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GENERAL STAFF MEETING
UNIVERSITY HOSPITALS
UNIVERSITY OF MINNESOTA

CONTENTS

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I. SOCIAL AND ECONOMIC STATUS OF OUT-PATIENTS, UNIVERSITY OF MINNESOTA.

R. M. Amberg, Manager, Out-Patient Department.

Introduction:

Many hospitals in annual reports publish departmental summaries. The number of this and that, a survey of activities, needs and wishes are detailed. At Minnesota this is consolidated under the superintendent's signature in the President's Annual Report. In spite of this many have felt the need of an annual divisional survey in special projects, etc. Unique is the article we are reprinting today (through permission of the author and the publishers of the Bulletin of the Hennepin County Medical Society, III:9:207-212 (May 10) '32) in that it is concerned with a different type of treatment of our statistical material. Author Raymond Michael Amberg, Ph.C. Minnesota 1922; Graduate Student in Hospital Administration, 1922-23; Manager, Students' Health Service, 1923-19__; Manager, O-P.D. University Hospitals, 1929-19__; asks the question: Are we using the same standard of eligibility as the practicing physicians who refer patients? We admit 3 kinds:-1" referred by physicians, 2. social agencies, and 3. self referred. All are subjected to same investigation and representatives of all groups (including physicians) are rejected if ineligible by our standards. This does away with "fur-coat--automobile" standards. (It is estimated that about 3% "get away with" false statements?) Statement ours - not authors.

The answer is to be found in the author's summary which will follow. The data supporting these statements is next. Author Amberg, blond, affable, efficient - organizes service, collects, tabulates data - studies trends - is able to answer questions of social economic importance to all. Few Out-Patient Departments function so well in interests- teaching - patient care - clinical research. Poor departments offer poor teaching - poor patient service - no clinical research - are result of lack of interest by all concerned. Good services (in majority) reflect interest of those in charge. Congratulations, Ray. We appreciated your article very much - and look forward with interest to those which will follow.

W.A.O'B.

Summary

Results of this study indicate that the economic standings of out-patients is such that the question of their worthiness almost ceases to exist. Nearly ninety per cent were obtaining their support by manual occupations. Twenty-five per cent were unemployed at the time of their admission, and nearly twenty-five per cent were referred by physicians because of their inability to pay fees.

Comparison of all patients with the group referred by physicians shows no significant difference, although there possibly was more acute illness among this group.

Patients were of all age groups with a marked percentage of young adults.

A majority of patients were long time residents of the state, and the transient group less than five per cent.

Every county with the exception of one was represented by patients accepted for care.

The great majority reported two or more dependents apiece, and the fees usually charged by physicians in their offices would be beyond them.

The Out-patient Department is primarily serving a section of society that occupies the lowest economic position -- the worthy objects of medical charity.

Data

In the year 1837, Oliver Wendell Holmes, at that time a district physician of the Boston Dispensary, presented to the institution's board of governors the idea of a consulting room in which students and practitioners of medicine might together study, compare, and illustrate with each other, the many cases of diseases which could be collected among the "worthy poor". This possibly was the birth of the modern teaching out-patient department in the United States, and although great physical plants and splendidly equipped clinics have evolved from this single room, there has been no change of sentiment as to just who the worthy objects of our medical charity should be.

In order to determine how well

the University Hospital's Out-patient Department is adhering to this policy of accepting for care only those unable to pay the usual physicians fee, an analysis of 4919 consecutive cases, admitted during the period April to December, 1931, has been made. A sincere effort was exercised in the admitting of patients to secure correct information in regard to their financial and social status. Experienced almoners, especially trained, interviewed applicants in private cubicles, and secured the evidence which either admitted or rejected to service. Because of lack of funds, field investigations were not made, but there was a careful analysis of all statements regarding finances, size of family, and number of dependents. Incomes stated were compared with those for occupations of the applicant's class, recognition made of the address as to quality of neighborhood, credit ratings secured, check of property ownership made, and on some occasions the aid of commercial investigation agencies employed. The burden of proof as to their eligibility was placed squarely upon the shoulders of those desiring care.

Results of the Study

Of the 4919 cases accepted, 54% (2642) were female, 46% (2277) male; 23% (1208) were pediatric cases, 77% (3711) adult.

Of the adults, 2031 were married, 1209 single, 316 widowed, 104 divorced, 51 separated.

47% resided in Minneapolis, and 10% in St. Paul.

Table I
Patients admitted from Cities over 100,000

City	Male	Female	Total	Per Cent
Minneapolis	1057	1249	2306	47.
St. Paul	242	262	504	10.
Duluth	5	12	17	.3
	1304	1523	2827	57.3

Of the remaining 43%, less than .3% were residents of Duluth, which is no doubt due to the fact that Duluth has adequate facilities for out-patient care of the poor in connection with their local hospitals. The balance, or 43% represents admissions from every county of the state with the exception of Rock County, which is located in the extreme southwest corner of the state. Table II shows the distribution of accepted cases by county.

Table II
Distribution of Patients by Counties

M	F	T	County
9	8	17	Aitkin
53	65	118	Anoka
8	7	15	Becker
10	11	21	Beltrami
4	7	11	Benton
4	3	7	Big Stone
6	6	12	Blue Earth
11	7	18	Brown
14	14	28	Carlton
12	8	20	Carver
8	10	18	Cass
23	7	30	Chippewa
2	15	17	Chisago
4	2	6	Clay
	3	3	Clearwater
3	1	4	Cook
	3	3	Cottonwood
10	17	27	Crow Wing
78	63	141	Dakota
9	4	13	Dodge
11	10	21	Douglas
9	6	15	Faribault
2	3	5	Fillmore
7	11	18	Freeborn
9	5	14	Goodhue
4	1	5	Grant
1215	1442	2657	Hennepin
3	1	4	Houston
5	9	14	Hubbard
22	17	39	Isanti
15	6	21	Itasca
7	8	15	Jackson
14	31	45	Kanabec
12	6	18	Kandiyohi
	2	2	Kittson
10	12	22	Koochiching
2	5	7	Lac qui Parle
1		1	Lake
6		6	Lake of the Woods
7	8	15	Le Sueur
1	2	3	Lincoln
4	10	14	Lyon
13	27	40	McLeod
3	2	5	Mahnomen
6	1	7	Marshall
6	3	9	Martin

Table II (Cont.)

M	F	T	County
7	8	15	Meeker
12	14	26	Mille Lacs
21	19	40	Morrison
9	16	25	Mower
5	5	10	Murray
	2	2	Nicollet
5	4	9	Nobles
2	2	4	Norman
1	2	3	Olmsted
10	16	26	Otter Tail
2	1	3	Pennington
27	51	78	Pine
5	1	6	Pipestone
12	10	22	Polk
4	13	17	Pope
253	289	542	Ramsey
3	3	6	Red Lake
7	9	16	Redwood
13	26	39	Renville
32	49	81	Rice
-	-	-	Rock
3	2	5	Roseau
21	33	54	St. Louis
11	9	20	Scott
17	17	34	Sherburne
13	9	22	Sibley
27	33	60	Stearns
7	7	14	Steele
2	3	5	Stevens
5	7	12	Swift
17	27	44	Todd
2	1	3	Traverse
4	5	9	Wabasha
2	3	5	Wadena
3	1	4	Waseca
35	40	75	Washington
1	6	7	Watonwan
2	4	6	Wilkin
6	5	11	Winona
39	37	76	Wright
4	5	9	Yellow Medicine

Residence in State

The number of years residence in the state is of interest and importance when considering the occupation and financial status of the group as a whole. Over 95% had resided in the state more than one year, 79% more than five years, and neady 70% had residence exceeding ten years. Patients accepted represented a definite part of the states permanent population.

Table III

Number of Years Residence in Minnesota of Patients in this Group

	M	F	T	Per Cent
Less than 1 year	133	110	243	5.
1 year	102	102	204	4.
2 years	69	93	152	3.
3 years	64	62	126	3.
4 years	50	69	119	2.
5 years	78	65	143	3.
5 to 10 years	217	235	452	9.
10 to 20 years	490	637	1127	23.
20 to 30 years	463	530	993	20.
30 to 40 years	229	332	561	11.
40 to 50 years	186	239	425	9.
50 to 60 years	120	111	231	5.
60 to 70 years	63	43	106	2.
75 years and over	10	9	19	.38

Ages of Patients

The age of the patients is important from the viewpoint ofthe general situation as well as from their occupations and incomes.

Table IV showsthe ages range from under one year to 75 years and over with the largest individual age group between 20 and 24. The median age for the entire group was 28.3 years. Twelve patients were over 80 years of age. The oldest male 89 years, the oldest female 86. 53% were 29 years or under, and less than 25% above the age of 45.

Table IV

Ages of New Patients

Age Yrs	Patients each group M	F	T	%	State of Minn. Age Group %
Under 1	82	72	154	3.	2.
Under 5	210	209	519	9.	9.
5-9	202	153	355	7.	10.
10-14	149	185	334	7.	10.
15-19	181	283	464	9.	9.
20-24	244	358	602	12.	8.
25-29	216	234	450	9.	6.
30-34	142	232	374	8.	7.
35-44	264	405	669	14.	14.
45-54	258	305	563	11.	11.
55-64	224	175	399	8.	7.
65-74	146	83	229	5.	5.
75 & over	41	20	61	1.	2.

Comparison of the ages of Out-Patient Department patients with those of similar age groups in the state shows that judged on this basis, patients represent a cross section of the state's population. Significant variations existed only in two groups. 23% of the patients were under 15 years, while in the state's population, this group is 30% of the total. 31% of the patients were in a group 15 to 30 years of age, as compared to 25% in the state.

Table V shows the occupational divisions to which the wage earner or support of the family belonged. Nearly 55% (2604) were employed in unskilled or semi-skilled occupations. Although a few were clerks or stenographers, this group was composed mostly of unskilled store and office help. Very few of the salesmen were of the better class and were also mostly unskilled. 6% claimed no occupation, or acknowledged any special qualifications for earning a living. 16% were farmers or farm workers, a smaller percentage than one would expect in an agricultural area. The artisan, or semi-professional group was composed of actors, musicians, barbers, ministers, etc. Certain proprietors and managers of small businesses, such as shoe shops, small grocery and confectionary stores were considered eligible because of their very small incomes.

Table V

Occupation of Head of Family

	F	M	T	%
1. Common Laborer	997	719	1726	34.
2. Skilled Laborer	640	620	1260	25.
3. Clerks	93	106	199	4.
4. Farmers	369	378	747	15.
5. Farm Worker	15	62	77	1.
6. Salesmen	84	118	202	4.
7. Proprietors-Mgrs.	46	65	111	2.
8. Artisans - Semi-professional	54	133	187	4.
9. No profession	197	102	299	6.
10. Students	40	71	111	4.

Economic Eligibility

The present financial plight of the public does not exclude the physician. No matter what the next development in medical economics is to be, present conditions necessitate, more than ever, scrupulous consideration of the patient's ability to pay the cost of medical care. With this point of the profession in view, and also the feeling that in order to preserve human self-respect, the patient able to pay his physician should do so, an effort was made to establish a scale or measure that would exclude the unworthy.

An admission eligibility based upon size of family and annual income was put into effect during the year 1929. The eligibility schedule and number in each group follows:

Table VI

Economic Eligibility of Patients

No.		No. Dependents	Annual Gross Income	%
750	A -	None	$ 800 or under	15.
540	B -	1	1000 " "	11.
519	C -	2	1100 " "	11.
502	D -	3	1300 " "	10.
624	E -	4	1500 " "	13.
722	F -	5 or more	1600 " "	15.
1260	S -	Not in any above classes, but because of unemployment, previous illness, or financial emergency, accepted for temporary care. Admission later for a different condition will require reconsideration.		26.
4919				

Ownership of real estate automatically excluded the applicant. In many cases, especially in the "S" group, the annual income would have been higher if they worked throughout the year. 1219, or approximately 25%, were employed at the time of their admission. 74% of the group (3659) had incomes that could be classified. 26% required special consideration of their financial circumstances. 750, or only about 15% of the classified group, had no dependents. The balance of this group, 2909, or the remaining 85%, were supporting one or more dependents. The average number of dependents for the whole group was 3.1. The average number of children, 3.3.

Table VII

Occupation in Relation to Eligibility

	A	B	C	D	E	F	S	T
Common Laborer	342	215	170	162	186	241	410	1726
Skilled Laborer	169	164	155	165	216	147	244	1260
Clerks	40	28	29	20	20	28	33	199
Farmers	48	63	82	71	120	154	209	747
Farm Workers	16	3	2	3	4	13	36	77
Salesmen	23	23	29	34	27	14	52	202
Proprietors, Managers	10	19	19	15	16	9	23	111
Professional - Artisans	30	16	12	12	10	20	87	187
No Profession	31	7	12	3	14	84	148	299
Students	42	2	9	17	11	12	18	111
Total	750	540	519	502	624	722	1260	4919

In Table VIII, the number of patients sent to the hospital for care and the class of service to which they were admitted is shown.

Table VIII

Number of Patients Hospitalized

County	Per Cent	Pay	Per Cent	Free	Per Cent
780	63.06	333	26.92	124	10.02

Total Number Hospitalized - 1237
Total Per Cent Hospitalized - 24.93

Nearly twenty-five percent (1243) required bed care. 904, or nearly 75% of this group were unable to secure money for payment of their hospital bill. 780, or 64. per cent, were able to obtain county certification. 124, or 10%, were unable to obtain assistance for hospitalization, and were accepted as free patients. 333, or the remaining 27%, were able to raise the necessary deposit to admit them to a ward bed.

Table IX

Patients Referred by Physicians

		%
Minneapolis	354	33.
St. Paul	89	8.
Duluth	4	.3
Rest of State	630	59.
Total	1087	100.0

1087, or nearly 22% of the patients were referred by physicians. This group was compared with the whole to ascertain how nearly patients accepted by our system were in line with a group in which there was actual knowledge of circumstances, and no doubt of the patients' inability to pay their physician. 42% (447) of this group were from Minneapolis, St. Paul, or Duluth. 630, or the remaining 58%, were referred by physicians widely distributed through the state.

Table X

Employment of Patients Referred by Physicians
Compared with all Patients

	Total	Employed	Per Cent	Unemployed	Per Cent
Referred	1087	778	72.	309	28.
All Patients	4919	3700	74.	1219	25.

About 4% more of the group referred by physicians were unemployed than was shown

by the percentage for the entire group.

Table XI

Occupation of Patients Referred by Physicians
Compared with all Patients

	Number	Referred Per Cent	All Patients Per Cent
Common Laborer	381	35.	35.
Skilled Laborer	251	23.	23.
Clerks	39	4.	4.
Farmers	217	20.	15.
Farm Workers	19	2.	1.
Salesmen	47	4.	4.
Proprietors - Managers	21	2.	2.
Artisans - Semi-professional	23	2.	4.
No Profession	81	8.	6.
Students	8	.8	4.
Total	1087	100.0	100.0

Occupations of patients referred filled in surprisingly with those of all patients. The only variation of any significance being that in the farm group. 5% less of all patients being farmers than those in the referred group.

Table XII

Eligibility -- Patients Referred by Physicians
Compared with all Patients

Number	Eligibility	% Referred Patients	% All Patients
142	A - No dependents, Gross Income $800 or under	13.	15.
105	B - One dependent " " 1000 " "	10.	11.
129	C - Two dependents " " 1100 " "	12.	11.
83	D - Three dependents " " 1300 " "	8.	10.
122	E - Four dependents " " 1500 " "	11.	13.
208	F - Five or more depd. " " 1600 " "	19.	15.
288	S - Not in above	27.	26.
1087			

Table XII reveals no significant variation in eligibility between percentages of the referred patients and the entire patient group.

Table XIII

Hospitalization of Referred Patients

	County	Per Cent	Pay	Per Cent	Free	Per Cent
Referred	328	70.	112	25.	30	5.
All Patients	780	63.	333	27.	124	10.

The referred group required a much higher ratio of hospitalization than the casual group. 43% of patients sent in by physicians were hospitalized against 25% for the entire group. A slightly higher percentage of referred patients were able to secure either county or other aid to pay the cost of their care. 5% of referred patients received free hospital treatment against 10% for the entire group.

II. CASE REPORT

SYSTEMIC BLASTOMYCOSIS

Path. Koucky.

The case is that of a white male, 29 years of age, admitted to the University Hospitals 10-17-31 and expired 5-13-32 (209 days).

Past History

Health has been good previous to the onset of present illness. Had influenza, measles, and chickenpox during childhood. Fracture of pelvis in 1926. Frequent colds, coughing some during the attacks.

Chancroid?

1928 - Lesion on the penis which was soft and not painful, lasted for about one week. There was no rash following this. Patient had two negative Wassermanns since.

California

Patient's occupation is listed as "unemployed". He was in California from December 1929 until June 1930. He worked in a vineyard and later as a lineman.

Present Illness

12- -30 - Caught a severe cold. Coughed a great deal for 2 or 3 nights.

Hemoptysis - expectoration

1-12-31 - Observed some blood in the sputum. The cough increased and he raised almost a cupful of sputum within 24 hours. Examination by a physician at this time revealed nothing of note in the chest.

2- -31 - Still coughed and raised sputum, but lost no weight. Has had no other symptoms.

Weight loss - weakness

3-10-31 - Sputum continued. Patient began to lose weight. He also developed night sweats and has had severe chills at night. The amount of blood in the sputum increased, spitting up as much as a teaspoonful at a time. Increased weakness was also observed. Through this interval of time, sputum examination was reported negative by the State and University laboratories.

Tubercle bacilli found?

4-1-31 - Consulted a physician. X-ray plates were taken and sputum examined. Tubercle bacilli was found in the sputum. A cavity was found in the apex of the right lung.

Tuberculosis Sanatorium

4-21-31 - Admitted to a sanatorium. Course and Progress reported by Superintendent of sanatorium: The lung findings were always limited to right chest. The appearance was that of a pneumonia and eventually an abscess was diagnosed with the aid of a diagnostic pneumothorax. The pulmonary condition cleared rapidly (apparently with pneumothorax). At the time of transfer to University Hospitals, there was no evidence of findings referable to the lungs.

Blastomycosis

Had a skin lesion upon arrival at the sanatorium which continued throughout his stay. This lesion was a punched out area which showed very little, if any, tendency to heal. During the last six weeks stay in the institution, the lesions had responded to medication somewhat better than formerly. Smears from the lesion showed blastomyces. He was given 180 grains of K.I. daily with 15 grains of sodium iodide intravenously every other day. Skin lesions appeared during April 1931, first as indurated areas with abscess formation near knee on left leg. New lesions continued to appear and the old ones failed to heal.

University Hospitals

10-17-31 - Admitted to University Hospitals. Physical examination reveals an emaciated, white male in no great distress. Scalp - negative. Eyes - pupils are equal and regular, respond to light and accommodation. Ears, mouth, nose and throat - negative.

Chest

Thorax - excursion equal; most rales are present throughout lungs on both sides; no dullness on percussion; increased tactile fremitus on lower right side, anteriorly. Heart - sounds are equal; blood pressure 124/86. Abdomen, genitalia and rectal - negative.

Skin lesions

Skin - over the entire body, shows lesions in various stages of development;

some are red and tender but have not ulcerated or formed abscesses; others are typical abscesses; some have broken through the skin with an overgrowth of granulation tissue, giving the appearance of granuloma. There are several small scars which show marked discoloration, depression and atrophy of the skin.

Bones - joints

Bones - over the bony prominences, there is some tenderness and redness of the skin; no other findings. Joints - have a limited motion and are somewhat tender to touch. Impressions (Clerk): 1. Blastomycosis. 2. Tuberculosis. 3. Lues. 4. Coccidiodal granuloma.

Fellow's Report

Examination by Fellow: Distribution of lesions is generalized. There are lesions over the hands, arms, face, body and legs. They vary in size from 1 to 4 cm. The knees are swollen and somewhat tender. The small joints of the hands are swollen in a fusiform manner. There is decreased excursion of the right chest with impaired resonance posteriorly. Breath sounds tend to have a bronchial character, especially below the clavicle on the right. In this area, they also have a cavernous quality.

Laboratory

Urine - few wbc's. Blood - Hb. 34%, rbc's 3,320,000, wbc's 15,400, Pmn's 85%, L 12%, E 3%. Sputum - negative for tubercle bacilli. Blood Wassermann - negative. Spinal puncture - clear fluid, normal pressure, protein test negative, 3 cells per cmm. Spinal fluid - Wassermann and cultures negative.

X-ray of Chest

There is considerable increase in the width of the right hilum shadow and infiltration extending from it into the central portion of the right lung field along the interlobar fissures. This has the appearance of an old healed fibroid infiltration the exact natureof which is not entirely clear. The concomitant findings of the lesion in the knees and hands and forearm would suggest that the process in the lungs might represent either a blastomycosis or coccidiodal granuloma. Other types of fungus infection must also be considered. There is some widening and rarefaction in the posterior portion of the 8th rib on the right side which is very suggestive of an infiltration probably due to the same process.

X-ray of Bones

Of right knee and hand, left wrist and forearm - In the head of the second metacarpal of the right hand, there is a rounded central area of destruction. There are similar punched out destructive areas in the bases of the third and fourth metacarpal bones. The right knee joint appears to be quite normal. There is an area of destruction in the region of the tibial tubercle which is entirely cortical. A definite periostitis is present on the posterior superior and lateral surface of the tibia. There is an area of destruction in the middle third of the left ulna. The upper portion of the left hamate is completely wiped out. X-ray of dorsal spine and skull - Multiple areas of destruction are present in the skull similar to those reported in the other bones. The spine shows no definite evidence of disease. Diagnosis: Systemic generalized blastomycosis or coccidiodal granuloma. Skin consultation: Probable diagnoses: 1. Blastomycosis. 2. Coccidiodal granuloma. 3. Tuberculosis.

Course and Progress

The early part of the patient's stay in the hospital was characterized by the development of new lesions in various parts of the body. Abscesses repeatedly formed and were aspirated. 100 to 500 c.c. of thick pus was obtained on various aspirations. He complained of pain in the developing lesions which was relieved when the tension of the abscess was reduced. From time to time, he had joint pains, emeses and nausea. Except for the difficulty caused by developing lesions, he had no other major complaints.

Therapy

Therapy consisted of the administration of iodides, arsenic, sedatives and physiotherapy in the form of ultraviolet light. Arsenicals were given intravenously in the form of neoarsphenamine and tryparsamide. The iodide was administered first as potassium iodide given 180 M. by mouth daily with

sodium iodide up to 4 grams every other day. Later the iodides were cut down to M. 20 potassium iodide by mouth daily.

Laboratory Studies

Laboratory work during patient's stay in the hospital: Urine - remained generally negative, occasional wbc's were observed and occasional trace of albumen was found. Cultures from lesions: (10-26-31) Culture taken from a lesion on the arm - positive for yeastlike cells with budding forms which were later identified as blastomyces. Stool examinations were negative by the benzidine test for blood. Blood - the hemoglobin slowly rose until last examination showed 65%. Repeated sputum examinations showed no tubercle bacilli or elastic fibers.

X-ray follow-up

Check-up x-rays showed (12-1-31): Infiltration of right lung with coccidiodal granuloma or bastomycosis, somewhat improved. Infiltration of right lung, somewhat improved. Infiltration of other ribs, on right side, apparently beginning. Other lesions unchanged. (12-23-31) - X-ray of right shoulder and chest - Fungus infection of clavicle, ribs and lungs, improving. (2-16-32) - X-ray of right shoulder and chest - shows very little or no change.

Pulse, Temperature and Respiration

Throughout the patient's stay in the hospital, the temperature showed constant level, of septic type, approximately normal in morning with a rise to 101 up to 102+ in the evening. Respirations had approximately normal range. Pulse ranged between 90 and 120. Later, the fluctuations were more marked until just prior to death when the patient had a subnormal temperature.

Abscesses

The last part of stay in hospital was marked by continuous development of various abscesses about body. Occasionally had diarrhea.

3-28-32 - Under gas anesthesia, a large, deep abscess was opened about the knee joint and about a pint of thick pus was evacuated. A long leg cast was applied to give support to the leg.

Antemortem Course

About the first of April, patient required a great deal of sedatives. Given codeine, morphine, sodium amytal, allonal tablets, because of pain and restlessness. 5-5-32 - Much weaker than usual. He was out on serious. It was observed that he was drowsy. From this time on, he became more drowsy and very listless. 5-9-32 - Slept a great deal, was very weak and drowsy but could be aroused. Pulse now became irregular. Patient continually became weaker. 5-11-32 - Disorientated. 5-12-32 - Disorientation was much worse. Respirations became irregular.

Exitus

5-13-32 - 9:40 A.M. Expired.

Note:

Permission for postmortem examination not obtained.

Diagnosis:

Systemic Blastomycosis.

The finding of tubercle bacilli may be error or associated disease. Course of disease did not suggest latter.

III. ABSTRACT

BLASTOMYCOSIS.

Abstrs. Fisher* & Koucky.

*Fellows Fisher and Koucky collaborated this week on preparation of abstract. Medical Fellow Fisher interested in Blastomycotic patients, studies pictures, makes independent etiological observations, reviews literature, has excellent grasp of disease in all its manifestations. University Hospitals with most unusual concentration of uncommon conditions presents excellent opportunity for all to emulate Tulane's Floridan representative at Minnesota - Luther C. Fisher, Jr.

Historical

Blastomycosis first recognized as a distinct disease entity and causative organism discovered by Gilchrist in (1894). Montgomery and Ricketts reported 3 cases (1901). The same year, Hyde and Ricketts collected 17 cases. Following year, (1902) Walker and Montgomery reported first systemic case. (1905) Eisendrath and Ormsby saw systemic case

apparently beginning in lungs and collected 4 other systemic cases (previously reported. Hektoen (1907) found 13 cases of systemic and cutaneous forms, and differentiated between blastomycosis and coccidiosis. Within past 10 years, literature contains about 100 to 150 articles on subject.

Geographic Distribution:

For a long time, most of cases occurred in vicinity of Chicago. More recently cases have been reported throughout United States. Approximately 80%, however, have occurred in the upper Mississippi and Missouri River Valleys. Disease is especially limited to United States. In South America a type of chromogenic blastomycosis is reported which resembles North American variety somewhat.

Etiology:

Organism responsible for disease is so-called "blastomyces." Dispute exists regarding classification, division into types, and other characteristics.

Predisposing Factors:

Most patients have lived in unhygienic surroundings where dampness and mold prevails. Stober investigated living quarters of some of his patients and found practically all lived in damp places (often in presence of decaying wood, etc.) Cultures from mold in dwellings yielded organisms very similar to those recovered from patient. Downing (38 cases) found that all patients were engaged in some form of manual labor. Several of reported cases give history of residence in California (relation coccidioidal granuloma?) See our case.

Portal of Entry:

Cutaneous form of disease probably due to direct contamination of wound or abrasion. Many of systemic cases on the basis of the history alone suggest that the upper respiratory tract is main portal of entry. Occasional cases have been reported in which gastro-intestinal tract may have served as point of entranceof infection. (In Index Medicus, there is listed a group of 13 cases associated with gastro-intestinal symptoms said to be due to blastomyces.) (Article is reported in Italian literature.) Although cutaneous lesions coincident with systemic infection are very common, there are few systemic cases which can be traced to pre-existing cutaneous form of disease. Stober found this true in only 1 of his cases.

Contact Infection:

Apparently not common. Only 1 case reported which is proven (autopsy infection) in Stober's experience. Breaking of culture-tube in laboratory was followed by severe pharyngitis within few hours in 1 worker and by chills and fever and purulent bronchitis in another.

Organism:

(from Henrici). Name given to this American disease is misnomer. Applied first under mistaken impression that organism is purely a yeast and second that "blastomyces" is proper scientific name for yeast. Organism is not true yeast, although it presents yeastlike forms. "Blastomycosis" has been applied to one of other fungi and proper scientific name for yeast is "saccharomyces". Organism distinguished from true yeast and from cause of thrush by tough character growth on solid media and by abundant production of mycelium in culture. Author includes organism in genus "oidium" under "oidium dermatitidis." In body it occurs only as round or oval yeastlike cell reproducing by budding. Wall is rather thick, highly refractile and appears as bright line bordered by two fine dark ones (doubly contoured). Only one bud is formed at a time. Protoplasm is granular and almost invariably contains 1 or more rather refractile vacuoles. Organism is best sought for in preparations of 20% Sodium Hydroxide solution and examined with high dry lens. Cells are about size of leucocytes. If doubly contoured bodies are found and budding seen, diagnosis is practically certain. Air bubbles and fat droplets may be confusing if granular contents are not noted. Cultures readily obtained on Sabouraud's agar. Appearance of culture is quite variable (depends on age and number of transfers, and rapidity of transfers). In general 3 types of cultures may be seen. All types depend upon degree which organisms assume unicellular or mycelial forms.

First Type, (unicellular) is described as "mealy". First culture from lesions generally assumes this form. It is dry, somewhat wrinkled, friable and breaks up into small fragments when removed. It consists of unicellular and transitional forms (between unicellular and mycelial). Round, budding cells similar to those occurring in the lesions are seen. Frequently arrange themselves into articulated chains with beginning branching (beginning of mycelia).

Second Type of growth may develop directly from first on aging or transfer. Characterized by production of prickly elevations upon surface. Prickles are made up of closely packed filaments of true mycelium.

Third Type: wooly or cottony growth with abundance of loose mesh, aero-mycelium. In this type, unicellular forms completely disappear and are replaced by narrow branched filaments of typical mycelium. Also occurs in old laboratory strains which have been frequently sub-cultured. Spores have been recently described as occurring in aero-mycelium type.

Castellani in 6-year study of American type of blastomycosis believes 4 types of organisms may be isolated. These differ in cultural reactions.

Animal Inoculation:

Not uniformly successful and cannot be relied upon for diagnosis. In mice, intraperitoneal injections sometimes produce small, caseous nodules on peritoneal surfaces. Immunological investigations on whole have been negative. Protective immunity cannot be established in animals. Cutaneous reactions with extracts of cultures are absent in patients affected with disease. On other hand, it has been possible to demonstrate specific sensitization in culture-inoculated animals by intratesticular injections of culture extracts.

Pathology:

Primary skin lesions are quite characteristic and begin as a small, firm, papule. Number of secondary nodules develop about first which gradually enlarge and fuse. These break down in center and discharge pus through a number of small fistulae. As disease progresses, large elevated mass gradually develops with irregular ulcerated surface resembling somewhat a breaking down cancer or sometimes a tuberculous ulcer. Slight pressure on mass causes pus to exude from number of minute openings.

Microscopic appearance of tissue may present features resembling both tuberculosis and cancer. Inflammatory reaction, particularly in subcutaneous fibrous tissue, is largely granulomatous. With newly formed connective tissue and considerable infiltration with mononuclear leucotytes, and even giant cells. Epithelial tissue in response to irritation undergoes considerable proliferation; it may send long finger-like processes down into inflammatory tissue much as in epithelioma. Constant characteristic feature is occurrence of minute abscesses filled with polymorphonuclear leucocytes in epithelium proper. Dissemination occurs through lymph channels by blood stream and by extension.

Michelson notes resemblance between blastomycotic lesions and tuberculosis. Primary lesion is considerably like a tubercle. At first a collection of mononuclears occurs about organisms. This is followed by aggregation of polymorphonuclears and this goes on to necrosis. Central necrotic mass is surrounded by peripheral zone of mononuclears, lymphocytes, polymorphonuclears and giant cells. Michelson is of opinion that this is an allergic reaction. D'Aunoy and Beven after a study of 26 cases (6 autopsies) also stress similarity of lesions to tuberculosis.

Although injection of organism into animals has given irregular results, Hetkoen states several diseases of lower animals which may be due to a blastomycetic type of organism. Condition resembling farcy is found in horses, affecting particularly lymphatics and lymph nodes; in guinea pigs, a pulmonary infection resembling tuberculous pneumonia (also a spontaneous intestinal infection, usually localizing about cecum and involving lymph nodes in mesentery); in fowls an epithelioma contagiosum; in doves, a so-called pox. They are all believed to be due to an organism resembling the

blastomyces.

Immunological Studies:

Generally believed that immune reaction in blastomycosis is very small. Human attempts to demonstrate agglutinins, precipitins and complement fixation has been tried with varying success. Hektoen, as early as 1901, suggested vaccine treatment and tried it on several patients but he was unable to draw conclusions regarding value. Davids (1911) demonstrated precipitins in blood of guinea pigs which had received repeated intraperitoneal injections. Stober (1914) found patients infected with blastomycosis gave negative skin and ophthalmic tests. Houghton and Stober (1914) reported case of complete recovery of systemic blastomycosis after long administration of autogenous vaccine. Since then many investigators have followed this line of study without getting any consistent results. Complement fixation tests may eventually prove of value?

Localization of Disease:

Apparently most cases show only skin involvement. In 19 cases collected by Michelson, 13 showed cutaneous manifestation and only 6 were systemic. Downing collected 38 cases, apparently all cutaneous. D'Aunoy and Beven - 26 cases (Charity Hospital New Orleans) found 16 limited to skin, 9 systemic and cutaneous, and 1 with only systemic lesions. Cases involving only one internal organ have been reported. Jones reports spinal involvement alone and collected 2 others from literature. Most systemic cases show many involved organs. Apparently any part of body may be affected by abscesses. Louis and co-workers report case involving skin, bones, epididymus and prostate. (Case had prostatectomy and apparently recovered). Toepel saw a case involving bones, skin, lungs, kidneys and liver. Cases involving bladder, urethra, vulvo-vaginal region have been described. Lungs apparently are frequently involved. Castellani began investigating pulmonary disease caused by spirochetes and fungi early in the 20th century. Did first work in India and surrounding countries. Apparently in tropics, this form of pulmonary disease is not uncommon. Following stimulus of Castellani's work, cases of this type have been described in northern countries likewise. Entire group of organisms have been classified under group name "bronchomycosis". Disease in respiratory tract can be produced by wide range of fungi and yeast. That this type of infection is not uncommon is illustrated by fact that Healy and Morrison searching for this type of infection found 5 cases in a very short period of time (in Boston).

Clinical Features:

Appearance of cutaneous lesion has already been described. Disease progresses slowly and shows little tendency to heal. In 38 skin cases collected by Downing, first lesion appeared in 21 on face, in 4 on hands, 3 on feet, 1 scalp, 1 neck, 1 buttocks, and various combinations 7 times. In systemic form, symptoms of tumor formation and abscess in various locations appear. Lesions develop painlessly without much local heat or redness. They are soft and fluctuate, and when open they evacuate considerable pus from which the organism may be easily cultured. Septic type of fever is constant. Pulmonary form resembles tuberculosis in all symptoms. Hemorrhagic expectoration is common (our case). Later in disease, patient becomes very emaciated, fever more septic in type and probably most are fatal.

Diagnosis

is based on finding peculiar lesions of skin or in pulmonary type organism in the sputum and absence of tubercle bacilli. In the x-ray, diagnosis is suggested by multiplicity of lesions and according to Healy and Morrison by marked extent of lesion in contrast to the relative well-being of patient. Differential diagnosis includes coccidioidal granulomas and torula infection.

While about 80% of coccidioidal granulomas have been reported from San Joaquin Valley in California, isolated cases occur throughout United States. Disease may be primary in lungs or skin as in blastomycosis. Resemblance is very makred but disease is much more severe than blastomycosis, runs a more acute course with higher fever and greater tendency to become disseminated by blood stream and is almost invariably fatal. Torula

infection has occurred most frequently with localization in central nervous system. However, cases of infection in the lungs have been reported. If organism can be isolated, can be differentiated by cultural characteristics. Blastomyces reproduce by budding, ferment sugar and form mycelia upon culture. Coccidioides reproduce by sporulation, form mycelia upon culture. Torula reproduced by budding, as do blastomyces, but do not ferment sugar and do not form mycelia upon cultures.

Prognosis:

Apparently most cases of coccidioidal granuloma and of torula are fatal. California State Board of Health recommends for early cases of coccidioidal granuloma before condition has become generalized and only local lesions are present in extremities, that amputation may result in cure. Few cases have apparently been improved on colloidal copper and tartar emetic. Recovery from blastomycosis is not so uncommon. J. Fowler Avery (Mpls.) reports one cure. Case of blastomycosis of prostate in which prostatectomy resulted in cure has been noted. Michelson (19 cases) had 13 which were only cutaneous, all recovered, but in the 6 which were systemic, all proved fatal. In Charity Hospital series of 26 cases, 10 systemic deaths (6 autopsies); 16 cutaneous infections, 4 died; of the 10 systemic cases, 3 improved (lung apparently only organ involved), 6 died and 1 left unimproved.

Treatment:

Best results of treatment of blastomycosis have been following administration of large doses of potassium iodide. The dose of potassium iodide is increased to tolerance. (One patient in this hospital treated for actinomycosis was receiving over 600 minims of potassium iodide daily). Sodium iodide, intravenously, may also be used. Excision of local lesions, electrocoagulation, cautery, etc. have been used. In a few instances, amputation was done. In these cases, lesions recurred in other parts of the body. Michelson reports effect of various bacteriocidal agents upon growth of blastomyces in cultures. He found that potassium iodide in 1% solution inhibited the growth while 8% solution hibited the growth entirely. Gentian violet and acriflavine caused a definite diminution and stopped growth. Thymol was by far the most efficient fungicidal agent of all. A 1% mixture prohibited the growth of organisms entirely which suggests that thymol may be used in the local lesions with benefit.

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Conclusions:

1. Blastomycosis has been known since 1894.
2. The disease is practically limited to North America and about 80% of the cases have been reported from the North Central states.
3. The causative organism is a fungus known by common usage as "blastomyces".
4. It grows on sugar media, produces fermentation and mycelia in cultures.
5. Some authors believe there are several varieties of the organism.
6. The portal of entry is unknown in systemic form. The cutaneous type results from direct infection of an abrasion or wound. In systemic cases, respiratory tract may be primary focus.
7. The gastrointestinal tract may also be a portal of entry?
8. Animal innoculations have been only partly successful. The mouse is susceptible to a slight degree.
9. Immunological reactions are variable. Studies up to now show no conclusive results.

10. The disease microscopically resembles tuberculosis, chronic granuloma, and cancer. Resemblance to tuberculosis is so great that differentiation is possible in some cases only by finding organism.

11. About 75% of patients show only skin involvement; 25% have generalized lesions, rarely only visceral lesions are encountered.

12. Any organ in the body may be involved.

13. Of the viscera, lungs appear to be particularly susceptible.

14. The clinical course in pulmonary types is like tuberculosis.

15. Cutaneous types show chronic granulomatous ulcers. When combined with systemic forms, abscesses develop in the viscus and subcutaneous tissue.

16. Fever and debility are constant.

17. Coccidioidal granulomas and torula infections clinically resemble blastomycosis. Finding the organism is necessary to make the differential diagnosis.

18. Most systemic cases are fatal; the cutaneous types have a good prognosis (100% improvement in one series of 13 and 75% inprovement in another of 16).

19. Massive doses of iodides appear to be best treatment. Local surgical measures usually do not help because new foci develop elsewhere.

20. Thymol is suggested as a local agent of treatment on basis of experimental work.

Note: Henrici's work is recommended for clarity, compactness and excellent presentation.

IV. MINNESOTA STATE MEDICAL ASSOCIATION:

You are cordially invited to attend all of the sessions of the Minnesota State Medical Association meetings in St. Paul, Monday, Tuesday, and Wednesday, May 23, 24, and 25.

If you are not a member of the Association a guest ticket will be given you at the Registration Desk.

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Notes on last week's meeting will appear next week.