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Objective Evaluation of Therapeutic Procedures in Mental Diseases

Psychiatry has never had available the quantitative measurements so indispensable to other branches of clinical medicine. The fact that emotional tension cannot be expressed in mm Hg or mental aberration in terms of percentage deviation from normal has made it difficult to evaluate a given psychiatric case in an exact objective way. Described here is a scale which provides a method of assessing various personality functions in near-quantitative terms.

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In a series of previous publications we reported experiences in the use of a psychiatric rating scale for the quantitative recording of clinical changes in the course of mental diseases. This method was originally devised to facilitate investigative work in a research project where we wished to determine the occurrence of neuro-physiologic and biochemical changes in the course of certain psychiatric syndromes and their relation to the clinical picture.

It was obvious from the beginning that if the presence or absence of correlates was to be established, we had to have a method of evaluating day-by-day changes in the clinical course that could be adequately and intelligibly compared with changes observed in the physiological and chemical functions. To be useful in an objective study of this type, such an evaluation had to be expressed in terms that would lend themselves to quantitative recording and, at the same time, represent an adequate record of the clinical picture. There had, furthermore to be a statistically valid uniformity of recording when used by different observers working independently.

The Psychiatric Rating Scale

The Psychiatric Rating Scale presented here has been extensively modified in the course of subsequent research studies and has proven useful in these studies. In addition to its applicability in research, it has since its introduction several years ago shown itself to be a useful, much-needed method for evaluating the effects of therapeutic procedures (3-5).

Present trends in psychiatry and particularly the institution of new therapeutic procedures in the last few years have made necessary such a method of evaluation. Various shock therapies (electric shock, insulin, Metrazol), psycho-

Patient's Age :

* PSYCHIATRIC RATING SCALE (After Malamud & Sands, 1948)

FUNCTION	6	5	4	3	2	1	BASE LINE		1	2	3	4	5	6
APPEARANCE	BIZARRE		DECORATIVE		OVER-METICULOUS		NEAT	CARELESS	SLOVENLY	UNTIDY	INCONTINENT		SMEARING	
MOTOR ACTIVITY	EXCITED		AGITATED		RESTLESS		ACTIVE	QUIET	UNDER-ACTIVE		RETARDED		STUPEROUS	
MIMETIC EXPRESSION	INCONGRUOUS		DRAMATIZING		EXAGGERATED		ANIMATED	RESTRAINED	STIFF		WAXY-FLEXIBILITY		MASK-LIKE	
RESPONSIVITY	ANAKLITIC		SUGGESTIBLE		DEPENDENT		FLEXIBLE	RIGID	STUBBORN		RESISTIVE		NEGATIVISTIC	
HOSTILITY REACTIONS	DESTRUCTIVE		COMBATIVE		BELLIGERENT		AGGRESSIVE	SELF-EFFACING	SELF-DEPRECATING		SELF-MUTILATING		SUICIDAL	
SOCIALIZATION	DISRUPTIVE		MEDDLESOME		OUT-REACHING		EXTRAVERTED	INTROVERTED	SHUT-IN		ISOLATED		INACCESSIBLE	
EATING HABITS	OMNIPHAGIC		VORACIOUS		GLUTTONOUS		INDULGENT	FINICKY	ANOREXIC		REFUSING (SPOON-FED)		TUBE-FED	
SEXUAL BEHAVIOR	ASSAULTIVE		SOLICITING		OVER-ACTIVE		HETERO-SEX ACTIVE	HETERO-SEX UNDER-ACTIVE	HOMOSEX. PAS. HOMOSEX. ACT. (BY NECESSITY)		HOMOSEX. PAS. HOMOSEX. ACT. (BY PREFERENCE)		HOMOSEX. ASSAULT. OPEN MASTURBATION	
SLEEP	SEVERE INSOMNIA		MOD. INSOMNIA		RESTLESS SLEEP		LIGHT	HEAVY	SOMNOLENT		LETHARGIC		COMATOSE	
WORK	SCATTERED		DISORGANIZED		OVER-ACTIVE		EAGER	INDIFFERENT	SPORADIC-INEFFECTIVE		RESISTIVE		REFUSE	
ATTENTION	UNCONTROLLED		MARKEDLY DISTRACTIBLE		MODERATELY DISTRACTIBLE		ALERT	DETACHED	PREOCCUPIED		DISPARATIVE		COMPLETELY WITHDRAWN	
AWARENESS	CONFUSED	SCATTERED (DISORIENTED)	SPLITTING		SUPERFICIAL		DIFFUSE	RESTRICTED	PERPLEXED	DEPERSON-ALIZATION	CLOUDY (DISORIENTED)		UNCONSCIOUS	
SPEECH	INCESSANTLY PRODUCTIVE		PUSH-OF-SPEECH		OVER-TALKATIVE		VOLUBLE	TERSE	UNDER-TALKATIVE	RETARDED	BLOCKING		MUTE	
ASSOCIATIONS	ECHOLALIA		KLANG		ABRUPT		DIRECT	INDIRECT	VAGUE-CIRCUMSTANTIAL	TANGENTIAL	IRRELEVANCIES		NEOLOGISMS	
MOOD	EXHILARATED		EUPHORIC		ENTHUSIASTIC		OPTIMISTIC	PESSIMISTIC	SOMBER		DESPONDENT		DEEPLY DEPRESSED	
AFFECT	INAPPROPRIATE		EXPLOSIVE		LABILE		DEMONSTRATIVE	RESERVED	INADEQUATE		BLAND		FLAT (RIGID)	
FEELING	PANIC	ANXIOUS	TENSE		HYPERSENSITIVE		SENSITIVE	CASUAL	PHLEGMATIC		DULL		APATHETIC	
PERCEPTION	HALLUCINATIONS		ILLUSIONS PSEUDO-HALLUCINATIONS		EXAGGERATED INTENSITY		EXTEROCEPTIVE	INTEROCEPTIVE	SELF-OBSERVATION	HYPOCHON-DRIASIS	CONVERSIONS		SOMATIC HALLUCINATIONS	
THOUGHT PROCESSES	FRAGMENTED		ALOGICAL PARALOGICAL		ILLOGICAL		SHALLOW	CRITICAL	RATIONALIZING		OBSESSIVE HAIR-SPLITTING		OBSESSIVE DOUBT	
SUBJECTIVE REORGANIZATION	COSMIC DEL. (OMNIPOTENCE)	DEL. OF GRAND.	IDEAS OF PER.	IDEAS OF INFLU.	IDEAS OF REF.	AUTISTIC	EXTRA-PERSON. REFERENCE	INTRO-PERSON. REFERENCE	IDEAS OF INFERIORITY	SELF-ACCUSATORY	SOMATIC DELUSIONS		NIHILISTIC	
MEMORY	CONFABULATION		FABRICATION		OBSESSIVE REMINISCENCES		PRECISE SCRUPULOUS	CARELESS VAGUE	OVER-GENERALIZING		GAPS		DETERIORATED	
INSIGHT	NEGATION OF PROBLEM	PROBLEM EXOGEN.	RECOG. OF PROB. WITHOUT CONCERN		SHIFTING OF BLAME		SELF-SATISFIED	SELF-CRITICAL	SELF-HYPER-CRITICAL	ADD. OF NON-EXIST. PROBS.	DESPAIRING SELF BLAME		ATTITUDE OF COMPLT. HELPLESSNESS	

Rater's Name :

Date :

CHART I.

surgery, nonconvulsive chemical methods (CO_2, ether, niacin and others) and, most recently, hormonal therapies have followed in rapid succession. Claims and counterclaims of their effectiveness, of indications and contraindications, methods of administration, sequelae have made it important adequately to evaluate results and establish an objective delineation of each one's usefulness.

The Rating Scale is briefly described here, particularly as it can be applied in evaluating the effects of adrenocortical and allied substances in the treatment of certain mental diseases.

Basic Functions. In attempting to devise the Rating Scale, we recognized that personality disturbances do not lend themselves easily to quantitative recording. The more mechanical methods of measurement such as are used in chemical determinations for example were obviously inapplicable here. But quantitative recording was not altogether impossible. In everyday work with the mentally ill, we examine the patient, determine the type and severity of disorder and, in the process of treatment, observe and record changes in the patient's behavior that will eventually lead to a decision regarding the chances of recovery and social readjustment. To that extent we make objective, quantitative observations, using as a standard of measurement the relative degree of adjustment or maladjustment, as the case may be. We do this, furthermore, on the basis of such personality functions as motor activity, intellectual capacity, socialization, emotional tone and the like. Each of these functions is manifested in a form deviating more or less radically from that observed in the patient before his illness. Taking this into consideration, we developed the Rating Scale in the following manner.

A number of functions most commonly used in our clinical evaluations of a mental examination were selected and in each one a series of deviations from normal behavior designated in terms of relative severity of interference with adjustment. These functions and the deviations occurring in each one are presented in Chart 1.

Enumerated on the left-hand margin are the 22 functions selected. They fall arbitrarily into 3 groups, depending on how they can be recorded. The first group (1 to 6, 11 to 14, 19 to 22), contains all the functions that can be observed during the physician's interview with the patient. In the next group (7 to 10, inclusive) are functions that can be observed on the ward. These findings are obtained from the nurses, attendants and occupational therapists in daily contact with the patient. The third group (15 to 18, inclusive) represents those personality functions that take place within the patient and about which he must be questioned.

The Base Line. The first problem was to establish a base line against which to measure deviations. Our attempts at treatment do not aim at establishing a hypothetical normal – since the characteristics of any one of these functions in so-called "average" people vary with each individual – but toward a return of a patient to the level of behavior he maintained before his illness.

It was therefore found necessary to describe, in regard to each function, at least two variables found in average people of different types. The particular form that was true of a given patient preceding the onset of illness is taken as his normal level, and the aggregation of his own "normal" characteristics is

RATING SCALE

Pt.: E.T. Dr.: S.L.S. Date:

CATEGORY	6	5	4	3	2	1	BASE LINE	1	2	3	4	5	6	SCORE
APPEARANCE							X	✓						2
MOTOR ACTIVITY						✓	X							2
MIMETIC EXPRESSION							X		✓					2
RESPONSIVITY							X		✓					2
HOSTILITY REACTIONS						✓	X							2
SOCIALIZATION							X			✓				3
EATING HABITS							✓X							1½
SEXUAL BEHAVIOR							X					✓		5
SLEEP						✓	X							1
WORK							X				✓			5
ATTENTION							X			✓				3
AWARENESS							X	✓						2
SPEECH				✓			X							4
ASSOCIATIONS	✓						X							6½
MOOD							✓X							1
AFFECT							X						✓	6
FEELING				✓			X							3
PERCEPTION		✓					X							6
THOUGHT PROCESSES	✓						X							7
SUBJECTIVE REORGANIZATION		✓					X							5
MEMORY							X✓							1½
INSIGHT	✓						X							6
													TOTAL	145

CHART 2

used as the base line. Information about the patient's personality before the onset is obtained in the process of history-taking and recorded on the chart, where it remains as a constant base line during subsequent observations.

Method of Scoring. The manner of recording each examination is presented in Chart 2, which shows the result of a single recording in the case of a particular patient. The characteristic manifestations in each of the functions as they operated before the patient became ill are marked by x's, which form a base line in the chart's center. The sum total of these gives us the patient's normal personality profile.

We next designate the particular deviation of each function as it is observed during examination. The score in each case will depend upon how far the function deviates from the base line. The sum total of all the individual scores gives us the figure representing the degree of pathology present at that time.

Deviations in these functions may, and do, differ in terms of direction. In the case of motor activity, for instance, pathology may be represented by various degrees of overactivity or underactivity. Either way, there is an interference with adjustment. The direction of deviation is recorded by placing the check mark either to the left or the right of the base line. On the right-hand side go all the deviations characterized by what may be called "centripetal" pathology (a withdrawal of the person from contact with the outside and a turning inward of his activities). On the left-hand side we indicate the deviations that may be termed "centrifugal" (a progressive increasing of outwardly directed activities). The deviations are graded in terms of six possible degrees on either side of the midline. Since the score is determined by measuring the degree of deviation in relation to the base line, the maximum score in each function is seven.

The record of any one patient at a given examination is reported in terms of his total score (in the case of the above patient it was 74.5). As he is examined at various times during the course of illness, the accumulation of scores represents a quantitative evaluation of his progress. The nearer they approach the base line, or zero, the better is his condition.

Figure 1 shows the result of such an individual record in a patient treated by electric shock therapy (3). Here we see beneficial therapeutic results manifested in a fairly rapid drop of the score following its institution. The patient's final score was practically identical with his base line, and he was permitted to leave the hospital.

Two scores are given in Figure 1, one of them marked by a continuous, the other by an interrupted line. These two records, superimposed on each other, represent the scores obtained by two physicians who were evaluating the patient independently through the course of treatment. In this particular case, results obtained by the two examiners were practically identical. The fact is thereby demonstrated that the scale can be used with statistically valid uniformity, provided the physicians are well trained in psychiatric examination technique and in applying this particular method.

To check further on this point, 100 individual cases (3) were examined by 12 physicians.

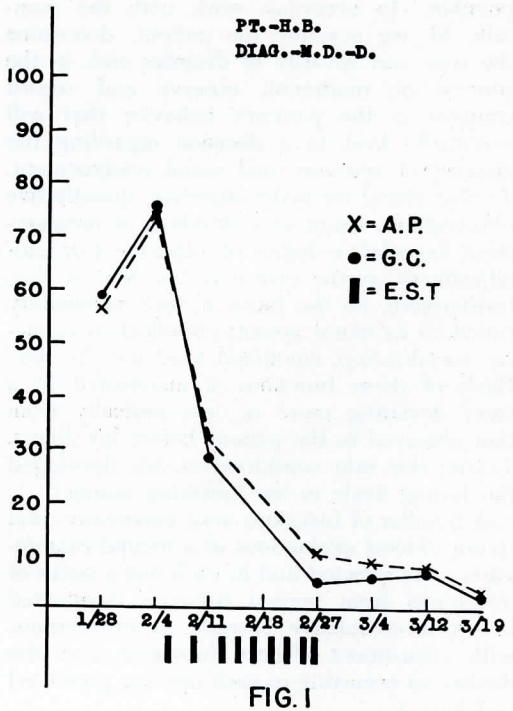

FIG. 1

Figure 2 shows their results. Each dot represents 1 patient, evaluated and scored independently by 2 physicians. The results, showing a highly significant statistical correlation of the various examiners, speak for themselves.

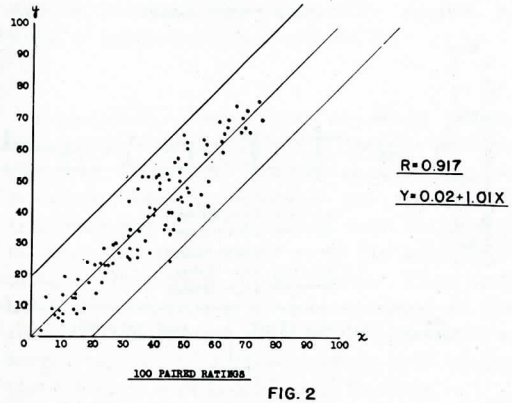

FIG. 2

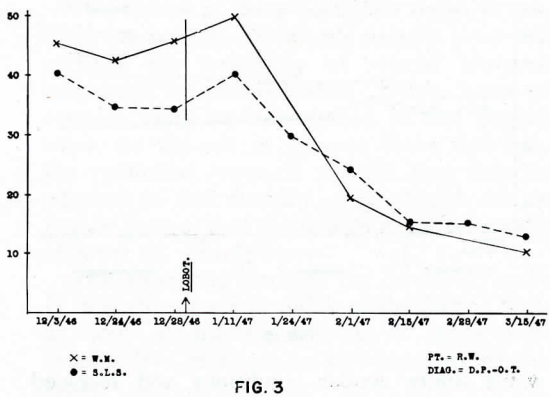

FIG. 3

Variations in results obtained are sometimes higher than was shown in Figure 1. Figure 3 represents a similar procedure in a patient treated by lobotomy (3). The similarity of the results of the two independent examinations in this case is not as great as in Figure 1. Nevertheless, the general trend is statistically valid, and we can see that at the end of the observation both agree as to the pronounced amelioration of symptoms; the final score is near enough the base line to consider him practically recovered.

Evaluation of Hormone Therapy

For several years, working in association with the Worcester Foundation for Biological Research (6), we have been investigating the relationship of disturbances in the function of the hypophyseal-adrenal cortex system in patients suffering from schizophrenia. In a large proportion of these cases, a disturbance of the function of this system could be demonstrated.

Since the introduction of ACTH and cortisone treatment by Hench and Kendall (7), we have been investigating the possible therapeutic effects on schizophrenic patients of these two substances and others related to them. This investigation is still going on, and in a number of other institutions as well, and complete results will be published later. We present here results on a few patients, however, to illustrate the application of the Rating Scale in such an investigation.

Nature of the Study. These were all schizophrenic male patients at Worcester State Hospital. Diagnosis has been definitely established and, since they had been in the hospital for some time, adequate information was available concerning their backgrounds, onset of the disease and its course. Because these patients were selected from a large group, it was possible to match them satisfactorily as to age, physical condition and severity of illness. The drugs used in the cases reported here were adrenocorticotropic hormone (ACTH),* adrenal cortical extract (ACE) † and desoxycorticosterone acetate (DCA). From each group treated with a given substance we selected matched pairs of patients, one of the pair receiving the drug (subject) and the other receiving a placebo (control). The placebos were: for the ACTH, 5 cc. of saline; for the ACE, propylene glycol; for the DCA, 1 cc. of olive oil. The administration of both drugs and placebos was carried out by one physician. Another, who did not know which of the patients were subjects and which were controls, followed their courses and rated them on the Psychiatric Rating Scale. Neither subjects nor controls knew what treatment they were getting; they were kept in the same

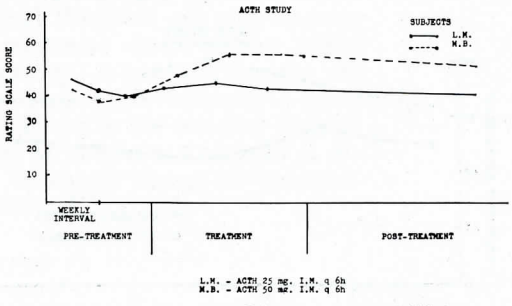

FIG. 4

* Gift from Armour & Co. † Gift from Upjohn Co.

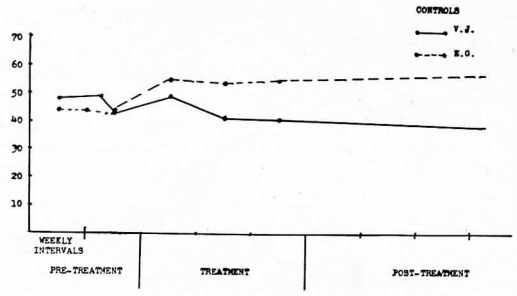

FIG. 5

ward under similar conditions and received the same care. General psychiatric examinations, nurses' notes and rating-scale scoring were carried out in both subjects and controls. Physiological and biochemical studies were conducted simultaneously in both subjects and controls before, during and after administration of drugs and placebos. Rating-scale scoring was done once every week before, during and after treatment.

Results. Complete results will, as already mentioned, be published at a later date. This report presents only sample studies.

(a) **ACTH treatment.** Patient L.M., in Figure 4, was given 25 mg. of ACTH by intramuscular injection every 6 hours for 25 days. Patient M.B. was given 50 mg. of ACTH every 6 hours for 25 days. Rating scales were taken before, during and after treatment; as Figure 4 shows, little change took place. Figure 5 presents results in the 2 controls of this series (V.J. and E.G.), given daily 5 cc. saline injections for the same period of time as previously described. One of them seemed to show a slight improvement, but it was of no statistical significance.

(b) **ACE treatment.** In Figure 6, patient

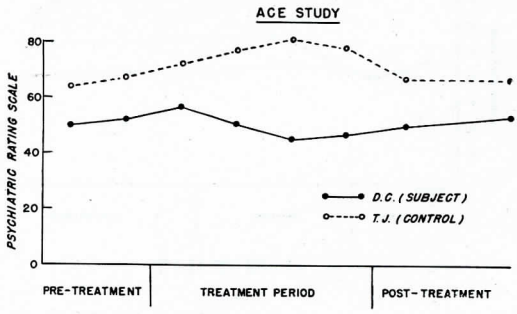

FIG. 6

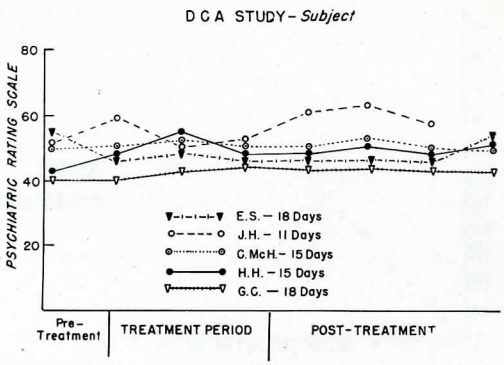

FIG. 7

D.C. received ACE treatment for 24 days; 1 cc. to the ninth day; 2 cc. to the twenty-second day; 1 cc. on the twenty-third day; 5 cc. on the twenty-fourth day (the cortisone equivalent of 1 cc. of ACE is 40 mg.). Patient T.J., the control of this pair, was given a placebo of propylene glycol, administered like ACE. Here again, little change occurred, although the control seemed to show a slight exaggeration of symptoms and the subject a slight improvement. The final result, however, showed practically no change.

(c) **DCA treatment.** To demonstrate the effects of DCA therapy 10 patients were used. Of these, 5 (j.H., C.Mc., H.H., G.C. and E.S.) were given 5 mg. of DCA daily for 11 to 18 day periods. Figure 7 shows the results. Minor fluctuations appeared in the Rating Scale, but followup study after treatment was finished showed no significant changes. Figure 8 shows results in the 5 DCA controls (H.S., J.D., C.E., E.Y. and M.H.) who were given 1 cc. of olive oil daily over periods of time corresponding to those for the DCA treatment. The Rating Scale records of their

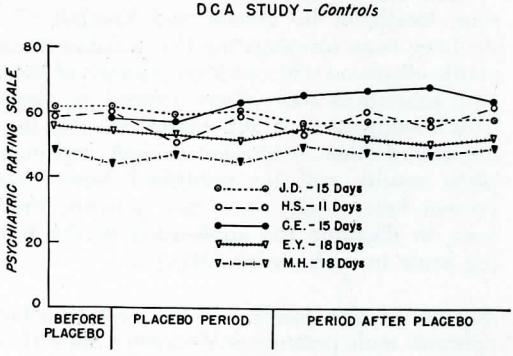

FIG. 8

clinical courses were essentially similar to those of subjects treated with DCA.

Discussion. Comparison of these results with those obtained in the 2 sample patients (Figures 1 and 3) readily shows that the hormone therapy achieved no appreciable beneficial results. We do not wish at present to draw any conclusions as to the efficacy of hormone therapy in schizophrenia. They must await the evaluation of data obtained in the study of the greater number of patients over longer periods of followup study and of the physiological and biochemical findings.

The failure of these particular drugs to produce successful therapeutic results does not exclude the possibility of steroid hormone treatment in schizophrenia. Other types of steroids must be investigated in this regard, since we do not at present know definitely the particular types of steroids that may be affected in this disorder, even though we do find in general that the system is pathologically affected in schizophrenia.

The foregoing findings do, however, serve to indicate the applicability of the Rating Scale as well as the importance of using such quantitative methods in investigations of this type.

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Spring Clinical Assembly

Massachusetts Academy of General Practice

On April 4, 1951, in the auditorium of the Boston University School of Medicine, 80 East Concord Street, Boston, staff members of the School and the Massachusetts Memorial Hospitals will give morning clinics from 9 a.m. to 12 noon in medicine, minor surgery (office procedures), and obstetrics and gynecology. A luncheon meeting will follow at the Hotel Shelton, 91 Bay State Road, featuring a panel discussion of some of the points brought out in the morning clinic in obstetrics and gynecology. Dr. Daniel M. Rogers is Chairman of the Program Committee. There will be no charge except for luncheon. Medical students and physicians are invited.

Medical Associates of Massachusetts Memorial Hospitals

With every advance made in the medical sciences, medical care has become potentially more effective. But the problem of providing such care has, by the same token, become more complex. For the tremendous expansion in the scope of our medical knowledge has brought in its wake specialization, and specialization has in turn brought about a decentralization of medical care. It is this decentralization that poses one of the most challenging problems involved in the distribution of medical services.

Specialization has created other problems — the problems of planning greatly expanded curricula, financing medical education and coordinating specialties and research. All these must be considered in a framework of twenty years of economic change, with public concern for its health services and interest in prepayment plans increasing, and with the modern hospital emerging as a focal distribution point for such health services. Recognition is growing that health service is a continuous process rather than a series of isolated occurrences.

All of these considerations led certain of the medical staff of Massachusetts Memorial Hospitals to the inescapable conclusion that an effort had to be made to develop a more adequate means of meeting the trend of the teaching staff's responsibilities in the areas of patient care, medical teaching and research as well as in supporting the clinical teaching of the Medical School. Many of the Trustees had independently reached the same conclusion and were receptive to suggestions.

During the past four years, Staff Members and Trustees have spent hundreds of hours in working out the most satisfactory and desirable organization and relationship to the Hospitals. On January 22, 1951, by action of the Trustees, a new division of the non-profit Hospital Corporation to be known as the Medical Associates of Massachusetts Memorial Hospitals was established at the request of Dr. Smithwick, the Surgeon-in-Chief, Dr. Keefer, the Physician-in-Chief, Dr. Tenney, the Obstetrician-Gynecologist-in-Chief and several other staff members with the full support of Dr. Bonnet, the Administrator, and Dean Faulkner of B.U.S.M.

The Medical Associates of M.M.H. is one form of a group association of physicians for the purpose of providing opportunities for the practice of medicine, research and teaching in a coordinated organization. In addition, it is believed that in the course of time the development of the Associates will make possible improved patient care at reasonable cost, stabilization of hospital occupancy at a high level, expanded clinical research, improved clinical teaching, indirect financial assistance to the Medical School and a comprehensive health service for the public.

Patients will be cared for in the traditional manner, with maintenance of ethical relationships toward referring physicians and return of patients to their care with prompt reports, with increased opportunities for convenient consultations and for consideration of overall cost of health service to patients. All matters of professional relationships between physician and patient will be in control of the physicians who are members of the Associates, in accordance with accepted standards of the profession.

Offices for the Associates have been arranged by the Hospital at 203-205 Commonwealth Avenue, with facilities for about thirty doctors, including laboratory and x-ray services. Ultimately a larger office building adjacent to the Hospital and School and in many ways preferable is contemplated. Delay until such a building became possible was, however, considered unwise.

The development of the Associates will be an evolutionary one covering a considerable period. All present Staff Members are being given the opportunity of discussing participation as Associates. Those who for one reason or another do not choose to participate will continue on the hospital staff as before.

Reports on the progress of the Associates will be made from time to time in the B.M.Q.

The Medical Associates of M.M.H. are dedicated to the ideals of the medical profession by making available for the sick of the present a comprehensive medical service and by conducting for the benefit of the sick of the future sound educational and research programs. Therein lies the only security.

Progress in the Treatment of Sterility

Dr. Meaker, a pioneer in the study of human infertility, summarizes here the results of a quarter-century of research. He emphasizes the multiplicity of the factors at work, necessitating a careful study of both partners. Successful treatment often depends on correction of several deficiencies, each in itself minor.

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In 1927 there was established in our hospital, thanks largely to the encouragement and help of the late Dr. Allan Winter Rowe, at that time Director of the Evans Memorial, the first clinical group in the world specially organized for the investigation and treatment of sterility. Similar groups soon appeared in other cities, and today they exist in every important medical center both here and abroad. An immense amount of research has been done on the physiology of reproduction and on the various ways in which that function may be impeded. Numerous diagnostic tests were devised, some proving of little practical utility, others becoming valuable routine procedures. Older methods of treatment were surveyed and largely replaced by newer and more efficient measures. The result of all this work has been to double the number of cases in which involuntary sterility can be relieved, a notable increase over the 20 per cent which represented the height of achievement a quarter of a century ago.

Causation of Infertility

Modern progress is basically due to a better understanding of the conditions that depress fertility, and in particular to three important concepts: the multiple nature of causation, the division of responsibility between husband and wife and the influence of constitutional disorders.

Multiple Causation. More than 40 different abnormalities, structural or functional, are now recognized as possible depressors of the reproductive function. Complete diagnostic study of a sterile mating invariably reveals at least two of these factors of infertility, and sometimes as many as seven or eight. Some of them exert only a mild effect, although the cumulative action of a sufficient number can lower fertility below the level necessary for conception. Others are more serious. A so-called absolute factor, for example tubal occlusion or atrophy of the testes, occurs in about 30 per cent of sterility cases. Even here the rule of multiple causation holds good, since there are always concomitant factors which would manifest their effect if the major obstacle were removed.

Division of Responsibility. In the majority of barren matings multiple causative factors are found to be divided between the two partners, hence all of the older ideas about individual male and female responsibility have had to be revised. Some years ago our local group worked out what still remains the most accurate method of evaluation, the results of which in 100 consecutive cases are shown in the following table.

	Cases
Responsibility entirely male	11
Responsibility divided, male greater than female	22
Responsibility divided, male and female equal	41
Responsibility divided, female greater than male	17
Responsibility entirely female	9
	100

Thus it becomes evident that the commonest clinical problem is not that of a perfectly fertile man married to an absolutely sterile woman, or vice versa, but rather that of two individuals, each of imperfect fertility, whose combined disabilities are great enough to make their union unproductive.

Constitutional Factors. Only recently have physicians appreciated a fact well known to stockbreeders for centuries, namely, that poor general health may seriously interfere with the capacity for reproduction. Now it is understood that in the aggregate, constitutional factors of infertility are fully as important as are

local disorders of the genital organs and, in the male partner, more important.

Such factors fall into five general groups. First come endocrine disturbances, in particular underfunctioning of the anterior pituitary, gonads and thyroid. Chronic intoxication may be caused by chemical poisons like alcohol or lead, but is much more often the result of toxic absorption from foci of infection. Fertility is depressed by most debilitating diseases and notably by even the milder grades of anemia. Faults of nutrition and hygiene may be exemplified by the familiar combination of an ill-balanced, often protein deficient diet and not enough exercise to insure good assimilation. And finally, evidence is piling up to suggest the possibility of psychosomatic mechanisms unfavorable to conception.

Diagnostic Study of the Sterile Couple

From the foregoing brief survey of the causation of infertility it becomes evident that adequate diagnostic study is necessarily a long and complicated procedure. It requires the collaboration of the urologist, gynecologist, internist, endocrinologist and, in certain cases, the psychiatrist. Some of the routine tests are highly technical. The program can seldom be completed in less than a month and often takes much longer. But expenditure of time and effort is well worth while, since the chances of therapeutic success are directly proportional to the thoroughness of the investigation.

Some Practical Details of the Management of Infertility

Since the scope of this article does not allow even a brief discussion of all aspects of diagnosis and treatment, the discussion will be limited to five matters in which modern views have led to more practical management.

Poor Semen. A most important step in diagnosis is mathematical evaluation of the semen. Ordinary fertile specimens show a count of at least 60,000,000 spermatozoa per cubic centimeter, not more than 25 immature or abnormal forms per cent, initial motility of 80 per cent or better and endurance, that is to say duration of life, continuing up to 24 hours. Subnormality in one of these respects may be counterbalanced by excellence in others. For example, counts somewhat below 60,000,000 are not inconsistent with good fertility, provided morphology and motility are satisfactory. But specimens falling notably short of these standards must be considered indicative of male infertility of a degree corresponding to their deficiencies.

In complete azoöspermia, a rather uncommon finding, the differential diagnosis lies between failure of spermatogenesis and a blockade in the epididymides or elsewhere in the duct system. Testicular biopsy will settle this question. If the seminiferous tubules prove to be hypoplastic or atrophied, the situation is irremediable. If good spermatogenesis is going on, removal of blockades may be attempted surgically, though results have generally been poor.

Far commoner than complete azoöspermia are relative deficiencies of the semen, likely to escape recognition unless specimens are examined with precise technique. It has sometimes been assumed that, since only one living spermatozoon is needed to fertilize an ovum, adequate male fertility is demonstrated if several millions are present in an ejaculate. But clinical experience has shown that men with a low sperm count, particularly if this is accompanied by poor morphology or subaverage motility, are for all practical purposes completely sterile. The same factors which in an obvious way depress spermatogenesis also operate to render useless for procreation such apparently normal spermatozoa as are produced.

About one-third of male partners in sterile matings exhibit relatively severe seminal deficiencies. Before such a finding can be accepted as truly representative, several specimens must be studied. A testicular biopsy may be informative. If the deficiency appears to be permanent the prognosis is poor, though seldom hopeless. Endocrine treatment is generally unavailing. Spontaneous improvement sometimes occurs. A scrupulous regulation of hygiene occasionally helps. But the trouble is most often a defect in the seminiferous tubules grave enough to preclude their proper functioning.

If the female partner has good fertility, artificial insemination with donor semen is a possible remedy. From the medical viewpoint this is a simple matter, but its legal and ethical aspects still require clarification. The promiscuous use of the method may moreover

create a variety of unfortunate sociologic or psychologic situations. Only a minority of couples are suitable candidates, but for them a successful result is likely to be one of the most gratifying of human experiences.

A word might be said about artificial insemination with the husband's semen. This practice has a small but clearly defined place in the treatment of sterility. It is indicated when natural insemination is prevented by such disabilities as impotence, hypospadias or vaginismus. It is irrational and useless when undertaken with the idea of helping weak spermatozoa along their way or simply in the hope that it may somehow work a miracle after all else has failed.

Anovulation. Most women with regular menstruation ovulate about 14 days before the next period is due. Some produce the egg at other times in the cycle, and some do not produce it at all. Such deviations from the usual pattern are much more common in women whose menstruation is irregular.

If a premenstrual or early menstrual biopsy yields non-secretory endometrium or if a basal temperature chart shows no thermal shift, the presumption is that ovulation has not occurred. Normal women have occasional anovulatory cycles, and several repetitions of the tests may be necessary before one can conclude that the egg-producing function is seriously impaired.

Endocrine therapy of anovulation is still in the experimental stage. The female sex-hormones are the result, not the cause, of the maturation and rupture of follicles; yet, paradoxically enough, the employment of these hormones offers at present a fair chance of remedying the difficulty. Minute doses are most likely to be successful: for example, the equivalent of one-tenth of a milligram of diethylstilbestrol once a day in the first postmenstrual week and twice a day in the second postmenstrual week, followed by 5 milligrams of progesterone once a day until the period starts. Apparently such treatment has a beneficial effect on the delicate ovary-pituitary equilibrium leading to an increased gonadotropic stimulation.

Medical literature includes many reports of sterility promptly cured by light irradiation of the ovaries or of the pituitary. The immediate results are admirable, but there still remains the question whether unfavorable mutations of the genes may not appear in subsequent generations.

The ovaries of women in the child-bearing age normally contain follicles in various stages of regression. Some of these may persist as tiny retention cysts, and ordinarily such structures are of no importance. In comparatively rare cases atretic follicles accumulate to the point where an increased intraovarian tension makes ovulation impossible. Conservative operations on polycystic ovaries often succeed in restoring normal function.

Cervical Hostility. Conception is impossible unless spermatozoa are delivered to the endocervix and there encounter a favorable environment.

For postcoital examination the wife, around the calculated fertile time in her menstrual cycle, reports within three hours after intercourse. If the endocervical mucus is found to contain several active spermatozoa per high-power field three facts are demonstrated: there is no anatomic fault in the technique of coitus; the husband possesses at least a fair grade of fertility; and the cervical secretions are favorable. A finding of defective or no spermatozoa raises a question of differential diagnosis which must be settled by further studies, particularly examination of the semen. In a certain number of cases the trouble proves to be abnormal thickness and viscosity of the endocervical mucus, with or without chronic infection.

Nowadays the treatment in these cases is chiefly medical. Small doses of estrogens stimulate the cervical glands to secrete normally, and infection is combated with sulfonamides or antibiotics. Two surgical measures may be useful in the way of improving drainage of the secretions: simple dilatation of the cervix, without curettage; and, rarely, a minor plastic operation such as posterior median discission to enlarge the os externum. Cauterization within the canal and conization are positively harmful to fertility, largely destroying or removing the endocervical mucosa.

Tubal Obstruction. About one-third of sterility cases show some type and degree of tubal obstruction. These faults are identified by insufflation of gas and further evaluated by hysterosalpingography.

With certain types of blockade the prognosis for fertility is exceedingly poor, as, for example, in tubercular salpingitis, in extensive disorganization of the tubes from old inflammatory damage and in organic sealing elsewhere than at the fimbriated ends.

Since the milder obstructions are often relieved by insufflation of gas or injection of oil, repeated trials of these measures are usually the first step in treatment. The function of the tubal musculature may be improved by long hot douches and also by small doses of estrogens. This therapy has special value in the rather common spasmodic blockades.

Though various ingenious operations have been devised, the small number of successful results has discredited surgery of closed tubes. Unwise selection of cases accounts for many of the failures. Salpingostomy should not be undertaken unless the following conditions are fulfilled. All non-tubal factors, including male infertility, must be ruled out, or identified and treated. Only fimbriated-end occlusions should be chosen for operation, since attempts to reconstruct other parts of a tube are seldom worthwhile. The tubes, as visualized in a hysterosalpingogram, must be in good condition; it is easy to make a stoma in a hydrosalpinx, but this procedure will not restore normal function. And finally, the postoperative care should include repeated gas-insufflation or oil-injection or both to maintain patency. If these requirements are met, one may expect to overcome in perhaps 20 per cent of cases what would otherwise be an unsurmountable obstacle to fertility.

Hypometabolism. Endocrine therapy in sterility is so generally misunderstood and so widely misused that it will be worthwhile to summarize here what has already been said or suggested on the subject. Gonadotropins are theoretically indicated to stimulate malfunctioning testes and ovaries and would be valuable if potent preparations were available; unfortunately they are not, as yet. Testosterone is helpful only in rare cases of impotence. Estrin may be used to improve the secretion of the endocervical glands and the action of the tubal musculature; cyclic estrinprogesterone administration sometimes acts on the anterior pituitary in such a way as to increase its gonadotropic function. The steroid hormones should be given only in the smallest doses, since large dosage would inhibit the pituitary and thus defeat the main therapeutic purpose by depriving the testicles or ovaries of their physiologic stimulus. Broadly speaking, the results of sex-hormone therapy are uncertain. The employment of thyroid, on the other hand, offers encouraging possibilities. This hormone does not increase the production of spermatozoa or ova, but acts in some way, perhaps by correcting anoxia, to supply what might be figuratively called a hotter vital spark to those gametes which are produced.

An indispensable item in sterility studies is an accurate determination of the respiratory metabolic rate in both male and female partners. First readings are generally too high, since it is difficult to obtain basal conditions in persons not accustomed to the test, and one or more repetitions may be necessary to get a reliable result.

It is conventional to assume that all basal metabolic rates between minus 10 and plus 10 are normal, presumably because findings within that range suffice to rule out myxedema on the one hand and thyrotoxicosis on the other. As a matter of fact several of the body mechanisms, notably that of reproduction, function best only when the metabolic rate is around the upper limit of the so-called normal range.

There is a striking relation between hypometabolism and infertility. In 100 cases of sterility, 154 of the partners had rates on the minus side, and in 66 of these the rates lay in the range minus 11 to minus 30. Incidentally, none of these patients showed signs or symptoms suggesting the classical picture of myxedema. That the relation is one of cause and effect has been amply demonstrated by the experience of many clinicians, who report large numbers of cases where pregnancy occurs as soon as a metabolic depression in one or both partners is corrected.

It should not be assumed that hypometabolism is always due to thyroid underfunction, although that is probably so in the majority of the cases under discussion. But the most practical treatment is usually the carefully controlled administration of desiccated thyroid, which acts to stimulate metabolic activity whether it serves as a specific replacement or not.

Monthly check-ups, including a metabolism test and a survey of symptoms, are needed to determine progress and regulate future dosage. Most patients can be maintained satisfactorily at the plus 10 level; a few begin to show intolerance before their rates rise that high, and a few do well at levels of plus 15 to plus 20. The systematic carrying out of this therapeutic measure will result in numerous cures of sterility unobtainable by other means.

Impressions of the National Health Service in Great Britain

Back from England since November at his post as Assistant in Surgery at B.U.S.M. and M.M.H., Dr. Thompson, Rhodes Scholar at the Nuffield Institute for Medical Research at Oxford, adds up the sum of his impressions of the workings of nationalized medicine gained from his own observations as well as from conversations with Britons in every walk of life, from London cabbies to Oxford dons.

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It is manifestly impossible at the present time to draw final conclusions concerning the National Health Service in Great Britain. One would have to canvass every individual Briton to be able to speak with authority on the scheme's popularity among various groups of people both outside and within the medical profession. Feeling would no doubt vary from almost unanimous support in some groups to almost unanimous disapproval in others. Discussion of the Act's effects must therefore deal with specific groups of people. I shall attempt to present some impressions gained by personal observation of the Service in operation and by talking with numerous people in various walks of life. Certain of the implications of the British experience should be clear to the doctors of America if we are to maintain a free, unfettered and progressive medical profession.

There is widespread belief in this country, fostered by articles in popular magazines, that nearly everything about the present British medical set-up is bad. Such a sweeping conclusion is, in my opinion, erroneous. There must be some good points to a costly system (350 million pounds or 1 billion dollars a year) which 40,000,000 British people have not voted out of existence. The Health Service is one of the major platform planks of the Labour Party, returned to power at the last election. It is interesting to note that the concept of a government-financed comprehensive medical service was brought forward and endorsed by the coalition government under Winston Churchill before the war was over. At no time has the Conservative Party advocated repeal of the National Health Service Act. It was the unanimous opinion of everyone with whom I talked that the Health Service is there to stay, though modifications and adjustments are necessary.

We must examine the virtues and shortcomings of the system and know what groups favor and what groups oppose it. We must take cognizance of its good features as well as point out the bad ones, for the good features affect many times more people than do the bad. The political implications of such a statement upon the future of the medical profession are obvious.

Reduced to simplest terms, the reasons behind the establishment of the National Health Service in Great Britain in its present form were basically those of (1) practical necessity and (2) Labour Party ideology. Increasing costs of medical care made a comprehensive health service necessary if all the people were to receive adequate attention without suffering catastrophic financial set-backs in case of serious illness. Since the passage of the National Health Insurance Act of 1912, British doctors had been accustomed to a panel system of rendering medical care to workers. Extension of this panel system to cover the workers' families was not considered a radical departure, as the British Medical Association had for many years been recommending a more comprehensive health service. The final act as promulgated by the Labour Party went much further than was originally envisioned. In the second place, because the sources of private philanthropy had dried up and operating costs increased, hospitals could not maintain themselves financially. Government aid was necessary and in fact mandatory since no other financial support was available. Na-

tionalization of facilities was thus a practical necessity if the health of the nation was to be maintained. The complete nationalization of all medical personnel and seizure of the hospitals represented a much more drastic step than nationalization of facilities, and the reason is to be found in Labour Party ideology. It is this feature of the National Health Service that has meant encroachment upon the freedom of medical practice as we have known it in the past.

Pros.

What are the good features of the National Health Service as the British people see them? One finds on every hand, even among staunch Oxford conservatives, lay support of the health scheme both in principle and practice. In principle many of these people believe in more and better medical care for everyone and see no alternative to government support. In practice, the people derive tangible benefits from the system and are loath to oppose it. Some less thoughtful people consider only that they are getting "free" care, without taking into account the increased taxation which maintenance of the service demands. More thoughtful people take this into consideration but believe that extension of medical care justifies the cost. They also point out that one serious illness in a year will more than pay back the tax money contributed to the support of the Health Service. Since so many industries in Britain have already been nationalized, it does not concern the general populace too greatly that the doctors have lost their traditional freedom. Support comes not only from the workers, whose families now receive benefits, but from the middle and professional classes as well, the people hardest hit by rising medical costs, who now find that major illnesses can now be faced without serious financial difficulties. In postwar austerity Britain with its terrific tax burden this factor is of great importance. The maternity program has been popular, as have been the child-health benefits, with free vitamins and low-cost orange juice and milk for all. British children are healthy.

And Cons.

In general, the majority of doctors oppose the personnel-nationalizing features of the National Health Service. Most of those with whom I talked believed nationalization of facilities necessary, however, for the reasons already given. Their objections focus on the curtailing of their freedom and the limiting of their professional horizons. They are not free to go where they choose to practice but must take what jobs are open or what practices are available. The chance of acquiring a large private practice is rapidly vanishing; to buy or sell practices is unlawful. In many cases there are more qualified men than jobs available within the Health Service organization. Financially, of course, the position of most doctors is worse under the Act. And although a system has been set up whereby financial awards of merit are given to thirty-four per cent of the specialists on the basis of ability, the awards have not, to date, been handed out.

A source of irritation to physicians is the administrative task of filling out myriad forms for their patients, time that might be better spent in diagnosis and treatment. If he fails to sign the proper "chit," the physician runs the risk of losing a patient from his list, for the service has brought about a change in the patients' attitudes towards doctors, and they now demand services. Nevertheless, despite their grievances, the doctors have in their traditional fashion maintained their high standards of practice, even with the increased patient load since medical care was made available to all.

Some of the younger physicians, I found, do not object to the nationalization of the profession. As hospital house-staff members, these men receive salaries starting at $1680 (£600) per year and increasing to a maximum of $3360 (£1200) as senior registrar, in contrast to the time-honored pittance-payment system previously in existence. Again, when one receives benefits from a system he is less apt to oppose it. General practitioners can be found, too, who do not grumble about the Act, since they find themselves in approximately the same financial position now as before. Some are actually better off. Also, doctors who have been on a full-time salary basis in the past, such as radiologists for example, have not been much affected by the new system. In fact, some of the younger full-time men favor the scheme, since it enables them to get higher salaries earlier in their careers.

One of the most undesirable features of the

system is its expense. Costs have far outstripped original estimates, much of the money going for administrative overhead that does not contribute to the patients' welfare. Increased red tape has wasted time as well as money and contributed to inefficiency. It is stressed that the government went too far and attempted too much too soon. It promised more medical care than existing facilities and personnel could provide. The country's postwar financial condition is more responsible than the Health Service for many of the latter's faults, but the government can be blamed for lacking the wisdom to see that a less comprehensive program might have been a sounder one. Although the crying need now is for adequate bed space, no new beds have become available and no new hospitals have been built, although many hospitals were destroyed during the war. One of the program's main features was the promise of health centers throughout the country; none has been built. Abuses of the system abound, especially as regards pharmaceuticals, eyeglasses, unnecessary visits to the doctor, et cetera. Many anomalies became apparent after the Health Service went into operation. For example, dentists and oculists were able to make large sums of money, while the general practitioner was earning a relatively small income. All foreign visitors to the country were automatically covered by the National Health Service without having to contribute a penny.

One of the greatest faults of the system is the sweeping control of the entire Service by the Minister of Health in Whitehall. Ministry and Minister have been a constant target of criticism. Most doctors consider the Minister to have been high-handed and autocratic in his dealings with the profession and feel that cooperation has been unilateral. In many cases, the criticism seemed to me leveled not so much against the Health Service itself as against the person of the former Minister.

A Lesson to Learn.

What can we in America learn from the British experience? First of all, once such a system has been inaugurated, it is not easily uprooted. If every American were handed the free medical benefits enjoyed by the British, a majority would vote into operation a similar system. Human nature makes man loathe to criticize or abolish what bears free fruit. It is the good of the system that makes it attractive, and therein lies the danger to the medical profession. The implications are clear. If we in America are to avoid a government-controlled health program with all the attendant undesirable features so costly and so detrimental to our traditional freedom of medical practice, then the profession as a whole must see that sufficient attractive, voluntary programs are set up whereby the American people can get adequate medical care whenever they need it without fear of financial catastrophe. We have gone a long way but we must go further. As Lord Horder recently said of the British profession, "It was a pity we had no effective machinery by which we could express ourselves as a corporate whole."

Postgraduate Fracture Course

Professor Lorenz Böhler of Vienna, internationally known author of numerous texts, will conduct a Postgraduate Fracture Course to be given under the auspices of the Boston City Hospital and sponsored by the Boston University School of Medicine on April 18, 19, 20 and 21 in the Dowling Amphitheatre of the Boston City Hospital. An added feature of the course will be a daily presentation by nationally known American fracture surgeons.

Applications, accompanied by a check for the tuition fee of $50 payable to the Boston University School of Medicine, should be mailed to Miss Louise Curry, Secretary, Sixth Surgical Service, Boston City Hospital, 818 Harrison Avenue, Boston, Massachusetts.

BMQ

Daniel L. Marsh

On March 1, 1951, Daniel L. Marsh, after twenty-five years as President of Boston University, retired from that office and was succeeded by Harold C. Case. Dr. Marsh will continue to serve the University in the newly created position of Chancellor.

The quarter century already being referred to as the "Marsh Era" was characterized by a phenomenal physical growth of the University and was crowned by the development of the magnificent campus on the Charles River.

The strides made under his leadership by the School of Medicine, while less spectacular, have been of no less enduring importance. The long-range program upon which President Marsh embarked in 1926 was to build a medical faculty second to none. He has held to this high purpose through good years and bad and repeatedly shown his deep concern for problems of medical education. In a time when rising costs of medical education have made budgets a nightmare, he has kept cool and resourceful. We look forward to no slackening of pace under his successor.

JAMES M. FAULKNER, M.D.

The Trained Technician

Therapeutic efficiency and diagnostic precision in modern medical practice are to an important extent limited by the quality of available laboratory facilities. The laboratory's contribution to patient care has increased impressively. Its responsibilities have multiplied, forcing it to expand its scope of operations, revise its methodology and adopt analytical techniques and equipment of increasing complexity. New criteria of competence in laboratory personnel now apply. More is required today in this regard than such attributes as intelligence, cooperativeness, an intact color sense and such preparation as is afforded by a high school education and a laboratory apprenticeship. Except for those who work under constant supervision, at least two years of college work and a systematic technical training are now essential.

The A.M.A. Council of Medical Education in 1928 established a Registry Board for the setting up of minimum educational standards for technicians as well as for institutions undertaking their instruction. On the basis of policies recommended by the Registry, a total of 433 hospitals in this country, including this hospital, have revised their training programs or initiated new ones and select their enrollments in accordance with its stipulations. Entrance requirements now include at least 2 years in a recognized college, with completion of 12 semester hours of biologic sciences, 6 hours of general inorganic chemistry and 3 hours of quantitative analysis, supplemented by organic chemistry or biochemistry. Approved 12 to 24-month technology courses periods are conducted like a medical school clinical clerkship, with the student participating in and responsible for the normal laboratory activities as well as attending formal lectures demonstrations and examinations. About one-fourth of the time is devoted to hematology and bloodbanking, one-fourth to biochemistry and another fourth to bacteriology and parasitology, the remainder being given to electrocardiography, basal metabolism, serology and tissue techniques. Graduates are eligible for the National Registry examinations, which officially certify them as Medical Technologists.

About 1800 technologists are certified in the United States each year. The number in Massachusetts is disproportiontely small, with a maximum enrollment in its 19 approved schools of only 76. Of the 23 in Boston hospitals, 12 are trained at the Massachusetts Memorial Hospitals.

According to present estimates, less than 10 per cent of the clinical laboratory technicians practicing in this state are qualified for certification as Registered Technologists, approximately 4 per cent having college degrees. These data, admittedly crude, still imply a remarkable shortage of trained laboratory personnel, readily confirmed by those in a posi-

tion to observe the organization and performance of numerous hospital laboratories. The need is most acute and most urgent where, of course, it is least apt to be recognized – in the many hospitals whose laboratories function without benefit of qualified supervision or intelligent interest on the part of the professional staff. In such an institution, a competent technician could make a maximum contribution to medical care; just as an incompetent worker can, and does, create maximum confusion.

Standards of medical technology and levels of performance are everywhere linked to the standards of professional medical care. That level can be raised only to the extent that medical practitioners as a whole recognize the importance of dependable laboratory work and understand the need for qualified laboratory workers.

The existing shortage of facilities for technology training is more apparent than real. Capable instructors and ample opportunities for instruction – equipment, space, patients – are to be found in a great many institutions which could readily make their resources available were the effort judged worthwhile. The majority of colleges could pattern their curriculums to give a full 4-year or longer course to students preparing for the more responsible laboratory posts. The one-year internship necessary for certification would be made a part of the curriculum. For the far larger number who plan merely to satisfy the minimum requirements and work in laboratories under close supervision, many junior college academic programs suffice.

A critical feature is the problem of recruiting promising candidates for training, a difficulty that hospitals could remove or at least minimize at once by approximating more closely the salaries offered technicians by industry. Granting that medical budgets will never be able actually to compete with industrial salary levels, some measure of improvement over the present discrepancy should be possible. Help in recruiting promising candidates can be looked for, also, from our colleges, which are in a most strategic position for influencing young people in the choice of and preparation for the career of a trained medical technician.

CHARLES P. EMERSON, M.D.

Milestones: Cadaver to Cat

The Class of 2050 will find it surprising that animal experimentation was still hampered a century earlier by lack of positive legislation. The almost universal theologic viewpoint in 1950, their history books will tell them, held that animals were made for man's use. Rare issues of *Vogue* will show fur coats and leather accessories. Meat had always been a staple of diet. As a public-health measure, this urban-agrarian society had had to limit the numbers of both domestic and wild animals. Yet – and this is what the historians will find colorful – a fanatic minority had dedicated itself to the cause of keeping these condemned animals from doing man the far more critical service of helping science keep mankind alive and well.

Although by 1950 two states and a number of cities had laws that increased the availability of condemned animals for research, Massachusetts physicians in 1951 failed to induce the Legislature to pass a bill making these animals available for scientific study.

If history is to record a favorable outcome of that crucial effort, each of us will have to become more vocal, more generous of our time and perhaps of our money, and more determined to remove from the path of progress the roadblocks of ignorance and propaganda.

GEORGE L. MAISON, M.D.

anti-antivivisectionist

Dr. George L. Maison, professor of pharmacology and chairman of that department, has been elected vice-president of the newly formed Massachusetts Society for Medical Research, an organization that will undertake an active campaign against restriction of medical research by the anti-vivisectionists. An outgrowth of the Massachusetts Committee for the Protection of Medical Research, the Society has been in existence about two months.

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The Department of Legal Medicine

There are numerous functional contacts between law and medicine. Basically, each profession is concerned with the preservation and protection of man's health; law with his social health and medicine with his physical and mental health. As social sciences, each imposes on its practitioners the responsibilities of exerting their skill and knowledge in the public interest. Individual efforts have been adequate. The same cannot be said where mutual cooperation has been required. Frequently there has been confusion and, sometimes, conflict where there should have been an integration of joint professional thought.

One explanation for this unfortunate situation is that the practitioner of one specialty rarely understands the intricacies of the other. So highly developed have the two sciences become that no single person can know all the phases of even his own profession. In medicine alone, for example, there are now some fifteen to twenty specialty boards.

A more basic incompatibility between the two professions is that law requires fact. A fact is something that exists or did exist. Medicine can rarely supply fact. What it does supply is opinion, *viz.*, an impression or belief. Opinions are frequently wrong, a fact the law appreciates. Last week I examined a sick man. From his own as well as his friends' statements, I concluded he was suffering from some acute abdominal catastrophe. He died; had no further information been available, I should have thought the cause was rupture of a peptic ulcer. There was nothing negligent in my observations; nevertheless autopsy showed death to have been caused by coronary arteriosclerosis. There was no evidence of peptic ulcer.

There are many obscure problems about which medicine speculates but cannot explain. Consider such a case as this. A healthy man sustains mild concussion and, so far as immediate events show, makes an uneventful recovery. Six months later he exhibits substantial personality changes, becomes assaultive, suspicious and finally is arrested for breaking and entering. The law would like to know what, if any, was the cause-and-effect relation between the man's head injury and his subsequent psychopathic behavior. Medicine has no absolute answer. Any three physicians questioned might give totally different opinions. Law has therefore become reluctant to accept medical evidence even when it is incontrovertible.

What is the solution? Law must accommodate its system to the evidence medicine can give. Medicine needs to supply more fact and less opinion. It is not our purpose here to discuss what is being done to resolve such problems. The discussion does, however, serve to point out the wide area in which law and medicine overlap; to it we apply the term "legal medicine." The legal profession, evidently considering its specialty the more important, employs the designation, "medical jurisprudence," which Black's *Law Dictionary* defines as ". . . the science which applies the principle and practice of the different branches of medium to the elucidation of doubtful questions in a court of justice. It is a sort of mixed science, considered as common meeting ground to practitioner both of law and physic."

What constitutes the academic discipline of Legal Medicine, and how does it function as an applied science? In the curriculum of a medical school, Legal Medicine has two main functions: first, the presentation of laws that affect medical practice. Law defines how medical schools shall be conducted, who shall practice medicine, the extent to which and the manner in which the physician must act in behalf of the mental and physical health of the public, and the other types of activities in which licensees may not engage (unprofessional conduct).

Another important phase of medical law is the field relating to professional negligence (malpractice). All persons must act prudently and with ordinary care in their relations with each other, and failure to do so is negligence

for which damages may be recovered at law. Physicians are peculiarly susceptible to negligence charges, since many times they fail to obtain the hoped-for result. Generally the public tends to exaggerate the skill of physicians and has the mistaken opinion that a bad result indicates lack of ability or negligence on their part. Medicine is not an exact science, and the physician does not impliedly guarantee the results of his treatment. Basically his legal obligations are no different than, for example, the requirement that an operator of an automobile be able to drive and employ ordinary care while driving. The law requires the physician "to possess and exercise that reasonable degree of learning, skill and care" possessed by physicians of good standing practicing in the same locality.

Secondly, Legal Medicine concerns the application of medical skill and knowledge in the administration of justice. Society requires that murder not go unrecognized nor murderers unpunished. Equally important is that the innocent not be falsely accused. The guardianship of public interest in this respect constitutes a specialized type of medical endeavor and represents a field best characterized as forensic pathology.

In brief, forensic pathology deals with the various forms of physical and chemical trauma, particularly as these are concerned with (a) the agent of injury, and (b) the effects and the manner of injury. The autopsy plays a vital role in the gathering of such medical evidence. The medicolegal autopsy involves considerably more procedures and has objectives different from autopsies done purely for medical reasons. The medicolegal postmortem examination often constitutes the chief or only source of information on numerous important matters. Who was the dead person? When did death occur? Had the body been moved after death? Were the injuries consistent with the apparent or alleged circumstances? Was there anything on the body of the decedent pointing to the identity of the assailant? On evidence such as this may rest the guilt or innocence of an accused person.

What constitutes the so-called medicolegal death, one that needs to be investigated in the public interest? There are two main types of cases. One includes all deaths from violence; the other, those in which the cause of death is not known because it was sudden, unexpected

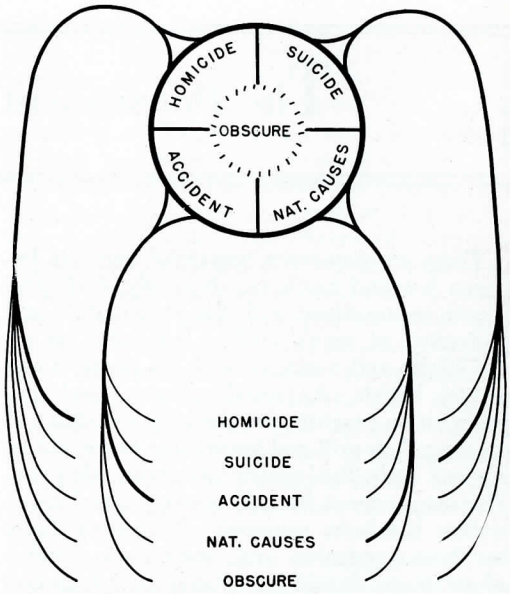


FIGURE 1.
Medical Investigation of Deaths in the Public Interest

or obscure.* About 20 per cent of all deaths in the average community fall into one category or the other, approximately 300,000 in the United States annually. This is shown in Figure 1 (Dr. A. R. Moritz, unpublished material). In the circle at the top of the diagram is given the apparent status before investigation. Some deaths appear to have been homicidal, suicidal or accidental; others have occurred suddenly or unexpectedly, although presumably from natural causes. In many cases of both groups, the cause and manner of death are obscure. Investigation shows that many deaths have resulted from causes or have occurred in a manner not indicated by the original evidence. How the pre-investigational impression may be modified is shown at the bottom of the figure.

Unfortunately, in many communities full investigation of violent and obscure deaths is not permitted by law. In others competent medicolegal service may not be available. Relatively few physicians are trained in this field. There is frequent opportunity for miscarriage

* Competent investigation reveals that fully 10 per cent of these obscure deaths, presumably from natural causes, result from one kind of violence or another.

of justice. For example, a man was found dead, presumably killed by a fall. There was no reason to suspect homicide. Autopsy, however, showed that he had been strangled and was dead before he hit the ground.

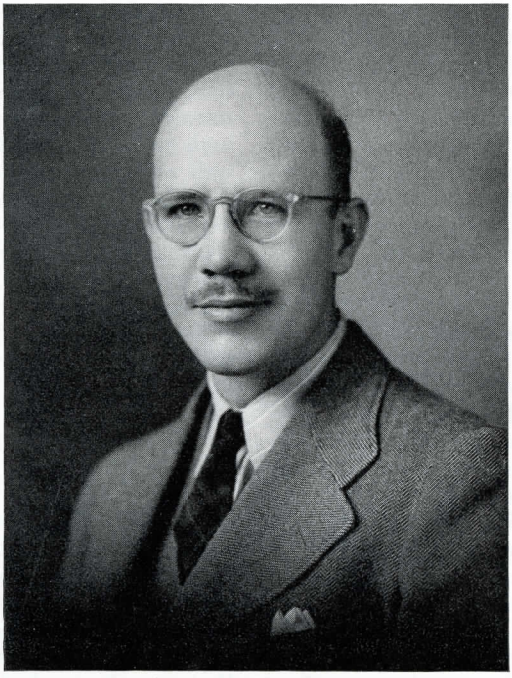
A psychopathic woman first accused her husband of trying to poison her, then took poison under circumstances that would create the suspicion of homicide. Pathologic and toxicologic examination showed, however, that the amount and kind of poison was incompatible with homicide and that the manner of death was consistent only with suicide.

In another case, a presumably healthy woman died suddenly. Her face showed superficial injuries, which her husband admited inflicting but said the assault was trivial and had occurred several days before her death. An autopsy, however, revealed intracranial hemorrhage, and on the basis of this evidence the husband was convicted of murder. A second, this time adequate, autopsy revealed the true cause of death to have been a ruptured mycotic aneurysm.

Another worthwhile function of the medicolegal investigation is the discovery of hazards detrimental to the public health: the observation that improper combustion in gas refrigerators may lead to fatal carbon-monoxide poisoning in households tightly closed up during winter months; the fact that severe progressive subcutaneous injury (beryllium granulomatosis) may follow cuts from broken fluorescent light bulbs, and numerous others.

All physicians need a basic understanding of Legal Medicine. The medical curriculum should provide it.

WALTER W. JETTER, M.D.



WALTER W. JETTER, M.D.

DR. JETTER, a graduate of the University of Buffalo School of Medicine, was Assistant Professor of Legal Medicine at Harvard before coming to the Boston University School of Medicine to head the Department of Legal Medicine, now in its second year of operation under his aegis. He lectures on toxicology at Boston University and at Tufts Medical School and is State Pathologist for the Department of Mental Health of the Commonwealth of Massachusetts, with responsibility for medicolegal investigations in all state and private mental institutions.

ANNUAL MEETING: MASSACHUSETTS MEMORIAL HOSPITALS

At the Annual Meeting of the Hospital Corporation, held in the Evans Amphitheatre on Monday, February 26, 1951, were elected four new Corporators: Dr. Claude Fuess, Mr. Wallace L. Pierce, Mr. F. Frank Vorenberg and Dr. Richard H. Norton.

Mr. Jerome Preston, President of the Corporation, pointed out the various steps taken by the administration and the Board of Trustees to further extend the services of the Hospital.

The Treasurer, Mr. Louis J. Hunter, reported a deficit of $43,000 in hospital operations for 1950, approximately one-half the 1949 and 17 per cent of the 1948 deficit.

Dr. Philip D. Bonnet, Administrator, reported that 97,138 days of care were provided the 8177 patients admitted during 1950. The Outpatient Department handled 55,000 visits and the Home Medical Service, operated in conjunction with the Boston University School of Medicine, made 14,700 visits to homes in the area served. In the Haynes Department of Infectious Diseases were hospitalized 25 per cent of all the victims of poliomyelitis in Massachusetts.

Patient Trends. In his report as Physician-in-Chief, Dr. Chester S. Keefer discussed the effect of current age and disease trends, pointing out the reduction in hospitalization of patients with diseases responding to newer forms of therapy, such as antibiotics, and citing the decrease in the pneumonia fatality rate from 35 per cent to less than 5 per cent.

Greater longevity has meant increased hospitalization for degenerative disorders. Such protracted illnesses as are occasioned by heart disease, cerebral accident, cancer, diabetes and certain psychosomatic disorders, requiring skilled care and treatment, present new problems for the hospital, the community and the physician.

Dr. Keefer also reported on research at the Evans Memorial Department for Clinical Research and Preventive Medicine into cancer, cardiovascular disease, endocrinology and metabolism, gastroenterology, genito-infectious disease, hematology, clinical immunology, infectious disease and radioactive isotopes.

Continued progress has marked the efforts of the Department of Surgery during the past year. Dr. Reginald H. Smithwick, Surgeon-in-Chief, pointed out that the Surgical Department carries more than half the surgical teaching assignments in the Medical School, is responsible for a major portion of the Graduate Training Program and participates in postgraduate teaching in hospital and medical school programs. In the past five years, the Graduate Training Program in Surgery has been extensively revised. Its present complement of 25 men now have an opportunity for 5 years of training, as compared with the 8 men limited to 3 years of training a few years ago.

Smithwick Foundation. Reporting in his capacity as Director of the Smithwick Foundation, which as in previous years has supported research and teaching and cared for patients with medical, obstetrical and gynecological as well as surgical disorders, Dr. Smithwick said that the Foundation's clinical activities are being transferred to the newly organized Medical Associates. The Foundation will continue to support its original purposes of research and teaching as well.

Dr. Benjamin Tenney, Jr., Obstetrician-Gynecologist-in-Chief, mentioned the growth of his department in the past year. As one of the three hospitals in Boston with an approved three-year training in obstetrics and gynecology, it has attracted more applicants than there are available training opportunities.

Several of the current projects in which the School of Medicine is closely associated with the Hospital were discussed by Dr. James M. Faulkner, Dean of the Medical School, who touched on the Home Medical Service, the Cancer Teaching Grants, Psychosomatic Clinic, Hormone Research Laboratory and the new Cancer Research Laboratory.

The formal meeting closed with the re-election of Jerome Preston as President, Glenwood J. Sherrard and George R. Blodgett, Vice-presidents, Bailey Aldrich, Secretary and Louis J. Hunter, Treasurer.

The meeting ended with an illustrated presentation by Dr. Bonnet of some of the complex activities of a modern teaching hospital.

Friedländer's Pneumonia

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The following article points the way toward better management of Friedländer's pneumonia by earlier diagnosis and more prompt administration of certain antibiotics. At the same time, it emphasizes some of the pitfalls connected with an early fall in temperature and the finding of other organisms by smear.

Dr. Pomerantz, who was graduated from McGill University in 1947, plans to return to Montreal for private practice in internal medicine. Dr. Wasserman, a graduate of Yale Medical School, served as captain in the Army Medical Corps for two years. Dr. Katz (M'39) conducts the course in physical diagnosis at the Medical School.

ALTHOUGH the mortality and morbidity of other bacterial pneumonias have been receding steadily (1), that of Friedländer's pneumonia continues high. Until 1945, various authors estimated a mortality range of 50 to 97 per cent for Friedländer's pneumonia (2-5). Since the advent of streptomycin, an over-all mortality rate of 20 per cent has been recorded in the literature (6,7). Cases cured with aureomycin (7) and chloromycetin (Case 1 below) have also been reported; sensitivity studies in mice indicate that certain strains of Friedländer's bacillus are moderately sensitive to terramycin (8). It has become possible therefore to treat successfully a certain proportion of the patients that formerly succumbed. Furthermore, owing to the fulminating course of acute Friedländer's pneumonia, the success of such therapy depends in part upon how soon in the course of illness the new antibiotic is administered. Early diagnosis is thus of paramount importance.

In the past year, several deaths on our wards from Friedländer's pneumonia have focused our attention on this problem. With a view to analyzing the factors aiding early diagnosis and favorably influencing the prognosis, the following study was undertaken. Among such cases at Boston City Hospital during the past 14 years, 33 fulfilled the conclusive criteria for diagnosis, based upon demonstration of lobar consolidation by physical examination and x-ray and by the isolation of Friedländer's bacillus (*Klebsiella pneumoniae*) from the sputum or blood stream.

Analysis of Data

In 3 of the 33 cases reviewed, onset was acute, but the course subsequently became chronic. Onset was acute in 30 cases which ended either in complete recovery or death. Of the total of 33 cases, 12 were treated in 1949 and 1950, 10 of them with streptomycin, chloromycetin, aureomycin, terramycin or some combination of these. Of these 10, 6 (60 per cent) died; in 4 of the fatalities, one of the new antibiotics was given for only twenty-four

hours before death. Of the 4 treated patients who survived, 3 were given specific antibiotic therapy promptly after admission. Terramycin was used in one instance, chloromycetin in another (Case 1), and terramycin followed by streptomycin in the third.

Pure cultures of *Klebsiella pneumoniae* were found in 25 cases; in 8 mixed organisms were present: *B. proteus* (1), *hemolytic Staphylococcus aureus* (2), *Hemophilus influenzae* (2), *Diplococcus pneumoniae* (4), *B. coli* (1), and *Alpha streptococcus* (3). In 18 cases Type A *Klebsiella pneumoniae* infection was present, 4 cases were associated with atypical Friedländer's organisms and 10 cases were untyped.

The patients' condition on arrival varied. Eight were in a state of shock; in 2 others shock developed within forty-eight hours. Two were admitted with the diagnosis of gastrointestinal bleeding because of a shock-like state and the presence of blood crusts over the lips. Nine patients were confused, disoriented or in delirium tremens when first seen.

In 7 of the cases, correct diagnosis was made less than eight hours after admission. In 13 others it was not made until 8 to 48 hours later and in another 13 patients, not until forty-eight hours after admission (See table). The nature of the sputum, as described by either the patient or the house officer, was bloody, rusty or like prune juice in 22 patients and white or yellow-green in 4 others. In 3 patients no sputum was obtainable, and no records as to sputum were available in the remainder. In

TABLE I. RELEVANT DATA ON THIRTY-THREE CASES OF FRIEDLANDER'S PNEUMONIA

CASE NO.	SEX AND AGE	YEAR OF HOSPITALIZATION	DURATION OF HOSPITALIZATION	INTERVAL FROM ADMISSION TO ESTABLISHED DIAGNOSIS	THERAPY OTHER THAN PENICILLIN OR SULFONAMIDE	HOSPITAL DAY ON WHICH SPECIFIC THERAPY STARTED	LOBES INVOLVED (CLINICALLY)	LOBES INVOLVED (AUTOPSY)	COURSE	AUTOPSY
1	M,53	1950	17 DAYS	<8 HOURS	CHLOROMYCETIN	FIRST	R.M.L.		RECOVERED	
2	M,60	1950	8 DAYS	6 DAYS	STREPTOMYCIN	SEVENTH	R.L.L.		DIED	NO
3	M,53	1950	4 DAYS	<8 HOURS	STREPTOMYCIN	FIRST	R.U.L.		DIED	NO
4	M,58	1950	3 DAYS	3 DAYS			R.U.L.	R.U.L.	DIED	YES
5	M,54	1950	13 DAYS	24 HOURS	TERRAMYCIN	SECOND	L.U.L		RECOVERED	
6	M,39	1950	1 DAY	<8 HOURS	AUREOMYCIN	FIRST	L.U.L.		DIED	NO
7	F,61	1950	7 DAYS	4 DAYS	TERRAMYCIN	FOURTH	R.L.L.,L.L.L.		DIED	NO
8	M,80	1950	19 DAYS	24 HOURS	TERRAMYCIN, STREPTOMYCIN	FIRST	L.L.L.		RECOVERED	
9	M,37	1950	3 DAYS	48 HOURS	AUREOMYCIN	THIRD	L.U.L.,L.L.L.		DIED	NO
10	F,85	1949	12 DAYS	POST-MORTEM			R.L.L.,L.L.L.	L.U.L.,L.L.L.	DIED	YES
11	M,58	1949	8 DAYS	48 HOURS	STREPTOMYCIN	THIRD	L.L.L.	L.L.L.	DIED	YES
12	M,79	1949	26 DAYS	4 DAYS	STREPTOMYCIN	NINTH	R.L.L.,L.L.L.		RECOVERED	
13	M,69	1946	2 DAYS	24 HOURS			R.U.L.,R.L.L.	R.U.L.,R.M.L.	DIED	YES
14	M,41	1946	9 DAYS	POST-MORTEM			R.L.L.	R.L.L.	DIED	YES
15	M,62	1946	70 DAYS	48 HOURS			R.L.L.,L.U.L.		CHRONIC	
16	M,57	1945	1 DAY	<8 HOURS			L.U.L.,L.L.L.	L.U.L.,L.L.L.	DIED	YES
17	M,49	1945	10 DAYS	48 HOURS			R.L.L.	R.L.L.	DIED	YES
18	M,25	1945	2 DAYS	POST-MORTEM			R.U.L.	R.U.L.,R.M.L., R.L.L.	DIED	YES
19	M,44	1945	2 DAYS	<8 HOURS			R.U.L.	R.U.L.	DIED	YES
20	M,33	1945	9 MONTHS				L.U.L.	L.U.L.,L.L.L.	CHRONIC, DIED	YES
21	M,65	1945	1 DAY	<8 HOURS			R.M.L.,R.L.L.		DIED	NO
22	M,50	1945	FIRST ADM. 35 DAYS		STREPTOMYCIN, 3RD. ADM.		R.L.L.,L.L.L.		CHRONIC	
23	M,30	1943	10 DAYS	48 HOURS			R.U.L.,L.L.L.		DIED	NO
24	M,54	1943	2 DAYS	<8 HOURS			R.U.L.,R.L.L.	R.U.L.,R.L.L.	DIED	YES
25	M,43	1942	2 DAYS	24 HOURS			R.L.L.		DIED	NO
26	M,52	1942	1 DAY	24 HOURS			R.L.L.,L.L.L.	R.L.L.,L.L.L.	DIED	YES
27	M,52	1942	2 DAYS	24 HOURS			R.U.L.	R.U.L.	DIED	YES
28	M,37	1941	1 DAY	24 HOURS			L.L.L.		DIED	NO
29	M,46	1941	3 DAYS	24 HOURS			L.U.L.	L.U.L.,L.L.L.	DIED	YES
30	M,44	1938	2 DAYS	POST-MORTEM			L.L.L.	L.L.L.	DIED	YES
31	M,34	1938	3 DAYS	48 HOURS			R.L.L.		DIED	NO
32	M,27	1937	2 DAYS	48 HOURS			R.L.L.,L.L.L.		DIED	NO
33	M,81	1937	2 DAYS	48 HOURS			R.M.L.,R.L.L.		DIED	NO

21 cases, no Gram stain of the sputum was done on admission. In the 12 instances where it was made, gram-negative, plump bacilli were described in 7 patients, and other organisms were identified in 5.

In 7 of the fatalities, the temperature fell to normal in the first 24 hours. Two of these were not being treated, 4 were getting penicillin, and 1 sulfadiazine. In 2 instances, drop in temperature was associated with falling blood pressure. In several cases where temperatures dropped to normal during penicillin treatment in the first 24 hours, the house officer's notes showed that it was misinterpreted as a favorable response; the patients died within a few days. It is noteworthy that patients who were getting *no* therapy occasionally showed a temperature drop.

Physical and x-ray examinations showed multilobar involvement in 14 cases. In 15 cases, upper lobes alone were diseased or lower lobes as well. The upper lobes were involved in 10 of 15 autopsied cases, 8 showing multilobar involvement.

A history of acute and chronic alcoholism was present in 16 cases (48.4 per cent). Fatty metamorphosis of the liver, or Laennec's cirrhosis, was found in 3 of the 15 autopsied cases.

Laboratory data showed that the initial white blood cell count was below 7,000 in 14 patients, 7,000-10,000 in 8 patients and above 10,000 in 11 patients.

Discussion

Friedländer's pneumonia is an uncommon but not altogether rare form of pulmonary sepsis. Between 0.6 and 13 per cent of all pneumonias are of this variety, averaging 1.1 per cent in over 17,000 cases (9). Our studies, as well as others, indicate that no clinical characteristic can, of itself, establish correct diagnosis early in the disease, distinguishing it from other varieties of pneumonia. However, there appear to be several characteristics of the disease that, considered together, suggest the probability of Friedländer's pneumonia and indicate early antibiotic therapy.

Shock, which occurred in 30 per cent of this series of patients early in the course of the illness, represents a common feature that might first arouse suspicion. Two-thirds of our patients raised bloody sputum, sometimes of gelatinous consistency. Direct smear and examination after Gram staining made possible an early diagnosis in 7 of 12 cases so examined. This highlights the opportunities for early diagnosis, undoubtedly missed in the 21 cases in which this simple procedure was not carried out.

Low white-blood cell count is another frequent characteristic of this disease. In 42 per cent of these patients, white blood cell count at the height of illness was below 7,000. An additional 24 per cent showed an initial count of between 7,000 and 10,000. The following brief case report exemplifies these points:

A 44-year-old white male (Case 19) entered Boston City Hospital with the diagnosis of "probable bleeding peptic ulcer." On entry, he was semistuporous, and no details of history were available. Bloody material covered the mouth; the skin was pale, cool and moist. Blood pressure was 100/70, the pulse rapid, the respirations accelerated and shallow. Typical signs of consolidation were evident over the right upper lobe. X-ray examination confirmed this finding. The white-blood cell count was 4100. A small amount of gelatinous, bloody sputum, obtained by swab on smear, revealed numerous gram-negative rods. Cultures of the sputum and the blood yielded Type A Friedländer's bacilli.

Diagnosis of Friedländer's pneumonia was made and the patient given penicillin and sulfadiazine. There was continuing and progressive collapse, leading to coma and finally death 2 days after admission. Autopsy showed Friedländer's pneumonia of the right upper lobe together with pericarditis caused by the same organisms. Microscopic examination of the adrenal glands showed degeneration of the cortical cells with infiltration of polymorphonuclear cells and small areas of hemorrhage in the cortex and medulla.

Smear examinations have occasionally shown additional organisms. When Friedländer's bacilli are scanty the other organisms may be mistakenly assumed to play a major etiologic role, and only subsequent growth of *Klebsiella pneumoniae* on culture may reveal the true nature of infection. This occurred in 8 of our cases (24 per cent). The result, in the following case report, was to treat the patient for pneumococcic pneumonia.

Although confusion and disorientation may occasionally accompany the prostration of an acute febrile illness, their incidence among a group of patients with Friedländer's pneumonia is strikingly high. Delirium tremens, as a manifestation of chronic alcoholism, similarly has been noted as a common feature of this infection. In this series, 27 per cent of the pa-

tients showed confusion, disorientation or delirium tremens when first observed.

As previously noted, an early sudden fall of temperature to normal was common, often without therapy. Rather than manifesting improvement, it augured a poor outlook and, in Case 4 was followed within 24 hours by death. Upper-lobe consolidation occurs frequently in Friedländer's pneumonia. An upper lobe was diseased in 45 per cent of the cases in this series – either singly or together with involvement of other lobes.

A 58-year-old Negro male (Case 4), treated previously at Boston City Hospital for alcoholism, entered with the history of recent onset of fever, cough and prostration. He was confused and disoriented, unable to contribute additional details of history.

Temperature was 105°, pulse 120 per minute, respirations rapid and shallow accompanied by a grunting sound. Dulness and moist râles were present anteriorly and posteriorly over the right upper lung field. Chest x-ray showed homogeneous density involving the right upper lobe.

The scanty sputum was whitish-yellow and showed small numbers of gram-positive diplococci on smear. Culture yielded Friedländer's bacilli.

In addition to general measures, 300,000 units of procaine-penicillin was given every twelve hours. Temperature fell progressively, almost precipitously to normal within forty-eight hours of entry. The patient remained profoundly prostrated, however, became comatose and died seventy-two hours after admission. Autopsy revealed Friedländer's pneumonia of the right upper lobe.

Occasional therapeutic triumphs using the newer antibiotics have been reported recently and account for the unprecedented low mortality figures for small series of cases of Friedländer's pneumonia. One of the 9 cases in this group so treated, this time with chloromycetin, is reported because of the gratifying outcome:

A 53-year-old white male (Case 1) was admitted to Boston City Hospital in acute respiratory distress. When first seen, he was sitting up in bed, markedly dyspneic, cyanotic, and each breath drawn with a grunt of pain.

The patient, a chronic alcoholic had been drinking heavily the preceding week. He had had a chill 48 hours before entry, soon followed by fever and marked sweating. The day of admission, he developed severe cough productive of bloody sputum. Coincidently, in the right side of the chest, he felt a sharp pain, accentuated by coughing and breathing.

Respirations were 40 per minute. The right side of the thorax was noticeably splinted, and movements of the chest on that side provoked severe pain. Over the lower right lung field, extending into the axilla, there was dulness to percussion and bronchial breathing. Moist râles were audible over this area; no friction rub was heard. Temperature was 104°; pulse rate 130. White blood cell count was 5700.

Gram-negative bacilli were found on a smear of the sputum, and cultures yielded Type A Friedländer's bacilli. (A test for reaction of the patient's organisms to chloromycetin subsequently revealed high sensitivity.)

Chloromycetin therapy was instituted three hours after entry, 2 gm. being given initially, then 1 gm. every 6 hours. Improvement was gradual but progressively more evident, with diminished toxicity, pain, cough and sputum production, and a gradual fall in temperature. On the sixth hospital day, the temperature was first recorded normal, later rising to 100° for the next 3 days. By the tenth hospital day it remained stabilized at a normal level, and the patient was essentially asymptomatic. Serial x-rays showed progressive clearing of the pneumonic shadow, and chest signs disappeared. The patient was discharged seventeen days after entry (See chart).

Various strains of *K. pneumoniae* would probably show varying degrees of response to chloromycetin. On the basis of clinical response and sensitivity studies with this patient's organisms, we are encouraged to believe that chloromycetin may be a superior therapeutic drug for Friedländer's pneumonia. Its wide range of effectiveness against other bacterial and viral infectious agents causing pneumonia would give it an additional advantage in cases of mixed infections or in situations where the seriousness of the patient's state required prompt use of an antibiotic before conclusive proof of Friedländer's pneumonia is established.

The effectiveness of terramycin *in vivo* (mice) and *in vitro* against various strains of *K. pneumoniae* offers promise that it, too, would be a highly useful drug in Friedländer's pneumonia. An additional advantage, as in the case of chloromycetin, is its wide range of effectiveness. Although terramycin gave variable results in the present series, the short period allowed for therapy in each case makes it impossible, as yet, to document its clinical effectiveness.

Aureomycin and streptomycin have already been used with gratifying results in small series of patients with Friedländer's pneumonia. Again, the patients' brief exposure to the antibiotics would preclude our drawing any

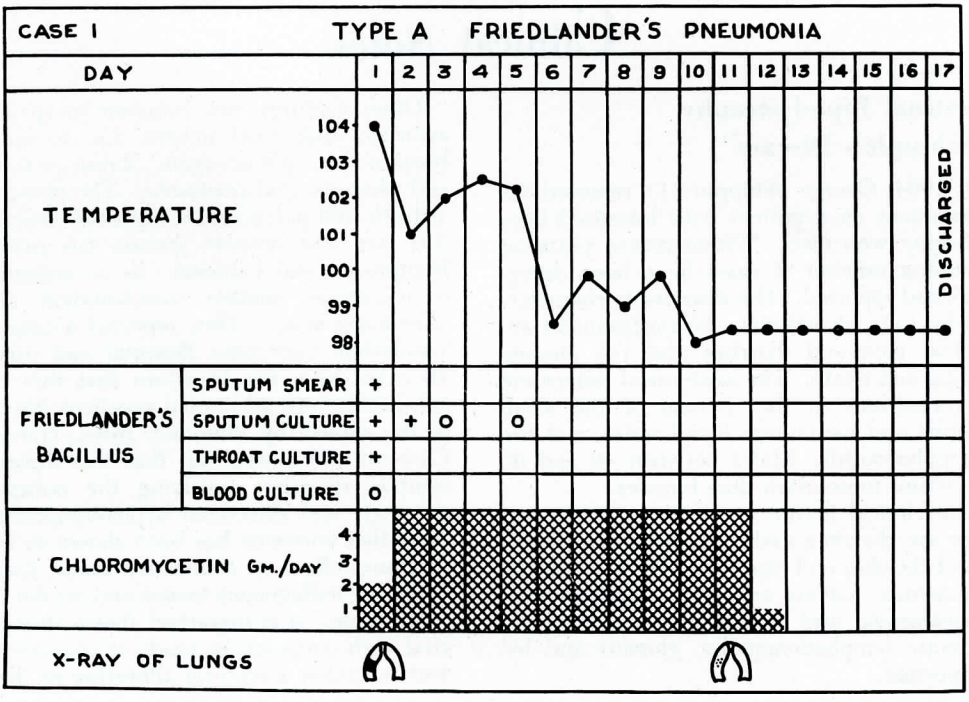
conclusions from the present series as to their relative merits.

The frequency of circulatory collapse in Friedländer's pneumonia raises an additional consideration as to modern therapy. Rich (10), studying the relationship between acute infections and circulatory collapse, concluded that there very often occurs in the adrenal glands necrosis of the cortical cells and infiltration with white blood cell elements. These changes are identical with the findings at autopsy in Case 19. One is led to speculate on the possible efficacy of cortisone or ACTH as an important supportive measure in combating the shock state associated with many cases of Friedländer's pneumonia.

Conclusions

Thirty-three proven cases of Friedländer's pneumonia were studied in an attempt to determine common factors that might facilitate early diagnosis and allow for prompt and effective therapy. The common occurrence of bloody sputum in a patient acutely ill with pneumonia involving an upper lobe or multiple lobes makes this association an important clue to the correct diagnosis. Further suggestive are a background of chronic alcoholism, together with delirium tremens, confusion, disorientation and circulatory collapse. A low or relatively low white-blood cell count represents one of the few pertinent laboratory findings that might early indicate correct diagnosis. Paramount among the diagnostic procedures, because of its ready application and frequent helpfulness, is the examination of a Gram-stained sputum smear.

Review of these cases showed that the occasional finding of other organisms in the sputum and a fall in temperature, which subsequent events proved not to be indicative of clinical improvement, were commonly misleading. Although no conclusion is drawn from this limited group as to the superiority of chloromycetin, terramycin or aureomycin as compared with streptomycin, it is probable that all four are effective agents against *K. pneumoniae*. If suggestive clinical features of Friedländer's pneumonia are present but bacteriological proof is lacking, the wider range of effectiveness against other organisms would give preference to chloromycetin, terramycin, and aureomycin, whereas streptomycin would be at least equally satisfactory in instances of proven Friedländer's pneumonia.



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Clinical Notes

Intestinal Lipodystrophy ("Whipple's Disease")

In 1904, George Whipple (1) reported his observations on a patient with intestinal lipodystrophy who died. Within recent years an increasing number of cases have been recognized and reported. The disorder is characterized by (a) polyarthritis, (b) postprandial abdominal pain and diarrhea and (c) chronic wasting and death. The anatomical lesions are lipogranulomas in the mucosa of the small intestine and mesenteric lymphnodes, and fibrous polyserositis. Males between 40 and 60 are victims more often than females.

The clinical features are not unlike sprue: there are diarrhea and steatorrhea, pigmentation of the skin and purpura, edema and hypoproteinemia, anemia and gastric achlorhydria, hypocalcemia and tetany, hypotension and moderate lymphadenopathy, glossitis and hypoglycemia.

Other features, not common to sprue, are arthritis, abdominal masses due to enlarged lymphnodes, splenomegaly, fibrous pericarditis and pleuritis, and peritonitis. The presence of arthritis and polyserositis and other features of this rare and obscure disease has prompted Kampmeier and Peterson (2) to suggest that it represents another manifestation of the "rheumatic state." They reported 4 cases from Vanderbilt University Hospital and analyzed 26 cases from the literature that they found acceptable. An additional excellent discussion of the subject by Plummer, Russi, Harris and Caravati (3) points out that this disease resembles disorders involving the collagen of the body and associated hypoadrenocorticism. Now that cortisone has been shown to have a profound effect on connective tissue, disorders involving collagenous tissues and on the "rheumatic state," it is important that a therapeutic trial with cortisone be made to observe its effect wherever structural alteration in the con-

nective tissues is suspected as the cause of any given disorder. New information concerning both the action of cortisone and the response of a rare disease will thus become available.

C. S. K.

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Surgery in Treatment of Cancer of the Cervix

Until 1920 surgery alone offered a hope of cure for cancer of the cervix. The five-year survival rate of 14 per cent was accepted as standard. In the absence of chemotherapy and modern physiology the operative mortality was high and the morbidity formidable. The advent of radium, later supplemented by external radiation, was therefore widely acclaimed, and radiation became the accepted form of therapy. As radiation therapists became more familiar with the use of combined local and external radiation, the end results continued to improve until a 30 per cent five-year survival could be anticipated. Unfortunately, the accelerated rate of improvement has not been maintained, though the encouraging reports of McKelvey, Bushke and Cantril indicate that we can increase the salvage by learning more about the use of radiation.

Published reports from many clinics indicating a renewed interest in surgery have in recent years given rise to considerable confusion as to the proper form of therapy for cancer of the cervix. Surgery was never, even by its most enthusiastic advocates, meant to supplant radiation. The two main reasons for logically considering surgery as a method of therapy are that: (1) certain cases appear to be resistant to radiation; (2) radiation appears to be of doubtful efficacy in curing nodes involved by extension of the malignancy. Since 17 per cent of cases of early cancer of the cervix may involve the nodes in the iliac and obturator regions, the reasonable doubt of the curative value of x-ray gives logical reason for considering surgical removal in selected cases.

The field of surgical application is sharply limited, however, and the indications for surgery sharply drawn. Meigs selects only those patients who are young and thin and, most important, in whom the neoplasm is sharply confined to the cervix. To include the corpulent patients or those with more advanced stages of the disease is to increase both the mortality and morbidity as well as the likelihood of recurrence.

To be effective, the surgery must be adequate The operation described by Meigs is a formidable procedure calling for a bilateral pelvic lymphadenectomy as well as removal of the entire paracervical and paravaginal tissue. Many surgeons will full knowledge that they are dealing with cancer of the cervix follow an operative procedure that is little more than a slight modification of the type of total hysterectomy done for benign disease. Such an operation can be followed only by tragedy, as recurrences appear promptly.

Surgery has a definite but limited place in the treatment of cancer of the cervix. Inasmuch as 75 per cent of all cases are beyond the confines of the cervix when first seen, radiation remains the basic form of treatment.

L. P.

Postgraduate Course in Internal Medicine

The American College of Physicians, as a part of its Postgraduate Education Program, has arranged for a Postgraduate Course in Internal Medicine to be given by members of the faculty of the Boston University School of Medicine and staff members of the Massachusetts Memorial Hospitals June 4 to June 8, 1951, inclusive. Dr. Chester S. Keefer, F.A.C.P., will be Director of the Course.

Abstracts

of articles published by staff and faculty

ABRAMS, ARCHIE A. *Intradermal infiltration anesthesia in first-stage labor.* New England J. Med. 243:636-40, 1950.

Intradermal anesthesia is useful in first-stage labor, abating pain for the greater part of labor without sedation and its depressing effects, particularly upon the baby. No local or systemic complications are risked and no special knowledge or special after-care required. The technique of infiltration is simple and can be used in the home as well as in the hospital.

Infiltration of the skin with an anesthetic agent is started at the midline just above the symphysis pubis and continued intradermally in a linear fashion, first to the left and then to the right above the inguinal ligaments, out to the anterior-superior iliac spines and then up the midline of the abdomen for a distance of 7.5 cm., extending approximately 2.5 cm. laterally on each side. When associated back pain appears, the skin area over the upper sacrum and sacroiliac joints is infiltrated intracutaneously. In our series of patients, relief of back pain was not dramatic. In some it was abolished, but most patients described the pain as an ache.

Most patients are treated with Metycaine, 1.5 per cent solution, with epinephrine in 1:200,000 dilution added. As much as 6 hours of anesthesia is sometimes obtained. In most multiparas and in a good many primiparas, a single injection suffices during first-stage labor. Approximately 30 cc. of the solution are used for abdominal infiltration and up to 30 cc. for back infiltration. It can be reinjected without untoward effect.

Since it will not deter labor progress, infiltration can be started as soon as the patient is in labor and complains of pains, regardless of early cervical dilatation. Many patients when dilated sufficiently to admit 3½ to 4 fingers complained of pain deep in the pelvis, indicating perhaps that at this stage of cervical dilatation the pain was not chiefly of uterine origin. In multiparas at this juncture, second-stage anesthesia—as a single caudal injection, saddle block, pudendal block or nitrous oxide, oxygen and ether—can be given without interference with the course of labor. In primiparas, 0.32 mg. scopolamine was given intravenously when longer unhindered progress was desired.

Any idiosyncrasy to this drug will be manifested within a short period by a small intracutaneous wheal. The question has been raised, whether absorption of the anesthetic agent might produce an analgesic effect of a systemic nature. Inasmuch as these patients are wide awake, one can readily determine sensitivity to the needle-prick, which is felt as sharp except at the actual sites of infiltration. With infiltration of one side of the abdomen, pain is referred to the opposite side.

Of the 40 patients of this series, 20 were private and 20 were ward cases. In all cases, the anesthetic effectiveness of the drug was simultaneous with its administration, and the tone of the uterus and the frequency, intensity or duration of the uterine contraction in no way altered. All patients remained conscious of their contractions even though painful sensations were absent and, as a result, all were fully cooperative.

Complete relief of pain was achieved in 22 patients of all degrees of parity; 15 had much relief (backache was sufficient to cause mention of it); 2 had moderate relief, with painful backache requiring some medication as labor progressed; 1 had little relief of either abdominal or back pain.

Almost all the multiparas complained of deep pelvic pressure with each contraction at dilatation admitting 3½ to 4 fingers, in some cases radiating down to the anterior surface of the thigh. Because the time of actual delivery in these instances was near, second-stage anesthesia was given with no interference in the course of labor or in the dispatch with which the second stage of labor was completed. In the primiparas the sensation of pelvic pressure most often occurred at dilatation admitting 4 fingers, when, if the progress of labor was active and the presenting part rotated, second-stage anesthesia was given. When rotation was not complete, either 100 mg. of Demerol was given intramuscularly, or 0.32 mg. of scopolamine intravenously. These medications were repeated in several instances when progress was slow; second-stage anesthesia was withheld so as not to inhibit progress.

It appears from these findings that in most parturient patients a new painful stimulus not of uterine origin occurs when the cervix is dilated sufficiently to admit 3½ or 4 fingers. It also seems that up to that point the pain of first-stage labor is chiefly of uterine origin, following the pathways

of Cleland; this pain was abolished completely in 55 per cent of our cases and almost completely in an additional 37 per cent. Only in 3 cases were results negligible.

It might be fair to assume that stretching of the surrounding tissues is the cause of pain in late first-stage and second-stage labor, with added discomfort arising from direct pressure upon the nerve roots of the sacral plexus.

COSTIN, M.E. and GASTON, E.A. *Solitary diverticulum of the cecum.* Arch. Sur. 60:743-8, 1950.

At this writing, 99 cases of solitary diverticulum of the cecum have been reported in the literature. Two new cases, observed recently at Framingham Union Hospital, are described herewith.

Diverticula of the intestinal tract may be classified as congenital or acquired. The former are in general of the "true" type, with walls made up of all layers of the bowel wall. Most often solitary, they occur usually in the small intestine. Much more common are the acquired diverticula, usually of the "false" type, with walls composed only of mucosal and serosal layers. They are usually multiple and most frequently found in the large intestine. Most cases of cecal diverticula reported were unclassified, probably because they were inflamed, and no clear histological type could be established.

The etiology of cecal diverticula is obscure. Weakness of the wall between constricting bands and weakness owing to rupture of an abscess from an appendiceal stump have been supported as etiological factors. A solitary diverticulum of the cecum may represent a duplicated appendix, but histological criteria usually fail to prove this because inflammation and the stretching and thinning of the sac wall distort the microscopic picture so that the anatomical characteristics cannot be clearly recognized.

The signs and symptoms of solitary diverticulum of the cecum depend upon the degree of inflammation present. With an acutely inflamed diverticulum they usually suggest acute appendicitis. Since appendicitis is the most common lesion involving the right lower quadrant, it is the most likely preoperative diagnosis. Carcinoma of the cecum with perforation is probably the next most common lesion suggested. In 84 per cent of the cases previously reported in which preoperative diagnosis was made, the diagnosis was acute appendicitis: In only 6 per cent of them was a diagnosis of diverticulitis made.

In the second case reported here, the symptoms were characteristic of acute appendicitis, which was the preoperative diagnosis. At operation, an acutely inflamed solitary diverticulum of the cecum was found and removed. Acute inflammation was not present in the first case, the patient's only complaint being constipation. Physical examination of the abdomen was negative. After barium enema, the x-ray film showed a clover-leaf deformity of the cecum. At operation, the preoperative diagnosis of carcinoma of the cecum was considered still tenable and a right hemicolectomy done. This situation is not unusual, however; approximately one-third of the patients reported on underwent cecectomy or resection of the right side of the colon because, in the absence of demonstrable metastases, the surgeon could not at the time of operation distinguish between an inflamed diverticulum of the cecum and a carcinoma.

If an accurate operative diagnosis can be made, the procedure is, when technically possible, simple excision or closure of the diverticulum. This was done in about one-half of the reported cases, with a mortality of 4 per cent. Mortality rates following resection of the right side of the colon and cecectomy are 11 per cent and 7.1 per cent respectively.

FARMER, D.A. and SMITHWICK, R.H. *Thromboembolic disease: A discussion of the problem in surgical patients with particular reference to the fatal embolus.* Angiology 1:291-301, 1950.

To reduce the mortality rate of thromboembolic disease to a satisfactory minimum, some form of prophylaxis must be found that will largely eliminate the fatal pulmonary emboli that occur without warning. With this in mind, 95 cases of thromboembolic disease occurring among 7343 consecutive general surgical admissions were carefully analyzed for frequency of possible predisposing factors. There were 12 fatalities (12.6 per cent), and it is of particular importance that 10 of them occurred without warning where thromboembolic disease had not been previously suspected.

Considering the expense of current methods of prophylaxis, their ineffectiveness in certain instances and the possibility of serious and even fatal attendant complications it does not seem advisable to subject *all* general surgical patients to either anticoagulation or vein interruption or both. We have tried to devise and test the practicability of a method of selecting patients for prophylaxis that would prevent a majority of deaths and, at the same time, reduce to an acceptable minimum the number of patients requiring prophylaxis. Until we have a reliable, inexpensive laboratory test that will accurately predict impending thrombosis, we must select cases on clinical grounds.

Having evaluated several factors common to many of our patients which in terms of frequency seemed to favor the development of thromboembolic disease, both in the entire series of 95 cases and in the 12 that were fatal, we have devised a scoring system which assigns to each

of the factors a numerical grade according to its relative importance.

1.	Age 50 or more	3
2.	Major abdominal or pelvic surgery	3
3.	Presence of cancer	2
4.	Serious postoperative complications	2
5.	Prolonged operation (3 hours or more)	2
6.	Obesity	1
7.	Varicose veins	1
8.	Abdominal distention	1
9.	Infection, particularly intra-abdominal or retroperitoneal	1
10.	Shock during or after operation (a systolic pressure below 80 accompanied by pallor and tachycardia for a half-hour or more)	1
11.	Prolonged immobility (10 days or more)	1
12.	Heart disease	1
13.	Blood dyscrasia or anemia (Hgb. 10 or below)	1
14.	Dehydration	1
15.	Previous thromboembolic disease	1

Any patient whose total score at any time during hospitalization reaches the critical level of 6 should be considered a suspect. Had this scoring system been applied to the 7343 patients studied and a uniformly successful method of prophylaxis applied to those with a score of 6 or more, the mortality rate would have been reduced from 12 to 2 per cent. We would, however, have had to employ prophylaxis in 30 per cent of them.

In view of the large number of patients eligible for prophylaxis and the disadvantages of current methods, we have decided to score all patients but to defer a complete program of prophylaxis. Patients with a score of 6 or more are closely watched and in some instances given prophylaxis.

We hope during this observation period to be able to evaluate the practicability and usefulness of this plan for detecting patients most likely to develop unsuspected fatal embolus. It seems probable that closer observation will further increase the number of patients in whom peripheral signs or symptoms are present, adequate therapy instituted early and the mortality rate thus lowered.

KNAPP, PETER H. and GOLD, BERNARD H. *The galvanic skin response and diagnosis of hearing disorders.* Psychosomatic Med. 12:6-22, 1950.

A previous study in a Military Hearing Center showed that almost 10 per cent of the population has some degree of psychogenic deafness. Later studies have revealed unsuspected hysteria in civilians with deafness. The disorder is hard to diagnose, since hearing is subjective. Various methods of measurement—whispered and low conversational voice tests, pure tone audiometry, measurement of the speech reception threshold and malingering tests, some using sodium amytal or hypnosis—were useful in finding many discrepancies and indicating degrees of psychogenic loss. But all these technics depend on what the patient says. The electroencephalogram has been used to find objective indices of an individual's actual acoustic threshold, but its value is limited.

More fruitful has been application of the *galvanic skin response*—a nonspecific sudden alteration in the electrical resistance of the skin, evoked by many stimuli, including sound. This paper deals with application of that technique to 121 military cases and brief confirmatory observations on 12 civilian cases. The method consisted of bringing speech to subjects through a voice attenuator such as was used for determining speech reception levels, while an instrument measured changes in the skin resistance of the palms. After an initial period of stabilization, words were spoken, first so softly as to be inaudible. The intensity was gradually increased and a record made of the level in decibles at which the subject first responded with his skin, and the level at which he later responded with conscious hearing. Of the 121 military cases, 6 (5 per cent) had erratic or generally unresponsive records. In the remaining 95 per cent, a satisfactory physiologic threshold to sound could be demonstrated by the reflex response in the palms.

In 14 controls with normal hearing and 26 physiologically deaf patients, speech was discriminated at levels virtually coinciding with the threshold as determined by the galvanic skin response.

The 77 cases that deviated from this picture showed an increasing gap between skin response and awareness of speech, indicating psychogenic deafness. Their disabilities, illustrated in case reports, ranged from mild emotional elaboration of structural hearing loss to severe hysteria.

The psychogalvanic technique requires careful application, since skin resistance is labile and the reflex alteration not always constant. Indeed, it tends to decrease in successive experiments. Emotional factors of "conditioned" expectation appear to be important, both in the test as used in this study and in its subsequent extension to the sphere of pure tone audiometry. Absolute thresholds cannot have been demonstrated in all cases, to be sure, but the method provided objective evidence of the capacity to receive sound. It often succeeded in clarifying diagnosis when other methods failed. Its use confirmed the subtle interaction of emotional with mechanical forces in the etiology of many cases of hearing loss. Subsequent extension has confirmed its usefulness outside the military setting as part of a wider attack on problems of deafness.

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CALENDAR

Weekly Schedule

MASSACHUSETTS MEMORIAL HOSPITALS

Monday	9:30 a.m.	Ward Rounds, Infectious Diseases*
	10:30 a.m.	Medical Ward Rounds
	12:00 noon	Medical-Surgical Conference
	12:00 noon	Medical Clinic**
Tuesday	8:30 a.m.	Neurological Rounds
	9:30 a.m.	Medical Ward Rounds
	9:30 a.m.	Ward Rounds, Infectious Diseases*
	12:00 noon	X-ray Conference
	1:30 p.m.	Psychosomatic Conference, Ward Cases
	3:00 p.m.	Psychosomatic Conference, Home Medical Service
	4:00 p.m.	Surgical Pathology Conference
Wednesday	8:30 a.m.	Surgical Grand Rounds
	9:30 a.m.	Medical Ward Rounds
	9:30 a.m.	Ward Rounds, Infectious Diseases*
	11:30 a.m.	Cardiac Rounds
	12:00 noon	Medical Clinic**
	3:00 p.m.	Clinical Conference on Psychiatry
Thursday	9:30 a.m.	Medical Ward Rounds
	9:30 a.m.	Ward Rounds, Infectious Diseases*
	10:00 a.m.	Environmental Medicine Conference, Home Medical Service
	12:00 noon	Gynecological Conference
	12:00 noon	Medical Grand Rounds
Friday	9:30 a.m.	Medical Ward Rounds
	9:30 a.m.	Ward Rounds, Infectious Diseases*
	12:00 noon	Medical Clinic**
	12:00 noon	Clinicopathological Conference***
Saturday	8:30 a.m.	Neurological Rounds
	9:30 a.m.	Medical Ward Rounds
	9:30 a.m.	Grand Rounds, Infectious Diseases*
	11:30 a.m.	Ward Rounds, Infectious Diseases*
	12:00 noon	Medical Clinic

* – Held at the Haynes Memorial, Brighton.

** – This clinic is conducted in turn by the Boston University School of Medicine, Tufts College Medical School, and the Harvard Medical School, and is held at the Boston City Hospital.

*** – This Conference is held in turn at the Evans Memorial and the Boston City Hospital.

Additional information about special clinics and other staff activities may be obtained from the Evans Information Desk at the Massachusetts Memorial Hospitals.