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THE PROBABLE INFLUENCE OF HEALTH EDUCATION ON THE IMPROVING APPENDICITIS MORTALITY RATE

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These observations are based mainly on experience with the approximately 17 million industrial policy-holders of the Metropolitan Life Insurance Company in the United States and Canada—men, women, and children mostly in the wage-earning sections of the population. They are sufficiently representative, in number and geographically, of the populations of the two countries to be indicative of general conditions. Frequent mortality, morbidity, and other comparisons have confirmed this statement.

Among these millions of policy-holders the performance of appendicitis has been of an arresting and definitive character during the last 30 years or so. After a steady rise in the death rate since 1911, levelling off about a decade ago, the fatality rate started a fairly marked, consistent, and recently accelerated decline. This decline occurred despite a reported increase in the incidence of the disease. We are, in fact, concerned in this analysis with appendicitis as a cause of fatalities and with influences that seem to have affected the prevalence of serious and fatal complications. We are not aware of any new approaches affecting the incidence of the initial disease itself.

The Improvement in the Mortality Rate

That there has been a marked improvement in the death rate from appendicitis is evidenced by the records of industrial policy-holders as well as by those for the general population. There were indications that a maximum level in the mortality rate had been reached during the period 1929 to 1932. Since 1933 the decline has been consistent, and should probably be considered in two phases—1933 to 1939, and 1940 to date. It is believed that the decline in the first of these periods reflects in substantial part certain health educational activities undertaken with increasing intensity during those years. Since 1940, however, while the educational work has continued, subsequent therapeutic interventions have apparently produced an even more pronounced mortality improvement.

We are primarily concerned in these analyses with the first period mentioned above, when for the industrial-policy-holder group the appendicitis mortality rate decreased from 13.2 per 100,000 in 1933 to 10.3 in 1939—a reduction of approximately 22%. If in this group we go back to an earlier peak year (1929), when the rate was 14, the decline by 1939 is 26.4%. It may be safely said that during this period the picture has been influenced by no great new medical discoveries, such as toxoid in diphtheria or other striking immunization or therapeutic procedures, although there may have been some modest advances in surgical skill, some stimulus to hospitalization through voluntary prepayment insurance plans, and other minor influences. Yet the chief variables in the picture seem to be the mortality rate and the cumulative health educational effort to be subsequently described.

Can Health Education be Measured?

It must of course be admitted that one can never "isolate" health education or any other single factor in such a complex picture and give it a specific value. Conditions and results are influenced by other tangible as well as intangible factors, such as the prevailing medical opinion, hospitalization facilities and practices, nursing influences (such as the nursing service which the Metropolitan Life Insurance Company provides for its industrial policy-holders who are under medical care and acutely ill in their homes). Yet one may say that, of all the influences at work upon appendicitis in this instance, health education stands out as an essentially new ingredient. This health education factor seemingly influences not only Metropolitan experience but, as implied above, that of the general population as well. For instance, a drop of over 29% in appendicitis mortality in the Metropolitan experience in 1933 to 1940 is equalled by an improvement to the same degree for the general population in this period.

Health Education plus Sulphanilamide

In passing we should also make a brief reference to the second period—1940 to the present time. This period, as stated, has shown an acceleration in mortality improvement, and there is little doubt as to the reason. The health educational work has been continued and intensified, especially during 1940, but the new factor is the introduction of the sulphonamide drugs, and particularly the use of sulphanilamide intraperitoneally in cases of appendicitis with perforation and peritonitis. In fact, taking the period from 1933 to the first half of 1942, the insured group showed a mortality rate decline from 13.2 to 5.5, or 58% (general population figures are not yet available beyond 1940). The influence of chemotherapy on the last two or three years' experience is brought out by recent hospital reports dealing with deaths from peritonitis following appendicitis. Actually the number of deaths from appendicitis itself has always been relatively small. Perforation and peritonitis are the principal fatal factors. It has been estimated that more than 80% of the deaths from appendicitis are caused by this complication. It is also true that the peritonitis death rate and the incidence of the complication itself have been improving for some time, apparently reflecting the educational efforts during the earlier years. Hospital studies in Philadelphia, for instance, showed a decline in perforated appendicitis from 43% in 1928-9 to 19% in 1937. Now, current reports on acute appendicitis with perforation in certain New York City hospitals show very striking contrasts. One of these reports refers to 742 cases in 1935 to 1939, with about 3% fatal. In 1940 and 1941 this study covered 400 cases, with the use for the first time of sulphanilamide given intraperitoneally where the appendix had ruptured, with *no deaths*. Another series indicates 741 cases of appendicitis with perforation and peritonitis, with 2.7% fatal before

the use of the drug. Since beginning the intraperitoneal injection of sulphanilamide these observers record 642 cases with *no deaths*.

Savings in Death Claims

From the point of view of the insurance company, we are interested not only in deaths but also in death claims. The Metropolitan Life Insurance Company in its total death claim experience shows a decline in death claims from appendicitis from \$3,032,000 in 1933 to \$2,000,000 in 1941, in spite of a marked growth in the size of the company and the amount of insurance in force during that period. In fact, the Metropolitan insurance in force in 1933 was \$18,802,984,818, as compared with \$25,433,226,148 for 1942. While it is difficult to appraise the cost of health educational and special therapeutic efforts, it can undoubtedly be said that this improvement in death claims represents a saving in one year alone of many times the cost of all the educational activities carried on throughout the whole period in question.

The Health Educational Approach

What specifically were the health educational approaches to the problem? It may be said that a number of agencies have participated in the activity in a rather isolated way. The Health Council in one city, a medical society in another, have taken an interest in the appendicitis problem from the educational angle. However, there has been in the United States and Canada no national sponsorship for this movement, such as one sees for tuberculosis, venereal diseases, cancer, poliomyelitis, etc. The official public health authorities have not been active until recently, though about a year ago the United States Public Health Service published its first bulletin for popular distribution among industrial workers on the subject of appendicitis.

Co-operation of the Medical Profession

The Metropolitan Life Insurance Company was the first nation-wide agency to take a major interest in this problem, and presumably some of the details in the approach made will be of interest. At the start it may be said that an attempt was made to present a simple message, briefly and clearly, to the lay reader. The burden of this was that in case of persistent severe abdominal pain *the doctor should be called and no laxatives or cathartics taken in the meantime*. Contrasting experience was presented as to mortality among those taking cathartics and not taking cathartics, among those receiving *hospital attention early* and hospital attention late. Every effort was made educationally to join hands with the medical profession in stressing the avoidance of self-diagnosis and treatment. One of the leaflets used in the campaign may be quoted in this regard as follows:

"Appendicitis is one of the leading causes of death among children, adolescents, and young adults, thus taking life during the most productive years. *Self-treatment is responsible for a large number of the 16,000 to 18,000 deaths which occur yearly in the United States through appendicitis*. If a doctor is called promptly and skilled surgical attention obtained when necessary, nearly all such deaths can be prevented."

Aid of the Insurance Agents

Numerous methods and devices were used to arrest the attention of the policy-holder and to give him simple advice in concentrated, dogmatic, and emphatic form. The insurance company, as in its past efforts, made special use of its own field staff of more than 20,000 men—agents who enter thousands of industrial homes periodically, many of them weekly, for premium collection and other business purposes. These men have had a long training not only as insurance agents but also as health educators, and co-operated admirably in the appendicitis educational effort. As a matter of fact, in 1940 alone 93% of the men were active and took an aggressive part during that year. Many of them of course have had personal experience with appendicitis in their own families. Properly equipped with educational material, they serve admirably as health advisers for the families with whom they are in contact. Indeed, the company has hundreds of letters from parents, teachers, physicians, and others expressing gratitude for the part played by Metropolitan literature or the Metropolitan field representative in protecting or saving a life from the hazards

of appendicitis. For instance, a New Jersey physician wrote the company the following letter:

"I wish to call your attention to the admirable attitude of one of your agents in regard to a boy who was stricken with a severe case of acute gangrenous appendicitis. Your agent, who happened to walk into the boy's home, immediately became aware of this situation and, due to his efforts, saw to it that he did not waste any time, communicated with me, and had the boy at Christ Hospital, Jersey City, in a very short time. The agent about whom I write is entirely unknown to me, but, whoever he is, I feel that he played an important part in this affair and deserves an endless amount of praise."

Another report from a Pacific Coast agent is typical of much field experience in this effort:

"The mother was about to administer a laxative. I opened one of our appendicitis pamphlets and showed it to her, and she immediately called a doctor. A blood count was taken and the baby was found to have appendicitis."

One of the company's assistant managers from a Middle West district wrote in as follows:

"While I was out with Agent — I came into a home and found that the baby was sick with a stomach-ache. The mother was about to administer a laxative. I opened one of our appendicitis pamphlets and showed it to her, and she immediately called a doctor. A blood count was taken and the diagnosis of appendicitis made. This certainly was a wonderful help to her, and she appreciated it very much."

Messages Brief and to the Point

During the last concentrated effort with educational literature the agents were equipped with a simple leaflet, which consisted of four pages of text in colour and large type, and with a summary phrased and set as follows:

APPENDICITIS!!

NEVER BELITTLE THESE SYMPTOMS:

Pain or tenderness anywhere in the abdomen
Fever and nausea

IF SUCH SYMPTOMS PERSIST:

Do not take a laxative
Do not resort to massage or exercise to "work off" the pain
Do not take enemas
Do not take food or drinks

JUST BE SURE TO DO THESE

COMMON-SENSE THINGS:

Call your doctor without delay
Remain quiet and apply an ice-bag at the site of the pain

In addition to other educational materials the company's leaflets are also liberally provided for distribution by health and educational agencies with a recognized programme in this field. In fact, 1,200,000 copies of one of the company's appendicitis leaflets were distributed in one year, and since the beginning of the organized educational campaign a total of 6,400,000 pieces of educational literature on appendicitis have been placed in American homes. At the same time this campaign was carried out also by nurses employed by or representing the company, who make 3 million visits a year to insured families to furnish bedside care and to teach personal and community hygiene. Nurses and agents of the company were urged to discuss this programme with physicians and other professional and community leaders in their districts. They were asked to study the literature themselves so as to be able to interpret it clearly. The agents were asked to leave copies in at least 50 homes in their areas.

Use of Commercial Advertising Space

The company has also utilized space in its national magazine welfare advertising series—space that monthly reaches approximately 27,000,000 readers, which naturally include all types of policy-holders, as well as a certain percentage of those in the industrial group. This appendicitis advertisement has been repeated since its first presentation, and reprints of it have been made available for distribution by co-operating organizations or individuals, especially physicians, medical societies, and nursing and public health agencies. The text of a recent appendicitis advertisement, under an illustration presenting a

physician and mother at the bedside of a small boy, may be quoted in part as follows:

"HOW INNOCENT IS A 'STOMACH-ACHE'?"

A 'Stomach-ache' means *something's* wrong.

True, it may be nothing dangerous. But, because it *can* be very serious, no one should treat such a warning signal lightly. . . .

1. *Call a doctor.*
2. *Apply an ice-bag and remain quiet.*
3. *Do NOT take a laxative, food, or medicine.*

The importance of prompt medical attention is clearly indicated in a recent survey of appendicitis cases made by medical authorities. It reveals that the death toll, among those who delayed going to hospital from two to three days, was from *three to four times greater* than among patients admitted to a hospital within the first 24 hours. The survey further shows that fatalities among those who had taken a laxative after pain developed were *more than three times greater* than among those who had taken none. . . .

When in any doubt whatsoever about abdominal pain, call your physician for *safe* guidance—and call him *in time*. Then if serious disease is indicated an early diagnosis and treatment may speed recovery, reduce the cost of illness, and decrease the possibility of dangerous complications.

Send for Metropolitan's helpful free booklet, 'Appendicitis.'

The effect of such an advertisement on the casual reader is indicated by a copy of a letter in the company's possession, written by a Canadian traveller to the Pullman Company, which reads as follows:

"About three weeks ago I was travelling on one of your crack trains, and was stricken with a severe stomach-ache. The porter in one of your Pullman cars was most accommodating, and I asked him for, and he was glad to provide me with, some bicarbonate of soda in an endeavour to relieve my pain. He, however, brought me from the club car a bottle of a well-known cathartic, and told me that the conductor in charge suggested that I take a dose of the same.

Very fortunately, I had a recent institutional ad. of the Metropolitan Life Insurance Company that was running in the leading magazines. This ad. was headed, 'How innocent is a stomach-ache?' and advised that you do three things: '(1) call a doctor; (2) apply an ice-bag and remain quiet; (3) do not take a laxative, food, or medicine.'

Now I do believe that if I had not read this advertisement (I am not a medical man, and unfortunately have not been interested too much in physiology) I would have taken this strong cathartic and have had a ruptured appendix.

I decided to get off the train at 4.45 a.m. instead of going through to my destination. I was operated on around 6 a.m., and the surgeon told me that if I had taken the cathartic I would have had quite a gamble with my life."

The Druggists Step In

Posters have also been used—notably a poster for display in drug stores, with the co-operation of the druggists and pharmacists. The national organization representing the drug and pharmaceutical business was perhaps the second major national agency to participate in this effort in a consistent way. The public spirit and leadership of the druggists have met with wide and merited acclaim. The drug-store poster referred to carries an illustration of a man in some distress at the prescription counter evidently seeking medical aid, with the druggist indicating doubt and saying:

"It might be appendicitis—"

You should see your doctor.

16,000 to 18,000 people in the United States die yearly from appendicitis. Many of these deaths could be prevented if the doctor were called at once.

Self-treatment for abdominal pain is dangerous!

Do not take a laxative, food, or medicine.

Remain quiet and call your doctor."

This organized effort to combat self-medication has been strengthened through other lines, for in Jan., 1940, the United States Federal Food and Drug Administration put into effect a ruling making it obligatory to print on the label of laxative drugs a warning statement regarding their injurious use.

The Press, the Radio, Lectures, etc.

The education effort included many other methods and instruments, such as the distribution of news releases, the

preparation of radio scripts and the use of radio stations, the furnishing of lecture outlines, with statistical data and case experience, and the encouragement of talks to lay groups of many kinds throughout the country. Here again there came in the active co-operation of the medical profession, as these talks were usually given by local physicians—often medical examiners of the company, urged to take an active part in the programme by the company's Medical Division. Groups addressed included women's clubs, parent-teacher associations, community and service clubs, employee groups, schools, churches, etc. In nearly 300 of the company's district offices, where groups of agents are employed, the agents were addressed by the company's medical examiners, stressing the vital points in the programme and urging active participation in this activity for the benefit of the policy-holders. At the same time special articles appeared periodically in the company's "Statistical Bulletin," which goes monthly to thousands of physicians, surgeons, educators, health authorities, public officials, and others.

Conclusion

This experience as a whole seems to stand out in support of the value of health education. It encourages the belief that organized effort to instruct the lay public, including those with comparatively little economic and educational advantage, can be productive of concrete results. Success depends on the use of a few simple facts, forcibly and dramatically presented. It involves the co-operation and co-ordination of many agencies and influences, and the use of a variety of approaches. Experience seems to demonstrate a degree of cause-and-effect relationship between an educational programme and a contemporary improvement in the fatality rate from appendicitis, augmented by therapeutic advances as well.

It may be added that this experience is another seemingly clear-cut demonstration that "public health is purchasable," and that purposeful, timely, and specifically "aimed" investments in this field produce definite, measurable, and substantial returns.

**EFFECT OF THE pH OF THE BLOOD
ON HAEMOLYSIS**

WITH SPECIAL REFERENCE TO BLACKWATER FEVER

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The Problem of Intravascular Haemolysis

In the course of observations on 16 subjects of blackwater fever, of whom 5 died and 11 recovered, we were naturally faced with the problem of the arrest of the haemolysis. This is of course the basic problem in all the acute haemolytic diseases, and very little is known about it. Many haemolytic toxins and poisons are known, but in no haemolytic disease has the haemolysin been isolated. In other diseases, notably paroxysmal haemoglobinuria and march haemoglobinuria, the factors which precipitate the breakdown are known (such as the influence of cold and syphilis in the former, and severe muscular strain in the erect position in the latter). We know, of course, that chronic malaria certainly, and big doses of quinine almost certainly, are the precipitating factors in blackwater fever, but we still do not know why in one case these factors produce the fever and in another do not.

Experimental Work

We have made a few observations which shed some light on the problem of the wide diurnal variation in the fragility of red blood corpuscles and the relation between the fragility and pH. We have shown that the fragility of red blood cells