Original Articles.

INFANTILE MORTALITY: ITS CAUSES AND PREVENTION.[1]

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MR. PRESIDENT AND FELLOWS, — The Thirty-ninth Registration Report of Massachusetts is a valuable record of vital statistics, useful and interesting to the physician, the sanitarian, and political economist.

From its carefully prepared tables we learn the relative mortality of the different diseases, as influenced by age and sex, that prevail among our people, and are enabled to study those that are wholly or in part preventable, that we may check their ravages and promote the public health.

We find that in the year 1880 our population was 1,783,085. The number of deaths were 35,292, of which "consumption, as in previous years, heads the list," with a mortality of 5,494.

We also find that there were born alive during the year 44,217 children. In the same period 7190 died during the first year of life; 2281 the second year; 1250 the third; 857 the fourth; 635 the fifth; a total of 12,213 children who died under five years of age; 1463 died between five and ten, and 611 from ten to fifteen, showing that with increasing bodily development there is decreasing mortality, and that the age of infancy is the most perilous period of life. The deaths of the first year are 16.26 per cent. of the births and 20.04 per cent. of the deaths. The deaths under five are 34.60 per cent., or a little more than one third of the deaths.

This valuable registration report in its record of mortality, from "twelve of the most prominent causes in 1880," credits consumption with 5494, pneumonia 3076, cholera infantum 2118 victims.

When we consider that cholera infantum is a disease that occurs usually in the first year of life, among infants artificially nourished, and that consumption and pneumonia occur during almost the whole remaining period, grouping about certain ages more than others, it is evident that the deaths from cholera infantum, and the diseases from infancy and childhood, are the most suggestive and important on the list of vital statistics.

It is also very evident that the infant at birth, and for a long time after, is weak, feeble, immature, imperfectly developed, unable to bear successfully the vicissitudes of climate, resist morbific influences, and maintain its hold on life against adverse circumstances and the ignorance and inexperience of those intrusted with its care; and we are not surprised to find this period of life attended with excessive mortality, some of the causes of which, and its prevention, claim our consideration.

(1.) Among these causes are prenatal hereditary influences and inherited tendencies to certain forms of disease, like scrofulous and syphilitic affections, in their many varied forms, and congenital disturbances of fœtal growth, often caused by perturbating influences, affecting powerfully the nervous system of the pregnant woman. These causes cannot be avoided; they are beyond the control of the physician. We can advise the expectant mother to live prudently, to avoid undue emotional excitement, preserve self-control, and maintain a serene, cheerful, happy state of mind and disposition. We can advise the unhealthy mother to raise the child with artificial food, and perhaps do something by medication to modify morbid constitutional tendencies, and thus preserve life. The number of still-born premature deaths for 1880 was 1297.

(2.) Another important cause is the prevalence of acute infectious diseases, which are often severe and deadly. The most loathsome of these, small-pox, may be fully prevented by vaccination; and may we not confidently hope that by improved methods of treatment, either preventive or special, scarlatina and diphtheria will be robbed of their terrors and cheated of their victims? The deaths from this cause, under five in 1880, were 1909.

(3.) Another cause of this mortality is the severe acute inflammations, such as pneumonia, meningitis, and others; too often caused by exposure of the child, insufficiently clothed, to severe climatic influences, in accordance with the popular idea that such treatment makes a child tough, hardy, and vigorous; a most mischievous notion, as only the most robust can survive such treatment. Ignorance and carelessness have much to do with this cause of mortality, which, in children under five, in 1880, amounted to 2269.

(4.) Another cause is the great anatomical and physiological crisis of infancy, dentition, which with many children is attended with slight disturbance of the general health or nervous system; but when we consider the active nutritive processes going on in the growing teeth and dental follicles, the hyperæmia, and turgescence of the surrounding tissues, the intense excitement of the local nerves, we are not surprised when this physiological process passes the bounds of healthy action, and through disturbed innervations causes functional and pathological changes in distant organs, requiring watchful care and judicious treatment on our part to overcome. Dentition is rarely dangerous, unless associated with other disturbing influences. It is therefore important that all morbid conditions due to other causes should be carefully investigated, or our treatment will be empirical, irrational, and unsatisfactory.

(5.) Infantile mortality is often increased by the unhealthy hygienic influences to which many children are subjected, such as breathing impure air; by living in small, close, dark, sunless, overcrowded, ill-ventilated rooms; exposure to cold; heat, filth, want of proper care and clothing, impure water, and unsuitable food. Mortality from other causes is greatly increased by these insanitary conditions, which are attributable in a large measure to parental negligence and ignorance, which can only be overcome by carefully instructing the people, and stimulating their moral sensibilities; a work which requires time and patient effort, but sure in the distant future to be accomplished. A large share of this responsibility rests upon our profession, and we should improve every suitable occasion to instruct, advise, admonish, and warn the people. The perfect sanitary house and home has not yet been built and established by man! It is only to be secured in the mansions of the ideal, heavenly hereafter!

(6.) The influence of intense solar heat upon the mortality of infant life is well known, and so important that we cannot neglect its consideration. If we again consult the valuable Registration Report, we shall find that July, August, and September, the hot

[1] Read at the annual meeting of the Massachusetts Medical Society, June 14, 1882.

months of the year, are peculiarly fatal to infants, by the prevalence of diseases of the central nervous system and digestive organs, such as convulsions and cephalitis, diarrhœa, dysentery, and cholera infantum. To a certain degree, peculiar to each department of organic life, solar heat is an essential stimulant and excitant to all the processes of growth and nutrition. Above and below certain ranges of temperature, all forms of life are impossible. Our human life is a mystery, so is every manifestation of the life force in every aspect of investigation. Next to the mystery of thought is the mystery of animal heat; constant in man, in health, under all external conditions, at about 98.4° of Fahrenheit's scale. A few degrees above this point is speedily fatal, through change in the soluble albuminoid constituents of the tissues, arresting muscular contraction, circulation, and respiration. The influence of solar heat upon human life cannot be studied, except in connection with many other coincident conditions, which modify its effects, such as the moisture of the air, atmospheric currents, electric and magnetic influences, the state of the bodily functions, the supply of food and drink, clothing and exercise. Cases of insolation afford examples of its depressing influence and deadly power. The functions of perspiration and renal secretion are checked or arrested, and a condition closely resembling that of uremic poisoning is established, attended with convulsions, and congestions of the brain, lungs, and internal organs, great depression of the nervous system, a rapid rise of bodily temperature, and speedy death. The most important physical property of heat is its power to expand minerals, gases, and almost all substances subjected to its influence. It rarefies the air, so that the important function of respiration is imperfectly performed, less oxygen is inhaled, and the exhalation of carbonic acid is diminished. The gases contained in the tissues are expanded, the circulation is enfeebled, the secretions are checked, and the functions of the nerve centres which regulate circulation, respiration, and nutrition, maintain physical vigor, resist disease, and preserve the integrity of the organization, are greatly depressed, especially in delicate, ill-nourished, poorly fed infants, living under unfavorable hygienic influences. The indirect effect of radiant heat on the health of children and older persons is important, through its power to excite and quicken the processes of fermentation and putrefaction, in foods of a perishable nature, such as eggs, milk, fresh meat, fish, bread, fresh vegetables, and fruits, rendering them unfit for consumption, causing gastric and bowel derangements, that may be severe and fatal. To overcome this powerful cause of infantile mortality, it is important that the child should be kept quiet at home in the largest, coolest room in the house, supplied with light clothing, frequent cool baths, fresh air, and pure water. If necessary, cool the air of the room by keeping ice in a tub, or by hanging a wet sheet near inflowing currents of air. The refrigerator is an indispensable luxury and necessity with the rich. An abundant supply of ice for the poor, in hot weather, would favorably affect the mortality of infants, and greatly increase the comfort, health, and happiness of such people.

(7.) We will now consider the most important of all causes of infantile mortality: the use of improper, indigestible articles of food — the prolific cause of gastric disturbance, diarrhœa, colitis, cholera infantum, and starvation. Milk has been divinely ordered as the only proper food for the young of all classes of mammalia, and Nature has made provision for a bountiful supply. Milk is an animal food composed of several elements in variable proportionate quantities, in a state of emulsion, each of which is essential to the growth and nutrition, and no one that is superfluous to the necessities of the young mammal or human infant. In ordinary normal conditions, this fluid is abundantly and perfectly prepared in the mammary glands of the mother, and when properly administered fully meets the wants of the young child for both food and drink. Therefore it is a mother's most imperative duty to nurse her child, if possible, until several teeth appear, when it will desire, and be able to digest, animal and farinaceous food, and may be safely weaned.[1] The health and comfort of a child is greatly promoted by regular feeding, once in two hours and a half in the day-time, and twice in the night, and at longer intervals with increasing age.

We are often called to prescribe for children made sick by irregular nursing, every time they wake or worry, who have been dosed with Mrs. Winslow's infernal syrup of morphine; and the whole list of domestic remedies, and now comes the doctor, who will be expected to lance its gums, administer alteratives, laxatives, alkalies, astringents, tonics, stimulants, digestives, and more opium, which he may do only to be disappointed, unless he can persuade the mother to properly administer its food. Succeeding in this, the child will recover without medicine, and he can cure it in no other manner.

Again, to keep a child in a growing, healthy condition requires tact and judgment in its general management. The good physician will often remind mothers and nurses of the importance of pure air, sunlight, suitable clothing, and cleanliness. He will advise the mother to avoid visiting and traveling in the hot months, and keep the child quiet and cool at home, and offer it frequently cold water to relieve its physiological demand for fluids, and prevent it from overloading its stomach in nursing. He will advise frequent bathing to soothe, invigorate, and refresh its nerves. He will secure for it a good bed, at least when sick, and not allow it to be packed into a deep wooden box on rockers, with a rubber blanket or an old soiled comfortable to lie upon, with its head buried in a soft, hot feather pillow. A good-sized crib with a hair mattress, or a sack filled with clean oat straw, covered with a folded sheet, makes a good bed, especially in warm weather.

The good doctor will administer but little medicine for the disturbances incident to the process of dentition, for the child will not be well in hot weather, especially in the second summer, except under most favorable circumstances, until the teeth emerge or the autumnal frosts appear, making the air more bracing and invigorating, when diarrhœal disorders will speedily disappear.

Attention to these and many other seemingly unimportant, trifling matters secures good care, and good care is no trifle. It is indispensable if we would promote the health and comfort of our infants, and prevent this excessive mortality.

[1] The changes in the physical organization of our American women, growing out of our high pressure civilization, affecting their fecundity and their ability to properly perform the functions and duties of maternity, especially in nursing, have been ably discussed in the annual discourse for 1874, by Nathan Allen, M. D., LL D., of Lowell, and the reader is advised to review that address in this connection.

Circumstances may prevent the nursing of the child from its birth, or we may be obliged to wean sooner than is desirable; a wet nurse cannot be obtained, and artificial food must be provided. How shall this be secured?

The prevailing custom with physicians and nurses is to use cow's milk diluted with one, two, or three parts of water, with the addition of a little salt and sugar. Some prefer milk, water, and cream in variable proportions, or the use of some one of the many patent commercial foods that have recently been invented. Others rely upon thin gruels of arrowroot, corn starch, gelatine, barley, oatmeal, or wheat, either pure or enriched with milk. Such methods of artificial alimentation are recommended in all standard works on medicine, and by almost all teachers.

The books abound with learned arguments to prove that it is dangerous to administer undiluted cow's milk to an infant, and minute directions are given how to dilute, adulterate, and render it more acceptable and safe.

The chemist has been asked to determine, by the methods of his subtle art, the constituent elements and the difference between human and cow's milk, and he finds proportionally more sugar in human, and more casein in cow's milk, with less important variation in the fatty, saline, and animal elements. He also finds that the casein of human and that of cow's milk differs in its physical characteristics when acted upon by reagents, that of the cow forming a more tough, firm, indigestible curd.

Different analyses give variable results in all particulars, as might be expected, for it is apparent that the composition of any milk, human or animal, will be modified by the season of the year, the quality of the food and drink, the state of health, the time since parturition, individual and race peculiarities, and many other influences. Again, milk has certain volatile elements, and it may be polluted with septic germs or the infection agent of severe or deadly disease, which no art of the chemist can detect. So that whatever may be the results of analysis showing differences in the grosser constituents, they are not of sufficient practical importance from which to deduce the conclusion that it is dangerous to feed infants with undiluted cow's milk, and that they cannot be safely and successfully raised in this manner.

The power of the chemist ends with his destructive analysis. He can neither mix nor distill any fluid having the nature and physical characteristics of milk. The female is the only chemist who can prepare this invaluable food, elaborating it through processes secluded from observation in the laboratory of her mammary gland.

The artificial substitutes for human milk that have been mentioned have certainly been most thoroughly tried for many years, and the results have not been very flattering to the scientific acumen of the inventors. Thousands of helpless, beautiful children have been yearly starved to death, poisoned, and made sick by the use of these unsuitable, indigestible foods.

A consideration of some of the anatomical and physiological peculiarities of the digestive organs in infancy will aid us in the further discussion of this subject, for the scientific successful method of artificial alimentation must be in harmony with the facts of anatomy and physiology, and not rest on any other basis or theory however indorsed by eminent fathers in medicine.

At birth the child has no visible teeth. The salivary glands are small, weighing, as stated by the Drs. Jacobi of New York, "at the age of one month, thirty-four grains; at fifteen months, eighty grains; at two years, one hundred and eighty grains."

Their physiological function is the secretion of an alkaline lubricating fluid for assistance in deglutition, having power to convert amylaceous foods into grape sugar, or dextrose. These glands are so small at birth, and until the fourth or fifth month, that but little saliva can be secreted. After this age, while teething, it is often excessive.

The stomach is a simple dilatation of the alimentary canal, the curvatures of after life being absent. It easily rejects its surplus contents when overloaded, and saves the child from distress and sickness.

Its physiological function is the digestion of albuminoid or proteid foods by the solvent power of its secretions. Sugar, starch, and oil are not digested in the stomach. They pass into the duodenum with the chyme, and are digested by the secretions of the liver, pancreas, and intestinal glands.

In this connection we must mention the important anatomical fact, as stated by the Drs. Jacobi, "that the pancreas varies in weight in infants of the same age; that in infants under four months it is often less than a drachm, never weighing two drachms." If these are unquestioned facts, it is clearly evident that the infant has but feeble power to digest the starchy elements of farinaceous foods; and that decoctions or gruels, made from wheat, oats, barley, corn starch, arrow-root, and rice, which contain from sixty to eighty-six per cent. of starch, and are the basis of all commercial infant foods, should have a low place in an infant's diet, compared with cow's milk, which contains no starch, but has an abundance of all needed elements, and is almost perfectly adapted to the digestive organs of the child, the trouble being with the quality of the casein, and the liability to be acid instead of alkaline, like human milk.

"The investigations of Guillot into the change undergone by the food given to children in French hospitals, and the great mortality attending those who were fed on farinaceous and starchy substances boiled in water," is confirmatory on this point. "He found uniformly present in the bowels a jelly-like substance, which on analysis was found to be nearly pure starch." The children were starved to death.

If with care in the selection, management, and feeding of the cow, we can modify the milk product, and secure a food almost identical with, yes, infinitely nearer human milk than any artificial mixture can be, and if by some method of administration we can render it acceptable to the stomach, overcoming objections by good practical results, all of which we declare can be accomplished, ought we not, considering the enormous death-rates attending old methods, to take a new departure, and establish our practice on the only sound basis, the facts of anatomy and physiology? We can lose nothing in reputation. A larger mortality cannot be easily secured and placed to our credit!

Let then the physician and the physiological chemist, in dealing with this important matter, consult the great high priest of nature, the farmer, and, by his aid, using the chemistry of nature, secure an abundance of perfect natural food for our children, pure, sweet, rich cow's milk.

All theories and methods of administration to be

accepted as fixed must successfully stand the great crucial test of science, that of observation and experience. What testimony then can we secure from observation and experience?

In 1868 Dr. Stephen Rodgers, of New York, published an article in the *Medical Record* recommending undiluted cow's milk for infants, after nine years' experience, and its use in bringing up three of his own children.

Dr. Hiram Corson, in an address before the State Medical Society of Pennsylvania, on food for infants, some fifteen years ago, after observations extending over a period of more than thirty years, declares: "I feel quite certain that it is almost as easy to raise children by hand, if they have an abundant supply of good, undiluted cow's milk, as it is by the breast."

His experience confirms his opinion "that thousands of children who die annually of diarrhœal diseases, die for want of food. They are really starved to death." He says to the profession, "and we are not blameless."

Dr. Austin Flint, in his work on the Practice of Medicine, article Cholera Infantum, page 417, says: "There is reason to believe that infantile mortality in cities is attributable in no small measure to the use of diluted, sophisticated, artificial milk. The importance of undiluted milk from a pure source to the welfare of children is far from being generally appreciated."

It was with great pleasure that I found, while preparing for this occasion, in the last, the April, number of the *American Journal of Obstetrics*, a "special report of the discussion on the question of nourishment in the pediatric section of the fifty-fourth meeting of German naturalists and physicians, at Salzburg, September 19, 1881."

A commission had been previously appointed to prepare papers and investigate this important subject. A circular was prepared and widely distributed, directing the discussion to two points: —

"First. Substitution of natural, unadulterated animal (cow's) milk for human milk, and its production.

"Second. Substitution of artificial foods, with or without milk, for the natural milk; their nature and value."

After earnest discussion for two days the conclusions reached in regard to artificial foods were expressed by Dr. Soltmann as follows: "Now and evermore it is unanimously agreed, that these preparations *can in no way be substituted for mother's milk, and as exclusive foods during the first year are to be entirely and completely rejected.*"

In regard to cow's milk he said: "Therefore we now stand at this point: cow's milk is the only substitute for mother's milk. Our whole endeavor must be to procure and use this in the best way. This standpoint is a long step in advance on the broad field of work before us." As presiding officer he closed the discussion thus: "Let us hold fast, gentlemen, to what we have already gained. Let us attempt in the future to put it in the power of even the poorest to obtain good, pure milk for his children. United work on the part of doctor, experimental pathologist, physiological chemist, and land-owner can alone fill up the gaps in our knowledge of dietetics."

For thirteen years, when for any cause it has been necessary to resort to other food than mother's milk, and the fears of mothers and nurses could be overcome, I have used undiluted cow's milk, and failed only in three instances to raise the child.

One was born in midsummer; the mother had no milk. The parents had previously raised a child with pure milk. They attempted to raise this with fairow cow's milk, which was unsuitable; vomiting and purging did its work in a few days. A midwife attended at its birth. I saw it once the day before it died. It was not fairly under my care.

Another was born April 22, 1874. The mother had convulsions, was delivered with forceps. The child was partially nursed for three weeks, and then weaned with undiluted milk. It was very feeble from birth, but did well for nearly three months; July 27th it died after a week's illness, caused by fevered bloody milk, which was not detected until the child was made sick. The cow was injured in the pasture, and the unhealthy putrid milk poisoned and killed the baby.

The third case occurred in August, 1881. The mother was confined while suffering from a severe attack of acute dysentery. She died in seven days. The child was sick from birth, its body emitting a sour, urinous, sickening odor, like that from the mother during her sickness. It lived twenty-four days.

A brief recital of a few severe test cases, to illustrate the views here presented, is important.

CASE I. June 27, 1869, a daughter was born to Dwight E. Clement, of North Orange; nursed a month to July 30th, when the mother was prostrated with a severe typhoid fever. The milk "dried up," and grandmother, fearing "clear milk would kill the child," gave it one fourth milk with three fourths water. This was in the hot July. In a few days the child was sick with vomiting and purging. It rapidly failed, its flesh wasted, the anterior fontanelle was depressed. It uttered the peculiar plaintive moan we have all too often heard in similar cases. The hands dropped lifeless; the tongue lay on the floor of the open mouth; eyes half open; extremities cold; death imminent. Grandmother was ready to try anything. Undiluted milk was carefully administered.

The child is now a fine, healthy girl, thirteen years of age. This was my first case; it gave me confidence and courage.

CASE II. September 2, 1872, a son was born to Hollon Farr, of Athol. It never nursed, and was fed on milk and water, and Graham gruel and milk, until it was nine months old, when it was prostrated with vomiting and purging. Clear milk was advised, and the boy is to-day a fine, healthy fellow, nine years old.

October 10, 1875, another son was born. The mother had no milk. When the yellow bile appeared in the discharges, undiluted milk was given, and the nurse, who was very timid, was instructed to let it have all it would take, after giving it a little cold water. I was called in two weeks. The child did not thrive; it worried, was weak and feeble, with a peculiar red blush on the skin. The nurse had left, and the mother said she had given it only a great spoonful of milk at a time. It was starved. We advised the mother, and the child soon had all it wanted, and is to-day a fine, healthy boy, six years old.

Now mark this: four out of six of their children died in infancy, of cholera infantum, fed on milk and water and farinaceous gruels and milk, before I became acquainted with the family.

CASE III. July 23, 1876. A son was born to A. M. Sawyer, of Athol, after a hard labor, terminated with forceps; weight twelve pounds. Nine hours

after the mother suddenly died. The child never nursed. It was fed with water and a little milk for two days, until the yellow bile appeared in the discharges and appetite was manifested, and the nurse was instructed to give it undiluted milk. Three weeks after, August 14th, I was called. It was vomiting and purging. The nurse, a good one, the same as employed by Mr. Farr, was timid, and had added one fourth water. The child was cheated twice, first by the milkman, who supplied the milk from that of several cows mixed, instead of from one as he had agreed to do, and that was evidently extended with water. Second, the nurse added more water. Milk was obtained twice a day from a young healthy cow that had recently calved. It was carefully fed pure, a little medicine and brandy administered, and we had no further trouble. It is now six years old.

A child of E. A. Thomas was brought up on milk from the same cow at the same time.

CASE IV. May 2, 1867. A son was born to O. T. Brooks, of Athol. In six weeks the mother's milk failed from debility and "nursing sore mouth," and the child was weaned with one third milk and two thirds water. As usual the food disagreed; it irritated and poisoned the child; vomiting and purging finished its work August 30th, and a beautiful child passed away, aged four months.

December 6, 1871. Twin boys were born. At eight weeks they were weaned for the same cause, in the same manner as before. They lived, pale, ill-nourished and weak, until August, 1873, when the inevitable "vomiting and purging," made quick work with its victims, and the two dear children were laid away, aged one year and eight months.

October 26, 1875, a daughter was born. In two months was weaned, as the others were. The old enemy, vomiting and purging, tried for a few weeks to do the work which in midsummer it would quickly and easily accomplish. At length the fearful, reluctant mother consented to use undiluted milk, and in a few days the child was well, and is to-day a robust, healthy, beautiful girl, seven years old.

A son was born August 3, 1879. Was weaned in hot weather on undiluted cow's milk, without trouble, and is now a tough, strong boy, nearly three years old.

I have no record of the number of cases weaned and raised on undiluted cow's milk, probably nearly a hundred, as my obstetrical cases at full term, for the thirteen years, number five hundred and twenty; and I fully agree with Dr. Corson, "that it is about as easy to raise children by hand, if we have an abundant supply of good, undiluted cow's milk, as it is by the breast," and I will further add that under these conditions I neither hesitate or fear to wean in hot weather. Success with any plan of management can only be secured by attention to a multitude of seemingly unimportant details. The child seeks the breast to satisfy its thirst and appetite, and for no other purpose. It draws the warm milk slowly, with much effort, from the mother's breast. As it reaches the palate the gastric glands are excited, the digestive fluids are freely secreted, and mixing with the inflowing milk exert their solvent power on the whole bulk of ingesta with great energy. Therefore it is good practice, especially in hot weather, to offer the child cold water before nursing to satisfy its thirst, and prevent it from overloading its stomach.

In artificial feeding we should carefully observe the methods, and follow the indications of nature. Therefore we would satisfy the infant's thirst by allowing it to draw water from a tumbler slowly through the nurse tube; some children will require considerable, others but little. Not being an aliment it does not excite the secretion of the gastric juices. Then in a few moments allow the child *all the fresh, undiluted cow's milk it will take*, warmed to the temperature of the blood, only being sure that it is slowly ingested, just as nature supplies it when nursed from the mother's breast.

Some will ask, Why not mix the water and milk in the bottle instead of the stomach? What is the difference in result?

Milk and water is neither the one nor the other. It is extended, adulterated, weakened milk, and when thus administered more bulk is required for a given amount of nourishment, the stomach is over-distended, and the gastric juice so diluted as to weaken its digestive power; besides, the water and milk separately administered mix but little in the stomach, the water is so rapidly absorbed. By this method we do closely imitate nature, and in a great measure, yes, almost entirely overcome the difference in quality and digestibility of the casein between human and cow's milk.

The cow should be selected with great care. Milk from different breeds, and from cows of the same breed vary widely in their essential elements. That from the Jerseys and Alderneys is excessively rich in cream. The Ayrshire and grade cow should be preferred, as they furnish a fluid more nearly resembling human milk. A very fat baby is not to be desired. The quality of milk is influenced by the season of the year, the food, air, water, and care which the cow receives, and the state of her health. For obvious reasons we would avoid a diseased, old, or farrow cow, one fed on turnips, onions, cabbage, slops, garbage, and coarse, sour, swamp grasses, supplied with water from a stagnant pool or polluted well, or kept in a damp, filthy, ill-ventilated stable, and select a young, healthy Ayrshire or grade cow, that has recently had a calf; one that has good, sweet, upland pasturage, with pure spring water to drink, and a plenty of salt; one that is sheltered in a clean, well-ventilated stable; one that has good care, that is kept quiet and gentle, not worried by dogs or boys. We would examine the milk with a test tube, note its specific gravity, its color, smell, and taste, the percentage of cream, its reaction to test paper, and if acid reject it. We must use our eyes, our nose, our taste, and secure pure, rich milk, milked morning and evening from a clean cow, into a clean pail; keep it in a clean bowl, covered with a clean napkin, in a clean closet, away from the pantry where food is stored. It will rapidly absorb odors, dust, and septic germs, and in hot weather will quickly ferment, putrefy, and spoil unless cared for, and thus become the vehicle or cause of severe or perhaps deadly disease. It is the most sensitive and easily spoiled of all animal foods.

Having secured good milk we would procure a suitable nurse tube and bottle; one with a screw in the stopper is desirable to regulate the flow. We must be sure that the child draws the milk slowly, just as in nursing, for if poured into the stomach faster than the gastric juices can be secreted to mix with it, it may form a hard mass of curd, distress the child, and perhaps cause a convulsion.

The nurse tube and bottle should be kept scrupulously clean and sweet by rinsing in weak soda water

immediately after using. Perhaps, after all our care, the milk may not be acceptable to the delicate stomach; then render it more alkaline by adding a suitable quantity of bicarbonate of soda or potassa or the phosphate of soda, or try the milk of another cow. The trouble may be due to bacteria or microdemes; then sterilize the milk as advised by Tyndall, by subjecting it to a heat of 150° F. for a few minutes.

I never boil milk for a child; it changes its specific gravity and other characteristics. Salt should not be forgotten.

We cannot manage all children by one precise rule. Rules and methods must be elastic, and varied to meet individual idiosyncrasies and peculiar conditions.

That many children have been successfully raised on milk and water, mixed and other foods, we freely admit. They often look plump and well nourished, but how quickly their flesh wastes under a slight illness! Their tissues lack firmness and stamina; they lack endurance, and if much sick in hot weather are about sure to die, while breast-fed and pure milk raised children bear disease and dentition equally well; cholera infantum rarely attacks them.

The Registration Reports record the fact, which is confirmed by our observation and experience, that of all the causes of infantile sickness and mortality that of defective alimentation is the most important. Diseases of the digestive organs from this cause, when intensified by other unavoidable conditions, like hereditary tendencies, dentition, and solar heat, are not readily controlled by medicine. They are best treated by prevention. The resources of preventive medicine are of incalculable value to mankind. Can the worth of vaccination be estimated, or the immortal Jenner be forgotten? The power of the great anæsthetic to prevent pain, and save life, which was first demonstrated to a startled world in yonder hospital, by skillful surgeons of the Massachusetts Medical Society, will continue to bless all future generations.

In the late war the able and energetic General Butler, aided by his medical staff, through wise measures of prevention, in transferring his command to his successor, was able to declare to the people of New Orleans that he had demonstrated that the yellow fever could be kept from their borders, — a peaceful victory, of more value to this country than a successful battle.

We cannot have forgotten the epidemic of small-pox that so disturbed and alarmed the people a few years ago. Boston suffered not only from the loathsome pestilence, and its mortality, but in every branch of her industry and trade. Conceited, incompetent men controlled the most important department of administration, that of the Public Health, and the disease marched on unchecked. But when intelligent, competent Commissioners were appointed, and clothed with authority, one of whom, a respected Fellow of our Society, now His Honor, the mayor of this city — Dr. Samuel A. Green — the power of preventive medicine, wisely employed, checked the pestilence, the public health was restored, confidence and prosperity returned to this beautiful city, and the results were brilliant!

If that "perpetual and unrelenting sourge," typhoid fever, can be eradicated by preventive measures, as claimed by Dr. Parkes, Dr. Budd, and many English and German physicians, and, as very ably and suggestively discussed by Dr. Thomas H. Gage in this place two years ago, what a dark shadow of suffering and death would be dissipated! The comfort, happiness and security of human life would be greatly increased; the prosperity and welfare of society immeasurably promoted, and scientific medicine would achieve imperishable laurels.

If in the department of infantile therapeutics preventive methods can be so employed as to check the ravages of these diseases that rob our homes of our brightest jewels, will not the results be most brilliant and of incalculable value to society? To the accomplishment of this high purpose the profession should direct its investigations; and although we may be modest, obscure physicians, we can aid in this work, through associated effort, in our district medical societies, by imparting to each other our opinions derived from investigation, observation, and experience.

The crowning glory of our profession is its broad, practical humanity, that reaches with its ministrations the sick poor, provides care in asylums for the insane, the blind, the outcast, the inebriate, the consumptive, the feeble-minded, and even the nervous.

No adequate provisions have been made for the safety and welfare of the helpless infant. Our profession should encourage the generous philanthropy of wealthy men like Thomas Wilson, of Baltimore, who, dying in 1879, left a bequest of $500,000 "for the purpose of securing a summer retreat for sick children, from the heat and unhealthfulness of the city." His will says: "Having observed for many years the great and alarming mortality which occurs each summer among young children, . . . I do not think I can make a better use of some of the means of which God has made me steward than in the alleviation of the pains and prolongation of the lives of these little children." One hundred and sixty acres of land six hundred feet above tide water have been secured, a half hour's ride from the city of Baltimore, and the Wilson Sanitarium started in its beneficent work, dealing only with the poorer classes, without pay.

It is pleasant to notice that in our State similar institutions are being established, though on a small scale, with insufficient equipment: one, the Seashore Home at Winthrop; another, the Children's Hospital at Baldwinville. If generous benefactions could be secured for their maintenance and extension, and the mothers among the poor of large cities, living under unfavorable sanitary conditions, could receive, with their children, assistance and care during the hot months, very much would be accomplished towards preventing this excessive infantile mortality.

May we not reasonably hope that in the near future some member of our Massachusetts Medical Society, having the kind heart and executive ability of our late associate, Dr. Samuel Gridley Howe, will engage in this work, and accomplish for helpless infancy that measure of relief which he secured for the blind and feeble-minded; and that from the ranks of business some man with princely wealth, generous, humane, philanthropic, with the heart of a George Peabody, influenced by the spirit and example of the Great Nazarene, "who took little children up in his arms, put his hands upon them, and blessed them," who will establish a beneficent charity, after the example of Thomas Wilson, that will relieve poor children in their homes by furnishing an abundant supply of pure milk, ice, and other comforts, or provide for them good care in a well-regulated asylum.

This subject is so important, so far reaching, so in-

tricate a problem, so interwoven with the welfare and foundations of human society, that its discussion kindles enthusiam, and I am reluctant to leave the duty of this hour so partially and imperfectly performed.

Anxious fathers and mothers are seeking our aid, in our respective places of duty, to save their children from death! May we so wisely, tenderly, and successfully discharge our responsible duties as to deserve and receive the gratitude of parental hearts and the blessing of Almighty God!

PANCREATIC APOPLEXY, WITH A REPORT OF TWO CASES.[1]

BY MORTON PRINCE, M. D.

II. *Subacute form.* — Of this we have nine cases. The general course of an attack may be described as follows: In the majority of cases the patient has been subject at varying intervals to attacks of illness referable to the digestive organs. The symptoms complained of at these times are such as usually accompany disturbances of digestion; such as palpitation of the heart, depression of spirits, burning and uncomfortable feeling in the pit of the stomach, indigestion, heartburn, etc. In other cases they may be more severe, accompanied with colicky pain, "cramps," vomiting, and diarrhœa. In one case (Hooper) the patient had suffered two or three times a fortnight for some years from "bilious attacks;" other attacks in this patient consisted of vomiting of yellowish or greenish fluids, occasionally food. In another case (Loeschner) the attacks followed excesses at intervals during five years. They consisted of symptoms of indigestion, burning feeling in the upper part of the abdomen, belching heart-burn, colic, and frequent diarrhœa. In Homan's case the patient, besides having had colic, had been ill about one year previously with "jaundice." He described himself as being at this time yellow, with some epigastric pain, and disinclination to move, but most of the time he was able to attend to his business.

These attacks may have occurred at intervals during several years, or only during the previous few months.

In other cases again there is complete absence of any such history. The patient, who has previously been perfectly well, is suddenly taken with the illness which terminates his life. In almost every case the unfortunate, whether previously liable to such attacks as above described or not, is suddenly, while in good health, seized with severe pain in the abdomen. When the hæmorrhage occurs the patient may be quietly resting or pursuing his usual occupation. The pain which ushers in the attack is usually very severe, and located in the upper part of the abdomen. It steadily increases in severity, is sharp or perhaps colicky in character. It is almost from the first accompanied by nausea and vomiting; the latter becomes frequent and obstinate, but gives no relief to the pain. The patient soon becomes anxious, restless, and depressed; he tosses about, and only with difficulty can be restrained in bed. The surface is cold, and the forehead covered with a cold sweat. The pulse is weak, rapid, and sooner or later imperceptible. The abdomen becomes tender, the tenderness being located in the upper part of the abdomen or epigastrium. In some cases the tenderness is such as to prevent an accurate examination. Tympanites is sometimes marked. The temperature in most cases is either normal or below normal. The bowels are apt to be constipated.

These symptoms continue without relief; those which are most striking being the pain, vomiting, anxiousness, restlessness, and the state of collapse into which the patient soon falls. If reaction does not set in, the symptoms increase in severity, and death occurs with sudden collapse at the end of from thirty-six to forty-eight hours. Other cases pursue a more protracted course. The symptoms are more moderate, and life may be prolonged for four or five days, when death takes place. Sometimes there is an abatement of the symptoms, and an improvement in the general condition. There soon appear, however, symptoms of general peritonitis to which the patient finally succumbs at the end of from fifteen to twenty days.

Rarely the attack differs from the description just given in a more gradual appearance of the symptoms. In this form the patient who has formerly suffered at times from colic is attacked with what appears at first to be a similar condition. Instead, however, of recovery taking place, the attacks are repeated, and the pains recur with increased frequency and severity, sometimes during several days, until finally the pain becomes constant, and the condition described above is then presented.

The above is a general picture of the disease, but there are a few particulars which it will be well to consider in detail.

The number after each heading indicates the number of cases in which the symptom or other particular was noted.

Previous history (12). — In six cases the patients had always previously been free from illness, although this fact is only to be inferred from the reports in some instances. Four of these six cases were of the "apoplectic" form, death occurring suddenly. In seven cases there had been a history of attacks of some kind occurring at intervals and extending over a varying period of time, from some months to several years. These attacks were always referable to the digestive organs, and in character such as has already been described above. What relation, if any, these attacks bear to the one that finally ends the life of the patient, is a question, which, with our present knowledge, cannot be determined. That there is, however, some connection seems probable from the fact, that at least in more than one half the cases some such history is found, a frequency which seems to indicate something more than coincidence. Furthermore, at the autopsy in one case (Hooper), the appearance of the pancreas was such as to lead the examiner (Beale) to believe that successive capillary hæmorrhages had occurred. In another case the patient, some months previously, had been "jaundiced" for over two months, besides at other times having had colic. Now, jaundice is usually looked upon as one of the symptoms of pancreatic disease, and it is possible it may have had such a pathology in this case. Another patient had passed a gall-stone fifteen years previous to her fatal illness. A remarkable case (to be referred to later on) has been reported by H. Chiari, in which the pancreas sloughed, and was passed from the bowels. During the attack eighteen gall-stones were passed in the stools. In the light of these cases it may be questioned whether the hæmorrhage may not in some cases at least be dependent upon the pancreatic duct being obstructed by a

[1] Concluded from page 32.