A Biometrician's View of the
Geriatric Problem

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It is a commonplace that our population is increasing. That the pattern of increase is not uniform for all ages is perhaps not so widely known. Currently the reservoir of people aged 20–30 is below earlier levels, while the old age group and the young (below 20) are showing an accelerated growth.

With the increase in the number of aged (above 65) in the population, the problem of the aged mentally ill has increased as well. That there has been an increase in the incidence of mental illness among the aged is far from a settled fact. There is certainly, however an increase of aged patients in mental hospitals, at least in the urban areas of our state and country. Let us look at the record.

The age distribution of the population is not static, moreover, as the youth of today are the aged of tomorrow, merely taking stock of the current situation is not enough. There are several relevant indices that need to be examined: 1. the actual proportion of the aged 2. the span of life, or life expectancy, of the newborn 3. the proportion of newborn children reaching old age (65+) 4. the span of life of the aged, or average number of years of life remaining after age 65 is attained.

1. The proportion of the general population aged 65 and over has risen from an estimated 2.6 percent 100 years ago (1850) to 8.5 percent in 1955, or more than three-fold. At the turn of the century, when the census data began to be more trustworthy, the proportion was 4.1 or about.
half of what it is now. At the present time one out of every 12 citizens is a senior citizen. The raw figures indicate that this group has risen from 3,1 million in 1900 to 14,1 in 1955, and the increase is still continuing.

2. The span of life, or life expectancy, of a newborn child has increased from 39 years a century ago (1850) to 50 years in 1901 and to 70 years in 1954. Thus, the span of life has increased by some 30 years during the last century and by another 20 years since the turn of the century.

3. Only 40 percent of the babies born in 1901 could look forward to surviving to age 65, while fully 70 percent of the babies born today can look forward to reaching this milestone. Both of these estimates discount changes in mortality conditions during the life times of the two generations.

4. The expectation of life after age 65 has not increased markedly since the turn of the century. In 1901, the old age group could look forward to 12 more years of life. Currently, they have a life expectancy of 14.5 years, a gain of 2.5 years. It is interesting to note that while the expectancy for males increased only 1.5 years, the expectancy for females rose about 3.5 years. We may conclude that the dramatic increase in the life span has affected survival after age 65 to only a small extent, and is mainly the effect of increased survival at birth and in the younger age groups. The increase in added years of life, even after age 45, has been slight.

Thus, though more people are reaching age 65, barely half of them survive to 80.

The rapid growth of our aged population is expected to continue. The Bureau of the Census estimates that by 1975, people aged 65 and over will number about 20.7 million, that is about 6.5 million more than at present. This is a conservative estimate, as it does not allow for any reduction in
mortality.

What have been the reasons for the increase in the proportion of aged? One outstanding factor is, no doubt, the cessation of immigration. Another is the long-term reduction in the birthrate. But perhaps the most important is improved survival during infancy. Each of these factors may tend to influence the rate of hospitalization of the aged for mental disorders in different ways. Thus, cessation of immigration may reduce the load, since there seems to be a slight but significant excess of mental illness in the immigrant generation, which is dissipated in subsequent generations. The long term trend toward reduction of the birthrate may also serve to decrease the total number hospitalized in the old age group, if not the rate. Moreover, smaller families may be conducive to mental health in the long run. On the other hand, the increased survival of infants may be one of the indirect sources of increase in mental disorders of the senium. It is possible that the saving of life at birth has permitted many to survive to a ripe old age, only to fall prey to mental disorders in their old age. This is a sobering thought which forcefully points up the lag in psychiatric therapy and prevention, in contrast with the advances in other branches of medicine. The increasing hazards of living in an ever more complex society have also been adduced as a reason for the increase in mental disorders of the senium. Whether the increased tempo of life actually produces more psychopathology is debatable, but we can not dismiss the possibility that it elicits psychopathology in individuals who under less stressful circumstances would have remained well. Examples of such elicitation are not difficult to find. Frigidity in women, according to Kardiner, emerged as a problem only after the sexual revolution brought on by Freud. Conversely, the Marquesans, who live under organized polyandry, suffer not from frigidity but from pseudo-
Cyesis brought on by rivalry for more children. Similarly, enforced re-

tirement, loss of loved ones, etc., may catapult an apparently stable but

predisposed individual into mental disorder, for it should be realized

that each stage in life presents an occasion for mental disorder—the

senium is no exception. A still further possibility must be noted. Gen-

etically determined diseases which occur before or during the early re-

productive period of life, tend to be bred out of the population and per-

sist only because of new mutations. Diseases which effloresce after the

end of the reproductive period are unaffected by natural selection. Thus,

by permitting more people to survive into old age, medicine has also

increased the chances for genetic illnesses to emerge. When the span

of life was only 39, as it was 100 years ago, the probability of observing

a case of Huntington's Chorea was very low. Today, with the span of life

extending to 70, the chance of observing such an illness has increased.

So much for sheer speculation, without which, of course, the

gathering of facts can never go on, as it is the interaction between

speculation and observation that makes for scientific progress.

We have already examined the record of growth of the general popu-

lation. Let us now examine the record of growth for that portion of the

population who become mentally ill. There are only meagre data avail-

able for the total incidence of mental disorders of the senium but for

the hospitalized portion of these disorders there is a considerable

amount of data. Consequently, we shall devote most of our attention to

this portion.

There are several indices of first admissions for mental disease that

need to be examined:

1. the number aged 65 and over; 2. the percentage these constitute
of the total first admissions; 3. their age-specific rates; 4. the expectation of hospitalization for this group; 5. their discharge rate; 6. their death rate; and 7. the corresponding data for the two diagnostic groups that account for the majority of patients suffering from mental disorders of the senium: cerebral arteriosclerosis with psychosis and senile psychosis.

1. The number of patients aged 65 or over who are admitted for the first time to New York State Civil Hospitals for mental disease has increased from 923 in 1920 to 5,299 in 1950. In 1920 they included 14.0% of the total first admissions; in 1950, 33.1%.

2. This striking increase in first admissions is present even when the growth in the numbers of aged in the general population is taken into consideration. The average annual rates of first admissions to all hospitals for mental disease in New York State per 100,000 of age group have risen 50% for ages 65-69, 100% for ages 70-75, and 200% for ages 75 or over from 1920 to 1950.

The expectation of hospitalization for mental disease in New York State at birth has gone up from 48 per 1,000 in 1920 to 81 per 1,000 in 1940; for age 65 the figures have increased from 26 per mil in 1920 to 51 per mil in 1940. With further advance in age the increase is correspondingly greater.

Discharge rates and death rates are not readily available by age groups, but there are some data for cerebral arteriosclerosis with psychosis and senile psychosis;

1. The total number of first admissions with cerebral arteriosclerosis with psychosis to all hospitals for mental disease in New York State has increased from 1,521 in the period 1919-1921 to 10,686 in the period 1949-1951. For the former period it comprised 6.2% of total first admissions;
for the latter period, 18.3%. For senile psychosis first admissions increased from 2,238 to 7,536. It made up 9.1% of total admissions for the period 1919-1921; 12.9% for the period 1949-1951.

2. The rate of first admissions for cerebral arteriosclerosis with psychosis has shown the following increases during this 30 year period: 1. males 100% for ages 65-69, 300% for ages 70-74, and 500% for age 75 and over; 2. females-300% for ages 65-69, 450% for ages 70-74, and 600% for age 75 and over. The rates for senile psychosis for males and females combined decreased by 30% for ages 65-69, remained constant for ages 70-74, and increased 100% for age 75 and over. As 70 per cent of senile psychosis first admissions are aged 75 and over, the overall effect is an increase in rates, but it is certainly not as striking as the increase in rates for cerebral arteriosclerosis with psychosis. Of course, this apparent small increase may be due to changes in diagnosis from S.P. to C.A.S., especially for those under 75 years of age.

A striking phenomenon is noted in the increase in age at first admission. It has climbed steadily from 65 to 71 for C.A.S. and from 73 to 78 for senile dementia during the last 30 years, a postponement of 5 years on the average.

The expectation of becoming a first admission for psychosis with cerebral arteriosclerosis has increased for males from 51.2 per 10,000 new births in 1920 to 191.6 in 1940, and for females, from 37.4 to 186.3. The overall increase is about 4-fold.

For those attaining age 65, the rate has increased from 75.3 to 256.6 for males and from 41.6 to 210.5 for females.

What happens to these patients once they enter the hospital? What is their life expectancy after admission, what is their discharge rate and how have these indices varied since 1910?
The discharge rates from psychosis with cerebral arteriosclerosis have declined from 26 to 15 per cent for males and from 21 to 15 for females since 1910. Similarly, the death rates increased from 61.5 percent after 3 years in 1910 to 65.0 percent in 1950. In general, these patients are worse off.

In view of the fact that the life expectancy of the general population aged 65 has increased somewhat, the poorer outlook for the CAS patient is even more striking.

A similar story holds true of the senile psychosis group. The discharge rate has declined, while the death rate has increased. This is in part a reflection of the increase in the average age at first admission, but it cannot account for the fact that while in 1950 the general population had a life expectancy of about 14 at age 65, of about 11 at age 70 and of about 8.5 at age 75, the psychotic patients in this age range had no more than one year of life left if they became first admissions to a mental hospital.

Another striking contrast is that in the general population, death rates in the older age groups have been declining. In the 65-74 age group, the rate dropped from 55.6 per 100,000 in 1920 to 44.0 in 1948; in the next age group, from 122.2 to 96.3. But during this period, mortality in the hospitalized psychotic group increased.

From the overall picture the following points stand out. While from 1910 to 1950 the expectancy of life at age 70 for the general population increased from 9 to 11 years, the life expectancy of a psychotic first admission at age 71 (the average age of admission for psychosis with arteriosclerosis) is about only 1 year, i.e., by the end of the first year, more than half of the first admissions have died. This life expectancy has shown a downward trend during the last 30 years in contrast with the
upward trend in the general population. Similarly, at age 75, the expectancy of life in the general population has increased from 7 to 8.5 years. For first admission senile psychotics, however, the life expectancy at age 78 (the average age of admission for senile psychosis) is less than one. Instead of increasing, it has declined since 1910.

These are the cold sobering facts in the situation. Let us first examine the methods which have been applied for the cure of diseases of the senium. The most prevalent method and the one on which we have the most data is that of hospitalization. The hospitalization of the aged psychotic has a long history. While in rural environments there is a tendency to retain elderly psychotics at home, urban dwellers seem to prefer hospitalization. Thus in Massachusetts in 1850, the age specific curve of first admission declined for older patients (over 50), in direct contrast to what is happening now. Even today, in Norway and Sweden the curve descends after age 50. In Denmark, where there is data from 1910 to 1954, the proportion of the aged mentally ill has shown a relatively smaller increase over the rest of the admissions, despite the fact that the number of older citizens in the general population must have increased.

According to Aubrey Lewis, the rates of first admission (first attack) for mental disease in general in England have declined since the First World War, and this held especially true of the diseases of the senium. He pointed out however, that this did not indicate a decline in mental disorder, since an increasing proportion of mentally ill individuals were cared for in other types of institutions.

That hospitalization policy reflects cultural, rather than biological, differences can be readily demonstrated even in our own country. In 1938 we examined first admission rates, residence rates, death rates, and re-
lease rates for each of the major psychoses by geographic regions of the U.S. These rates showed a tremendous variability. The coefficient of variability was smallest for the death rates. Apparently, when due correction is made for the age distribution, death shows no discrimination between regions and it takes no holiday, even from mental disease. On the other hand, first admission rates for diseases of the senium showed the maximum variability.

The cultural influences which affect hospitalization of the aged suggest that there are other ways of dealing with aged mentally ill.

The recent Connecticut survey (Aged in Connecticut State Mental Hospitals, Shindell et alii, J.A.M.A. 1956, 160, 1121-1125) led to the conclusion that the number of aged patients (60+) who can be cared for outside of the mental hospital is a small percentage of the mental hospital population (6.5 percent of the total). This survey dealt with resident patients, not with first admissions. In order to investigate this matter further, the Department of Mental Hygiene's Biometrics Research has undertaken two studies.

In September, 1956, a grant was obtained from the United States Public Health Service for the purpose of examining the case records of residents in the Home for Aged and Infirm Hebrews in Manhattan, with a view to establishing criteria for distinguishing at time of admission: 1. those residents who make a satisfactory adjustment to the institutional life; 2. those who require short term therapy but subsequently adjust and 3. those who later require removal to a state mental hospital.

The case records at the Home for Aged and Infirm Hebrews present unusually complete data on medical history, physical and personality characteristics, pre-senescent social traits, and behaviors and attitudes on admission to the home. These data are unique in that complete records are available on the residents who make a good adjustment as well as for
those who require psychiatric care or hospitalization. The built-in control provided by the well-adjusted patients makes the data particularly suitable for determination of the correlates of good and poor adjustment.

In this pilot study, data are being extracted from the records of 50 residents (18 men, 32 women) who were transferred to Bellevue between 1943 and 1954 because of mental disease. A control group of 50 residents, matched on relevant characteristics, who successfully adjusted to the institution will also be studied.

Information is abstracted regarding medical history of resident prior to admission and following admission; relationships with parents, spouse, children, extended family, both prior to admission and after admission; social behavior, including amount of participation in different group activities before and after admission; work history, including regularity, interpersonal relations at work and attitudes to work; economic status, personality traits; behavior of resident at Old Age Home; reasons for seeking admission; attitude toward entering the home; reasons for discharge.

As a further step in distinguishing between the varieties of older patients now admitted to State mental hospitals, a cooperative study was instituted.

At Central Islip State Hospital a research program was initiated in July, 1956 to determine the efficacy of treatment provided for geriatric cases in the special geriatric unit at the Central Islip State Hospital.

Approximately 100 geriatric (over 65 years of age) patients are admitted per month to Central Islip Hospital. These patients can be classified into the following groups:

1. Fully ambulatory, confused but in fair shape

2. Non-ambulatory
3. an im-between group

Group 1 was selected as the most suitable population from which to derive the experimental and control groups in that 1. this selection would tend to eliminate the moribund and 2. this group is potentially more capable of responding to treatment. However, at the discretion of the admitting officer, non-ambulatory patients were admitted to the selection group if it was felt that a few days treatment would make them ambulatory.

On arrival at Central Islip State Hospital all geriatric cases are placed in the admission building where they remain for a minimum of five days for physical and mental examinations and for case-history work-up. After completion of the admission process, they are assigned to the appropriate hospital wards.

At the time of the admission work-up, a psychiatrist designated by the Director selects those patients suitable for admission to the new geriatric ward. Then alternate members of the selected groups are assigned to the experimental unit, leaving the others to be cared for in the regular wards. Patients referred by the admissions service for potential assignment to the geriatric unit are required to have the following characteristics.

1. Aged 65 or over

2. Female sex (homogeneity in sex was expected to favor a significant experiment inasmuch as the sample size was to be limited. Moreover, the females referred to the Central Islip geriatric service are a characteristic geriatric population while the males are recruited to some extent from the homeless alcoholics of the Bowery.

3. Diagnosis—senile psychosis or psychosis with cerebral arteriosclerosis or cardiovascular renal disease.
4. Absence of other gross organic involvement

5. First admission to a mental hospital

Four measures of the effect of treatment are being made.

Progress in the hospital is ascertained by rating scales of ward behavior administered to the control and experimental groups at the following points in time:

a. within 5 days of their admission to the hospital (while still on the admission ward.)

b. four weeks after admission

c. at any change of status or at six months after admission.

Another measure of the efficacy of treatment will be the number of patients released in the two contrasted groups at the end of a stated period after admission to the hospital.

A third measure will be duration of hospitalization, i.e. the number of months spent in the hospital during the above mentioned selected period following admission to the project. The fourth measure will be convalescent adjustment. At one, two and three month intervals after discharge from the hospital both experimental and control patients are rated for convalescent adjustment on special scales applied by social workers.

On July 1 a pilot study was initiated to test out the selection procedure and the administration and usefulness of the behavior rating scales. On December 1 the pilot study was ended and the data collection was begun. The selection procedure had operated successfully and was retained. The behavior rating scales were revised in the light of administrative problems associated with their use. Three scales were constructed by the social work staff to evaluate: 1. home status of the patient at time of admission, 2. placement potential at time of leaving the hospital and 3. convalescent
status on follow-up.

By January 30, 16 patients had been assigned to the experimental and 16 to the control group.

It is estimated that by the end of one year about one hundred and twenty patients will have passed through the geriatric unit and one hundred and twenty will have had regular hospital care. The size of these two groups is sufficiently large to permit a statistical analysis of the data.

Biometrics Research also has under way a study of the literature dealing with the growth and decline of various functions with aging. Although individual variations in the growth and decline of human functioning are striking, there are nevertheless certain regularities evident which transcend these individual differences.

The survey of the literature on the relation between aging and the physiological, sensory, perceptual, psychomotor, and conceptual responses of man suggests that the more closely tied a given performance is to physiological functioning, the quicker will be its rise and decline. Thus, auditory acuity, a function of physiological mechanisms, reaches its maximum during adolescence.

Performance that is less dependent on the physiological substrate—such as vocabulary, problem solving, etc., does not generally show this rapid growth and decline. In fact, such skills rise gradually and decline slowly, if at all, with age. Furthermore, we have noted that chronic schizophrenic patients who have this normal pattern of growth and decline seem to end their days in the hospital; while those who show a disturbance in this pattern generally leave the hospital. Perhaps graceful aging is nothing but an organized gradual decline in these functions, while disorders of aging reflect themselves in an incommensurate decline of function. Social factors, such as role-playing and adjustment to new roles are also
significant. At all events, by discovering the expected pattern of
growth and decline in the normal senescent, we may be able to detect ab-
normal senescents more readily.

Prospects for future studies

1. Although the span of life of the aged is not very great, it might
be useful to conduct prognostic studies on the outcome of disorders of the
senium similar to those we have been conducting with schizophrenics. A
battery of physiological, sensory, perceptual, psychomotor and conceptual
tests to a selected geriatric group in a mental hospital may help provide
base lines for prediction of outcome.

2. Some of the rarer genetic conditions which attack the senium may
be detected by means of family incidence studies.

3. The variety of therapies now available can be investigated in
groups of patients to determine the relationship between the base-line
measurement obtained at time of admission and outcome.

Discussion

The analysis of the data on first admissions in the older age groups
has indicated that 1. the rate of hospitalization is increasing rapidly
and markedly 2. the age at first admission is being pushed forward so
that older patients are being admitted 3. mortality rates have remained
stationary or even increased during the last 30 years 4. release rates
too have shown a decline. These trends are in contrast with the trends
observed in the general population in which life expectancy has risen even
in the older age groups and mortality rates have declined. What possible
explanation could one offer for these trends? The increase in rate of hos-
pitalization, dependent as it is on cultural-social factors, urbanization,
etc., has already been dealt with. That survival and release rates of first
admissions with diseases of the senium are so much poorer now than they were
30 years ago and in opposition to the trends in the general population, is baffling. One explanation is that the patients we are getting are more moribund and more severely sick. This no doubt is true. But is it sufficient to explain the total effect noted? Another possibility is that over and above the poorer condition of the entering patient, the overcrowding and understaffing of many of our geriatric wards are engendering a condition in our aged similar to the marasmus which developed in infants at the turn of the century. If that is so, can we accomplish as much for our neglected aged as we were able to accomplish for the neglected infants of 50 years ago?

Only by investigations of the type conducted in our special geriatric units and in old-age homes will we be able to determine whether the high death rates and low release rates are biologically or environmentally determined. By providing greater care and more opportunities for rehabilitation and return to productive work, a sizeable effect may be produced on both the death rate and the release rate. The human gains from such a program are likely to be great. Whether the state can support such a program on a scale commensurate with the need, is a moot question.

**Summary:**

We have tried to emphasize the following basic observations:

1. First admissions rates to our mental hospitals in the older age group are showing a rapid increase.

2. Expectancy of life in these first admissions is about ten years less than that of the corresponding age group in the general population.

3. While the mortality in the older ages in the general population has been declining during the last few decades, this decline has
not become evident in our state hospital first admissions.

4. The discharge rates for disorders of the senium have actually declined during the last few decades.

Our general conclusion is that something needs to be done during the second half of the 20th century for the last decades of life, similar to what was accomplished for the first decades of life during the first half of this century. Can we through medical, psychological and social techniques develop methods to reduce the mortality rates and increase the release rates? Is it possible that crowding our geriatric cases into a useless existence in our state hospitals is provoking senile marasmus similar to the infantile marasmus which occurred in the early years of this century, thereby increasing mortality and decreasing discharge rates? To be sure, success in this direction may prove to be expensive to the state, as it will add to longevity. In fact, in Scandinavian countries, the decrease in mortality rates in the old age group has already added 8 percent to the bed capacities of the hospitals. But release rates, productivity and life enjoyment may also rise in the wake of such improvements. The first decade of life is of concern only to parents. All of us, however, are candidates for the last decades of life. Can we ourselves countenance our own approach to a relatively secure old age, while thousands of our colleagues are doomed to stagnate in our senile wards? And are we ourselves so sure that we will not land in one of them?