in all mental hospitals who received shock therapy between 1935 and October, 1941. According to this tabulation a total of 68,688 patients received such therapy. It is possible, however, that this represents an incomplete enumeration and that probably more than 75,000 patients have received some form of shock therapy. Since insulin, metrazol and electric shock have been used for varying lengths of time in the responding hospitals, it is necessary to pro-rate the number of patients receiving such treatment to the total number of hospital patients under treatment during the period that shock therapy was in use in order to obtain a rough estimate of the proportion of all mental hospital patients who received this form of treatment. This is done as described in the footnote to Table II. The results show that 1.45 per cent of patients under treatment during any one year received insulin shock therapy, 2.28 per cent received metrazol shock therapy and 2.33 per cent received electric shock therapy. The highest proportion of patients who have received the various types of shock therapy was to be found in private hospitals. As might be expected, patients treated in psychiatric wards in selected general hospitals were least subjected to any form of shock therapy.

The trend in the use of shock therapy is shown in Fig. 1. Insulin shock was introduced in 1935, followed by metrazol a year later. After a lag of about a year both were taken up with considerable enthusiasm. Insulin reached its peak in 1938 when its use was reported by 54 per cent of responding mental institutions; metrazol reached a peak in 1939, when 65 per cent of responding mental hospitals reported its use. Since these peaks, however, the rate of decline for metra-

zol has been greater than for insulin; if these trends continue metrazol will become less popular than insulin sometime during 1942. Electric shock therapy first came into appreciable use in 1939 and was adopted more rapidly than either insulin or metrazol. It was being used by 42 per cent of mental institutions during October, 1941, when its use was still increasing with no evidence of diminishing interest except in two hospitals where it was discontinued upon the basis of doubtful or inadequate results.

Fig. 2 throws additional light on changes in the use of shock therapy by showing the trends within hospitals which have used

was replaced by another type of shock therapy. The tendency has been to discard the old for the new with many institutions going progressively from insulin to metrazol to electric shock. Of the institutions reporting decreased or discontinued use of insulin 23 indicated that it was being replaced by metrazol, 27 by electric shock, 18 by both metrazol and electric shock, and 4 by typhoid or combinations of insulin-metrazol or metrazol with curare. Of the institutions reporting decreased or discontinued use of metrazol 88 indicated that it was being replaced by electric shock, 4 by insulin and 1 by insulin-metrazol. Of the institutions

TABLE II  
THE EXTENT TO WHICH SHOCK THERAPY HAS BEEN USED FOR ALL PATIENTS UNDER TREATMENT IN MENTAL HOSPITALS<sup>1</sup>

	Total patients receiving shock therapy			Average annual percentage of all hospital patients under treatment <sup>2</sup>		
	Years therapy has been used			Insulin	Metrazol	Electric
	1935-41 Insulin	1936-41 Metrazol	1940-41 Electric			
State hospitals .....	18,479	29,497	5,590	1.12	1.98	1.96
Federal hospitals .....	912	341	26	1.15	1.29	1.58
City and county hospitals .....	1,059	1,979	467	3.06	4.72	4.21
Private hospitals .....	2,556	4,232	1,186	6.27	9.48	11.76
Psychiatric wards in selected general hospitals .....	645	790	500	0.26	0.39	0.79
Total .....	23,651	36,839	7,769	1.45	2.28	2.33

<sup>1</sup> Omitted from table are 429 cases who received combined insulin-metrazol shock therapy in state, federal, or private mental hospitals.

<sup>2</sup> This index is derived by first computing the average number of patients receiving each type of shock therapy per hospital year of treatment and then standardizing the resulting figures for each 100 patients annually under treatment in the average hospital for each class.

shock therapy. In general these data support the trends shown in Fig. 1. A few more hospitals report an increasing use of metrazol than of insulin, while an increasing use of electric shock is reported in many more institutions than report increased use either of metrazol or insulin. The use of metrazol was also decreasing in slightly more hospitals than was insulin, while the use of electric shock was decreasing very little within the institutions using it. Fig. 2 also shows the proportion of hospitals which discontinued the use of each type of shock therapy; insulin was discontinued by 34 per cent, metrazol by 33 per cent, and electric shock by less than 1 per cent.

Most hospitals reporting decreased or discontinued use of any one type of shock therapy usually indicate that it is being or

reporting decreased or discontinued use of electric shock, 2 indicated that it was being replaced by metrazol while 1 indicated that it was being replaced by camphor, petrotoxin and metrazol.

Personnel and financial considerations rather than merit alone sometimes determined the discontinuance or decreasing use of one or all types of shock therapy. This is shown by such typical statements as the following:

Our nursing personnel is inadequate to undertake any form of shock therapy which would require considerable nursing care.

It has been necessary for us to adopt the method which requires the least help from the nursing staff, namely electric shock therapy.

For institutional work in which the funds would be available I would prefer insulin treatment to any one of the three.

1942] there is a private hospital catering to a middle class of people and I believe insulin shock would be used more frequently were the question of expense not such a problem. Consequently we are using electric shock and metrazol in preference. Insulin shock therapy was discontinued because of very encouraging results were obtained continuing the expense and also because of a personnel shortage due to the defense emergency.

In spite of evidence that the use of insulin and metrazol is declining rapidly, 66 per cent

Replies to the question, "If only one form of shock therapy were available to you which would you use?" are tabulated in Table III. Since many hospitals expressed a preference for some form of shock therapy even though they had not used it, the responses are broken down according to the kinds of therapy which had been used. Of 111 institutions which had used all three forms of shock therapy, almost 60 per cent preferred electric

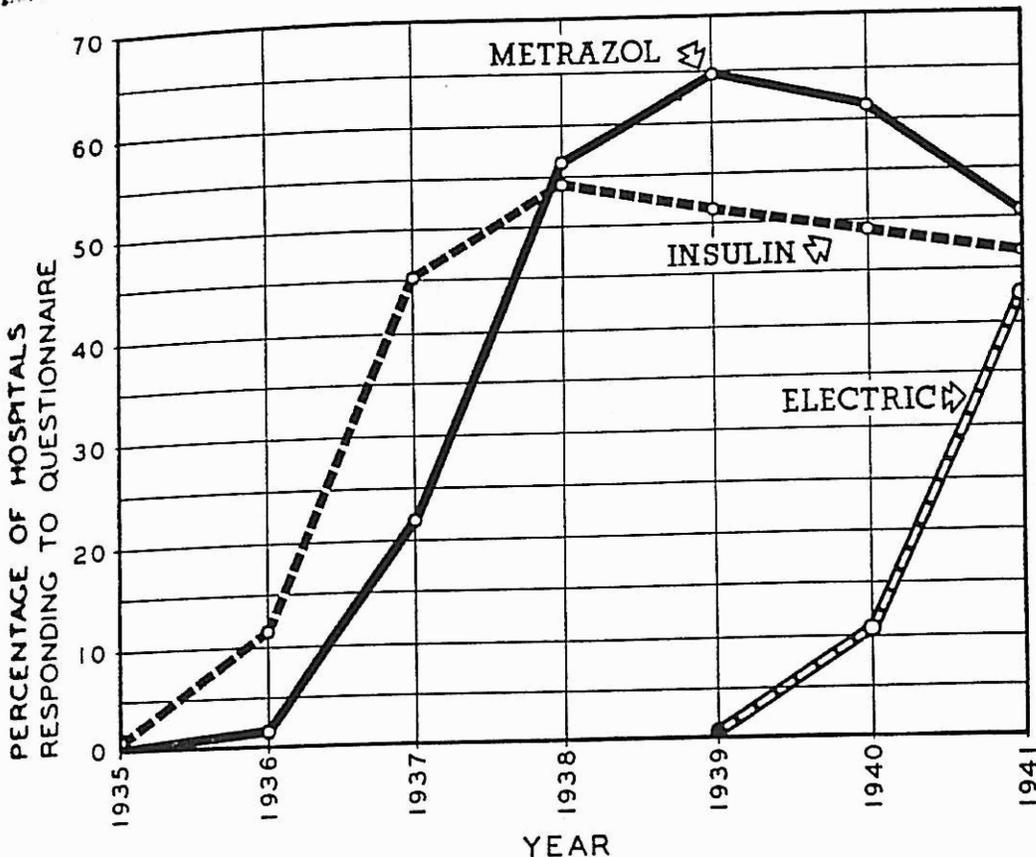


Fig. 3. Percentage of all mental hospitals using insulin, metrazol and electric shock therapy at the end of each year, 1935-1941, inclusive.

Hospital administrators believe that insulin shock is a valuable form of therapy, 78 per cent believe that metrazol is valuable, while 77 per cent believe that electric shock is of value. These data are shown in Fig. 3 and the percentages are based only on the opinions from hospitals which were using the type of therapy which they professed to prefer. It is interesting to note the small proportion of hospitals which considers shock therapy of no value.

shock, 8 per cent metrazol, 13 per cent insulin, 7 per cent some combination, and 13 per cent were undecided or did not state. Some typical reasons given for preferences were:

The reason I select electric shock therapy is because if it were the only therapy available it would be the easiest and the least expensive for the type of hospital we have. However, I feel that there are now definite indications for the use of insulin, metrazol or electric shock in various types of psychotic patients. I feel that insulin is of definite avail in certain forms of dementia praecox

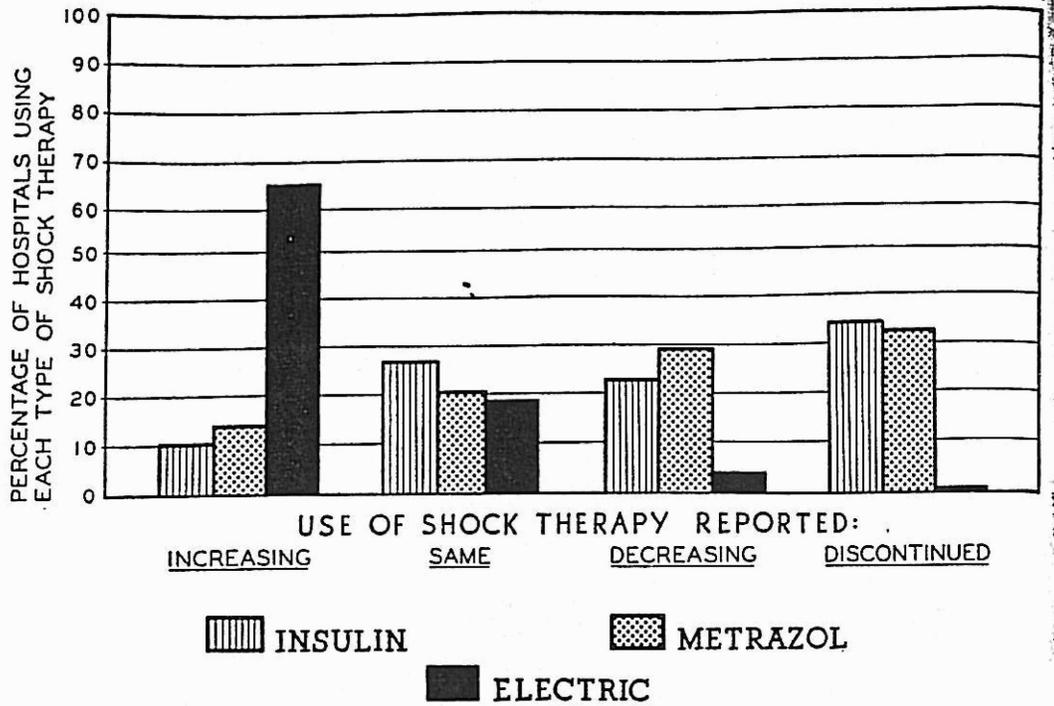


FIG. 2.—Trend in the use of shock therapy in mental hospitals.

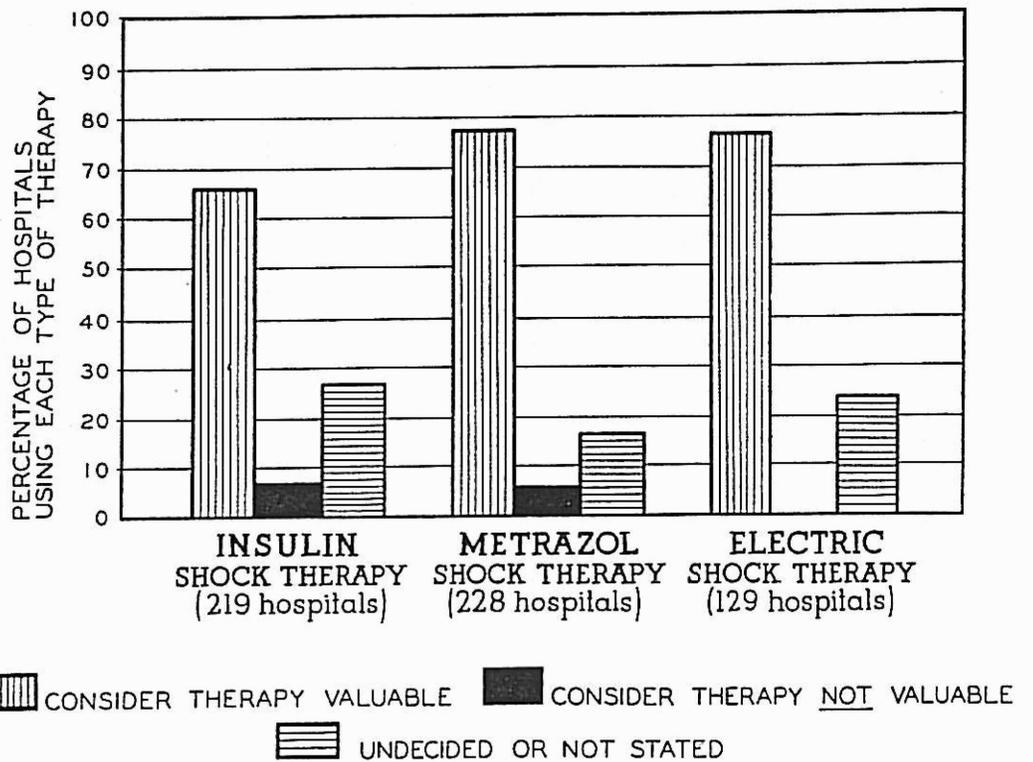


FIG. 3.—Opinions concerning the value of shock therapy.

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where electric shock is of no avail. I feel that the depressive syndromes and the maniacal syndromes are best treated with electric shock or metrazol shock therapy. In the well advanced cases of paranoia no therapy is of any avail.

I like electric shock best because it produces a complete amnesia from the start; it does not produce the fear that metrazol does and the results are the same as to cure.

We have pioneered metrazol in the United States and extended its scope to other disorders than schizophrenia. Our results have been most gratifying and here of the ill effects claimed by others. We are of the opinion all ill effects can be eliminated by the employment of a proper technique in approaching the patient and the administration of metrazol.

If only one form of shock therapy were available to us for use in schizophrenia, we would prefer to use insulin.

Metrazol and insulin were most frequently used together. Two interesting comments on combinations follow:

We place great stress on a combination of insulin and metrazol and now on insulin and electric. We have tried, also, a series of different types of shock in rapid succession. In 1937 we stopped using metrazol alone and only used it in combination with insulin; by this technique of giving it to a relaxed stuporous patient we decreased our injuries to a marked degree.

Metrazol, when used in selected cases to induce convulsions during the insulin treatment, can often make the difference between success and failure, when either metrazol or insulin alone is unsuccessful.

Fig. 4 shows the psychiatric conditions for which the three types of shock therapy are indicated according to the respondents. Of

TABLE III

TYPE OF SHOCK THERAPY PREFERRED<sup>1</sup>

Preferences expressed by hospitals using	Number of hospitals reporting	Shock therapy preferred								Undecided and not stated	
		Insulin		Metrazol		Electric		Combinations		No.	Per cent
		No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent		
Insulin, metrazol and electric	111	14	12.6	9	8.1	66	59.5	8	7.2	14	12.6
Insulin and metrazol	78	26	33.3	20	25.6	6	7.7	6	7.7	20	25.6
Metrazol only	30	..	..	11	36.7	6	20.0	3	10.0	10	33.3
Insulin only	21	8	38.1	..	..	2	9.5	..	..	11	52.4
Metrazol and electric	9	..	..	1	2	6	2	..	..	2	2
Electric only	3	..	..	..	..	2	2	..	..	1	2
Miscellaneous	8	5	2	..	..	2	2	1	2	..	..
None	45	2	4.4	..	..	4	8.9	..	..	39	86.7
Total	305	55	18.0	41	13.4	94	30.7	18	5.9	97	32.0

<sup>1</sup> Replies to question "If only one form of shock therapy were available, which would you use?"  
<sup>2</sup> Less than ten cases in denominator.

The results obtained with electric shock are comparable with those obtained when metrazol therapy is used. However, electric shock is preferable for the following reasons: (1) More economical; (2) Technique of treatment simpler; (3) Useful in patients whose physical condition contraindicates metrazol therapy; (4) Fewer complications, especially compression fracture of the vertebrae; (5) Less anxiety for the treatment.

The use of metrazol by the medical staff of this hospital has apparently given better results than any other form of shock therapy used, although these were not considered, I believe that we would probably be using insulin as much as metrazol.

Electric shock is preferred because of: (1) Less danger to patient; (2) Results slightly more effective than metrazol; (3) Less apprehension; (4) Can be used when condition is complicated by organic factors.

Eighteen institutions preferred some combination of the three types of shock therapy.

the hospitals reporting the use of insulin 96 per cent had used it for some form of dementia praecox while 25 per cent had used it for some form of the manic-depressive psychoses. Hospitals using metrazol also used it more frequently for dementia praecox (81 per cent) than for manic-depressive psychoses (73 per cent), but the users of electric shock listed manic-depressive psychoses as an indication (86 per cent) ahead of dementia praecox (79 per cent). Many more of the institutions listed involuntional melancholia as an indication for metrazol (67 per cent) and electric shock (73 per cent) than for insulin (14 per cent). The psychoneuroses were considered suitable for treatments in 15 per cent of the institutions using metrazol and electric shock and in 10 per cent of

those using insulin. Some comments on various conditions suitable for treatment are as follows:

Insulin, it seems to us, is far more valuable in cases of schizophrenia where we have seen excellent and lasting results. Metrazol did not give good results in schizophrenics. On the other hand, involuntional psychoses and manic-depressive insanity have a comparatively good prognosis anyhow. In cases of depressions of manic-depressive insanity we saw a number of failures with metrazol; after a temporary improvement the patient slipped back or changed his symptoms from depressed features to hypochondriacal ones.

Our preference is electric shock for the manic-depressive and involuntional group, insulin for schizophrenia.

Metrazol was a valuable form of treatment, but it does nothing that electric shock cannot do less expensively, more safely, more pleasantly and all around in superior fashion. Metrazol shock was indicated in the involuntional melancholias and in depressive states. I do not believe it had value in other conditions. Electric shock is of value in the involuntional melancholias, in the depressive states, whether of manic-depressive or other unclassified type, and in what I have called the anhedonic unreality syndrome. Electric shock treatment is limited in its value. It has no place in the treatment of neuroses. It can be used experimentally in the earlier phases of what is diagnosed as schizophrenia, fully realizing that the percentage of error under such circumstances is great and that there is a spontaneous remission and recovery rate as well. Its use in chronic schizophrenia seems to me to have little or no value. In the obsessive-compulsive states it has not given me any noteworthy results. On the other hand in the involuntional melancholias, in the depressive states of whatever type it brings immediate amelioration to practically all cases, and recovery to some, though an uncertain proportion slip back later. The improvement cannot be accidental since practically every case shows at least marked temporary improvement.

Convulsive shock (metrazol or electric) is more effective in affective disorders; insulin shock is best in schizophrenia. However, with any shock treatment improvement in schizophrenia is only temporary, as essential schizophrenic patterns remain unchanged. Results obtained in affective disorders are more gratifying.

It is interesting to note that 6 per cent of the institutions using insulin considered it useful in the treatment of various forms of chronic alcoholism, although little concerning such use has appeared in the literature. From the questionnaire responses it appears that shock therapy is used more in treating the manic state of the manic-depressive psychoses than one would judge from a cursory

reading of the literature. Several rather unusual uses were recorded. For instance, a young malingerer who was a car thief, "recovered" his memory after one metrazol injection.

Some hospitals said they did not recommend shock therapy, but gave it occasionally upon request of patient's relatives.

Reported specific diagnostic indications in descending order of frequency are: For insulin—catatonic dementia præcox, paranoid dementia præcox, hebephrenic dementia præcox, involuntional melancholia, depressed states of manic-depressive psychoses, manic states of manic-depressive psychoses, psychoneuroses, simple dementia præcox, and alcoholism.

For metrazol—involuntional melancholia, catatonic dementia præcox, depressed states of manic-depressive psychoses, other depressions, manic states of manic-depressive psychoses, psychoneuroses, paranoid dementia præcox, and hebephrenic dementia præcox.

For electric shock—involuntional melancholia, depressed states of manic-depressive psychoses, catatonic dementia præcox, manic states of manic-depressive psychoses, other depressions, psychoneuroses, paranoid dementia præcox, and hebephrenic dementia præcox.

Many respondents mentioned limitations on the value of shock therapy and particularly the necessity of combining psychotherapy with it. Typical statements follow:

Except for a few cases in whom several shock treatments facilitate a subsequent psychotherapeutic approach, I do not feel that shock treatment can justify its use. It is very often a short cut for the more laborious, but more productive attempt at reorientation and exploration of the psychodynamic problems involved.

The cases treated with shock without intensive psychotherapy have not persisted well. Metrazol has not seemed to offer the opportunity for the same type of psychotherapy, therefore, I prefer insulin, despite its length and expense.

We feel that, in general, electric shock and metrazol treatments bring the patient to a state in which a better rapport can be established and thus psychotherapy used more effectively.

The pharmacological shock treatment methods are used here only as adjuncts in a total psychotherapeutic approach, including psychotherapeutic interviews with physicians, and a program of physical education, occupational therapy, hydrotherapy, physiotherapy, and a program to promote socialization.

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 We use it when we think it is indicated and  
 use it to do a certain thing; that is, not to cure  
 a manic, but to keep a manic from exhausting him-  
 self not to cure a simple depression, but to make  
 a depressed case that is not eating, eat. It is a  
 therapeutic measure, which should be used for what  
 it offers. Considering the prognosis of the cases  
 that we treated our results have been what we  
 expected in 83 per cent of the cases.

Figs. 5, 6, and 7 show the complications re-  
 ported for each type of shock therapy. The  
 classification was not predetermined, but was  
 made up from the replies received. This is

and dislocations particularly in metrazol  
 therapy are well directed. The fracture and  
 dislocation rate in electric shock is 9 per  
 1,000 with no other complication exceeding  
 0.6 per 1,000. However, at least some of  
 the cases listed as "sore back" were prob-  
 ably fractures. Comments relating to com-  
 plications are as follows:

We had a metrazol fracture rate of 6 per cent  
 without curare. We have been using curare (in-  
 tocostrin Squibb) routinely for the past year and  
 have had no fractures.

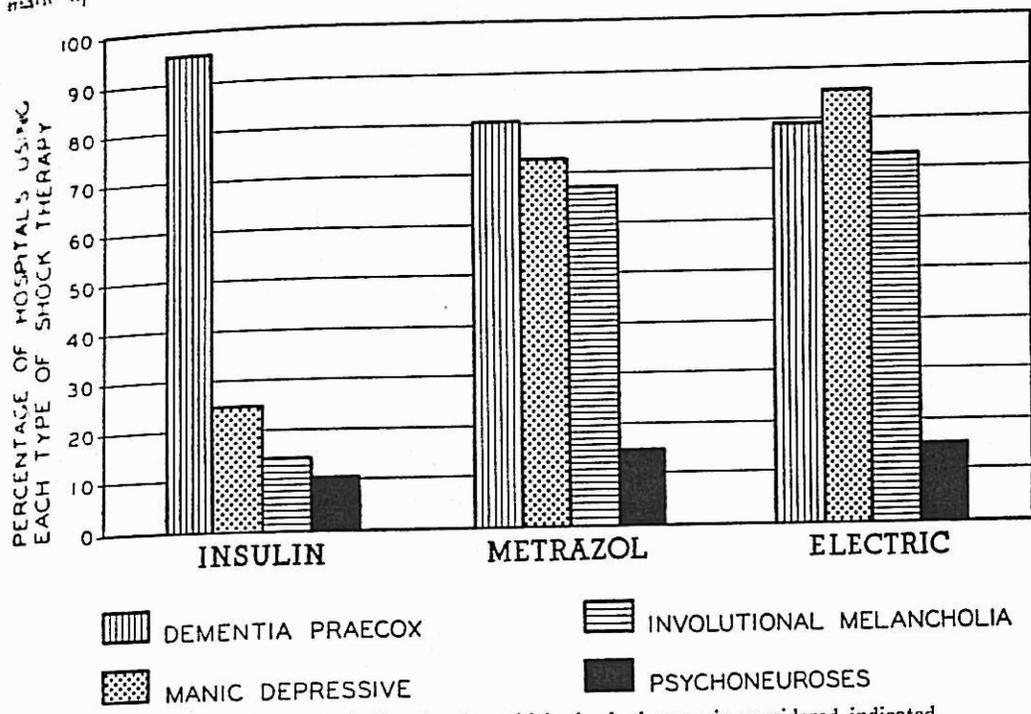


FIG. 4.—Classes of mental disorder for which shock therapy is considered indicated.

why convulsions are shown as a complica-  
 tion of insulin therapy; only a few hospitals  
 regarded it as such, hence the low reported  
 rate. The most frequent complication of  
 insulin therapy was prolonged coma with a  
 rate of 8.5 per 1,000 cases treated, about  
 3 1/2 times more than pneumonia and pulmo-  
 nary conditions, the next most frequent  
 complication. In metrazol therapy, fractures  
 and dislocations with a rate of 39 per 1,000  
 are by far the outstanding complication,  
 being 34 times as frequent as tuberculosis  
 activation which is the only other complica-  
 tion with a rate greater than 1 per 1,000.  
 This shows that efforts to prevent fractures

We have had no fractures in the past year since  
 the use of curare.

Our treatment with curare and metrazol has been  
 so satisfactory in selected cases that we have so far  
 not availed ourselves of electric shock equipment.

We feel quite differently about metrazol shock  
 therapy since using intocostrin. We have had no  
 complications and can give it to persons with cardio-  
 vascular disease and some other diseases which  
 would otherwise contraindicate its use with safety.

Total complication rates are shown in  
 Fig. 8 together with death rates. Twenty  
 per 1,000 (2 per cent) of all the insulin  
 cases had complications recorded; 43 per  
 1,000 (4.3 per cent) of all metrazol cases  
 had complications recorded; 11 per 1,000

Fig. 5.—Rate per 1000 patients receiving insulin shock

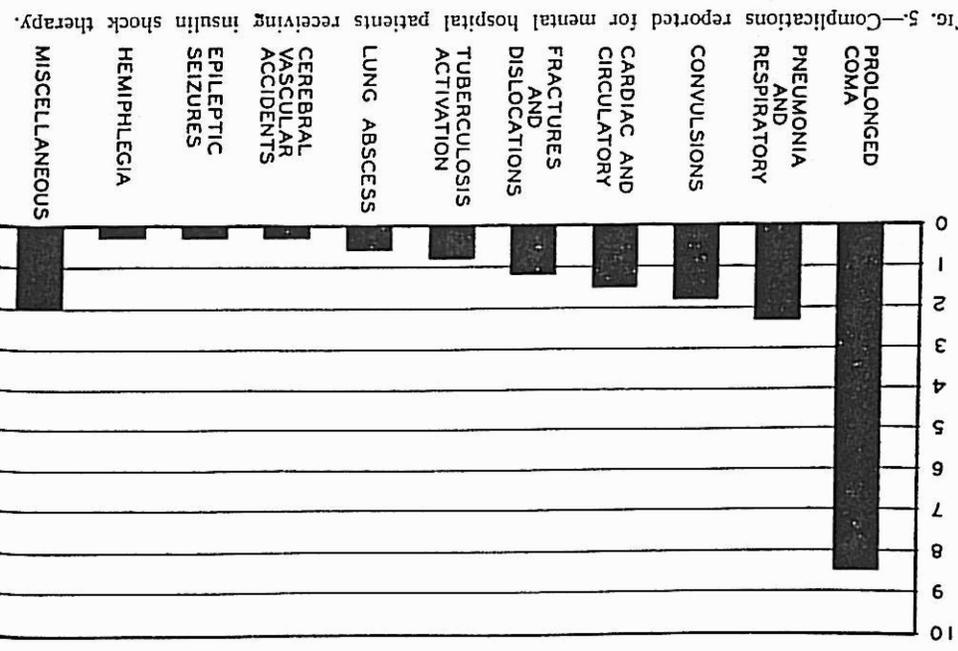


Fig. 5.—Complications reported for mental hospital patients receiving insulin shock therapy.

Fig. 6.—Rate per 1000 patients receiving metrazol shock

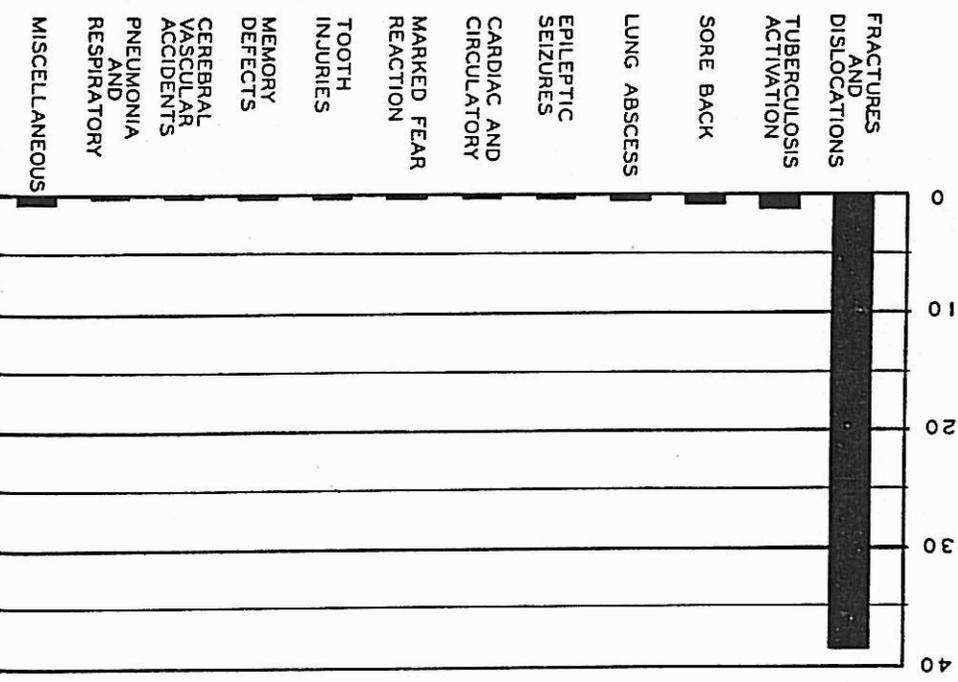


Fig. 6.—Complications reported for mental hospital patients receiving metrazol shock therapy.

1942] (111 per cent) of those receiving electric shock suffered complications. Although metrazol therapy is more often attended by complications than insulin or electric shock, these apparently are not as serious as those found with insulin or electric shock. With

insulin the death rate is 6 per 1,000 compared to 1 per 1,000 for metrazol; with only 4 deaths attributed to electric shock therapy in 7,207 cases, the death rate is 0.5 per 1,000. Complication and death rates are substantially higher in public hospitals than in private institutions except for deaths due to electric shock, and here the number of deaths is too small to obtain reliable rates. In insulin therapy the deaths in public hospitals are 2½ times as great as in the private institutions.

Assuming that complications and deaths are as faithfully reported by one group of institutions as the other there are several possible explanations for this seemingly greater hazard attending the use of shock therapy in public hospitals. Many of them are greatly understaffed as regards physicians and nursing attendants so that patients may receive less than optimum care during the periods of special therapy. Lack of adequate medical staff may result in inadequate preliminary search for contraindications to shock therapy. Cases admitted to the private institutions may be better risks because of better physical condition and better nutrition

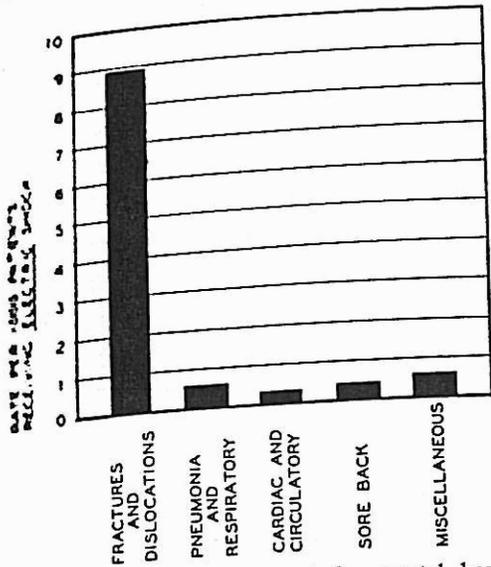


FIG. 7.—Complications reported for mental hospital patients receiving electric shock therapy.

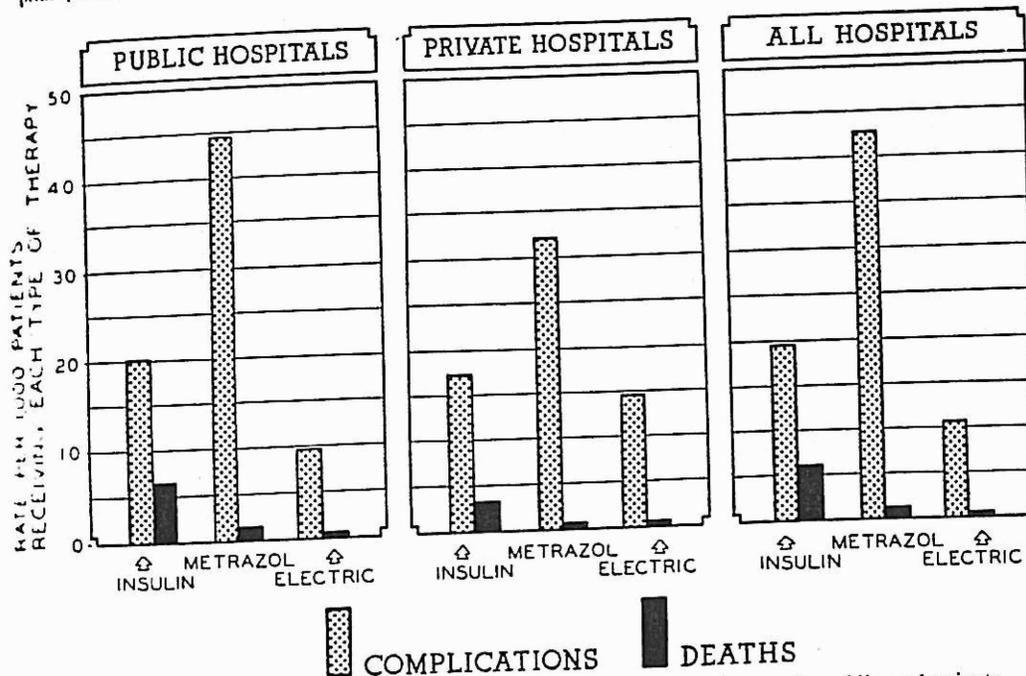


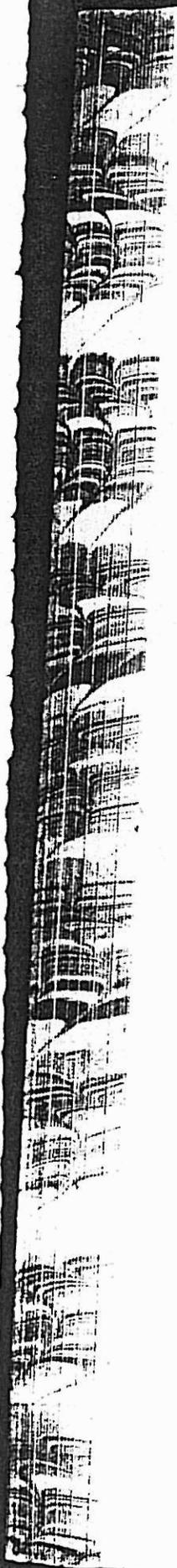
FIG. 8.—Complication and death rates for patients receiving shock therapy in public and private hospitals.

EPILEPTIC SEIZURES  
HEMIPLEGIA  
MISCELLANEOUS

insulin shock therapy

CEREBRAL VASCULAR ACCIDENTS  
PNEUMONIA AND RESPIRATORY  
MISCELLANEOUS

metrazol shock therapy



with fewer secondary diseases. The ratio of deaths to complications is also greater in public hospitals; this confirms the fact that shock therapy in public hospitals is more hazardous than in private institutions, but does not help to explain why it is so.

In conclusion, it is evident from the data presented in this paper that shock therapy has been widely adopted in mental hospitals

and is receiving an extensive clinical trial. The tendency has been to drop the older in favor of the newer forms, but the reasons for change have not always been based on scientific merit. Shock therapy is widely regarded as a promising therapeutic measure, but there is a healthy skepticism that insures careful study of the numerous problems raised by it. This is the essence of progress.