

## INFLUENZA IN ITS RELATION TO PREGNANCY AND LABOR.\*

BY

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FUTURE historians will record the months of September and October, 1918, as the most dismal and destructive period in the health annals of Philadelphia and, perhaps, no community in modern times has experienced such an overwhelming calamity. This visitation, despite the heroic work of our Health Department and the unflinching efforts of the medical profession, has applied to modern sanitation its supreme test, and medical science, in spite of ceaseless toil and splendid accomplishment, has stood in many instances, impotent and practically helpless. This statement applies particularly to those severely afflicted with associated pulmonary complications, but more especially to women in the various stages of pregnancy.

*History.*—A record of events is always studied with interest and profit, so I offer these as an excuse for referring, briefly, to the history of this destructive disease. In studying influenza, historically, one finds it has been present practically throughout all the ages and

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medical historians, according to Conklin, "have interpreted the vague utterances of Hippocrates and Livy, referring to a disease that assumed epidemic proportions in 412 B. C., as the first written allusion to the disease." It is quite probable, however, that the malady existed long before that period. It prevailed quite extensively in the sixth century and as sneezing was a characteristic accompaniment, it is asserted that the custom of calling down "God's blessing" on those who sneezed, originated at this time. In 827 and 876 epidemics prevailed in Italy and spread rapidly throughout Europe. Historians claim that the epidemic of 876 very sadly discomfited the victorious army of Charlamagne on its return march from Rome. One epidemic, limited to Germany and France, was prevalent in the tenth century and then for some unexplainable reason, the world, it is said, enjoyed comparative freedom from the disease for a period of 200 years. Various authors described influenza at the beginning of the fifteenth century and the course of the disease in pregnant women was referred to by a few of these men. In France, during the reign of Charles VI, in 1414, an epidemic of quite extensive proportions prevailed and an allusion to its effect on pregnant women was made. The identity of this observer remains unknown. Later, from time to time, references were made to its influence on pregnancy and labor. Our positive knowledge, however, of the disease, according to Wilson, "quoted by Conklin," dates from the great European epidemic of 1510. The malady at this time was so extensive, it is claimed, that "not a single family and scarcely a person escaped." It was again rampant and extremely widespread in 1557 and for the first time in history crossed the Atlantic and reached the shores of America. Indeed, at this period it became pandemic and was marked by an extremely high mortality. A very virulent epidemic prevailed in 1675 and large numbers of pregnant women were affected, many of them died. This is contrary to what had taken place in 1414, when cases of death in pregnancy were said to be extremely rare. During the past 400 years the world has experienced approximately seventy epidemics, one-half of which from their extensive character deserve to be looked upon as pandemics. There is recorded a description of a violent epidemic occurring in the early part of the eighteenth century which was especially fatal. Sixty thousand persons were infected in Vienna. A large number of cases occurred in pregnant women and a large percentage died. On April 4, 1761, a severe epidemic broke out in London and practically the entire population of the city became afflicted and pregnant



women were especially attacked. Abortion and premature labor occurred and these were followed by a high mortality. The last century has witnessed thirteen epidemics. One, very severe, prevailed in 1847 and another, with which many of us are familiar, occurred in 1889, 1890 and 1891. Our definite knowledge of the disease in relation to pregnancy really dates from this time. Studies were carried out both in this country and in Europe, particularly in France by Lefour, Vinay, Labadie-Lagrave, Paul Barr and others.

*History of Present Epidemic.*—The present epidemic in this community (Philadelphia), began in the latter part of August, but did not assume alarming proportions until the middle of September. Since then the toll exacted in morbidity and mortality, is almost unconceivable and the total number of persons infected thus far is impossible to determine. This is due to several reasons. In the early stages of the epidemic, cases were not reported nor were they reportable. Thousands of cases occurred and were not recorded because the physicians did not have the time. The Bureau of Health, however, estimates that at least 10 per cent. of the population or 175,000 persons were infected.

*Factors of Present Epidemic.*—In the present epidemic certain factors stand out with unusual prominence:

1. The enormous number of persons afflicted.
2. The marked incidence of pulmonary complications.
3. The high degree of mortality.
4. The unusual disturbance in the functions of the generative organs of women.
5. The susceptibility of pregnant women to the disease.
6. The high percentage of abortion and premature labor occurring among pregnant women afflicted.
7. The extremely high mortality occurring in these subjects.

*General Mortality of Present Epidemic.*—The general mortality in this city, for the four weeks during the height of the present epidemic, from September 28th to October 26th, inclusive, reached the appalling figures of 13,939. Of this number 11,599 persons died of influenza and pneumonia. For the week ending October 5th the death-rate per thousand of population was 35.26 per cent., for the week ending October 12th, it was 95.74 per cent., for the week ending October 19th it increased to 107.07 per cent., the highest death-rate ever recorded in the history of the Health Bureau. The highest death-rate in this city occurred on October 15th. On this day 711 persons succumbed to influenza and pneumonia, and on October 16th, the largest number of deaths reported throughout the

state reached 1831. During October, 1917, the deaths from these diseases in this city averaged seven daily. The death-rate for the city during the year of 1917, was 17.02 per thousand population. In this connection it is of extreme interest to study the recent report of the United States Census Bureau for the year 1916. During that period 18,886 persons died of influenza, equivalent to a death-rate of 16.4 per 100,000 population. These figures represent an increase of 65 per cent. over those in 1915 and an increase of 75 per cent. over 1914, thus showing a progressive increase in the mortality of influenza during the years mentioned. The death-rate for the present year will unquestionably be far in excess of any previous period. In a report in the *Journal of the American Medical Association*, September 28, 1918, reference is made to the present epidemic and it is claimed that 10 per cent. of those infected develop pneumonia and that the mortality ranges from 25 to 33 $\frac{1}{8}$  per cent.

*Relation of Influenza to Pregnancy and Labor.*—In a perusal of the early history of influenza one finds but scanty reference to its influence on pregnancy and labor. This is probably due to the comparative mildness of the disease in former epidemics and perhaps pregnant women did not suffer to the extent they have in that through which we are now passing, although, as previously stated, reference was made to the disease in its relation to pregnancy and labor as early as the fifteenth century. The presence of a hemorrhagic tendency is remarked by some authors, and epistaxis and menorrhagia have been mentioned as the most common. The fact that pregnant women are likely to abort or miscarry is also referred to. Both Biemer and Gottshalk have reported observations of this type. G. H. Gilmore reports four personal cases of influenza complicating pregnancy. One patient was delivered of a living child at the eighth month and recovered. Two patients aborted and recovered. The fourth patient recovered and her pregnancy continued to full term. This author, writing as late as 1897, states that from the reports he was able to gather, influenza is not an infrequent complication of pregnancy and that many cases of abortion and premature labor occur. He also states that pregnancy complicated by influenza and terminating in either abortion or miscarriage "occasionally" results in the death of the mother. The sad experience in the present epidemic compels one to accept this statement with considerable reserve and it would certainly be more truthful, descriptive and not too emphatic to say that pregnancy complicated by influenza in this epidemic, at least, terminates in abortion and premature labor



in a large percentage of cases and not occasionally, but frequently the mother dies. Indeed, the frequency of abortion and premature labor with the associated high mortality in the epidemic, through which we are passing, is almost unbelievable. Practically every physician has been appalled by the disruption of the function of the pelvic organs culminating in menorrhagia, metrorrhagia and premature birth, the latter frequently being followed by the death of both mother and child. I am persuaded that nearly every physician in this city has, during the past few weeks, observed on one or more occasions conditions of this type. There are approximately 3000 physicians in active practice at this time and, therefore, a simple reference to the multiplication table demonstrates most vividly the terrible destructiveness of the calamity through which we have just passed.

*Acute Infections of the Disease in Relation to Pregnancy.*—It is quite generally accepted that pregnancy increases the susceptibility of women to nearly all of the acute infections and the theory that pregnancy renders women immune to a certain degree to these infections is at present quite universally refuted. This statement applies to all the acute infections excepting scarlet fever and cholera. Statistics show that pregnant women are not as commonly attacked by those infections as are the nonpregnant.

*Scarlet Fever.*—Olshausen, according to Williams, was only able to find seven instances of scarlet fever contracted by women while pregnant, but those infected, however, showed a very high mortality.

*Cholera.*—This disease from observations made is not as common in pregnancy as it is in the nonpregnant, but those becoming infected, like scarlet fever, show an extremely high death rate. During the cholera epidemic at Hamberg, in 1892, Schütz (quoted by Williams) reported a mortality of 50 per cent. in pregnant women and 54 per cent. of pregnancies ended in either abortion or prematured labor. Other infections such as typhus, typhoid, smallpox and pneumonia exact an extremely heavy toll.

*Typhoid Fever.*—Statistics show that in typhoid fever from 40 to 60 per cent. of pregnant women abort or are delivered prematurely and that the mortality of the disease is increased thereby at least 25 per cent.

*Smallpox.*—Vinay (quoted by Williams) reported 235 cases of this disease complicating gestation with a mortality of 36 per cent. In the nonpregnant the mortality is placed at less than 25 per cent. Abortion and premature labor occur quite commonly.

*Pneumonia.*—This disease complicating pregnancy, is an extremely

serious condition. Gestation is interrupted in more than 50 per cent. of the cases and accompanied by a mortality of from 15 per cent. to 35 per cent. Vinay, in studying this question, made the interesting observation that in instances of pneumonia, in which pregnancy was interrupted by an induction of labor, the mortality rose to 68 per cent.

*Influenza.*—As I have previously intimated this disease has not been accorded real serious consideration in its relation to pregnancy and labor, although previous epidemics have seriously interfered with these vital processes. I am convinced that many of the previous epidemics have been infinitely less severe and have not disturbed to the same degree or so mortally pregnant woman as has the present epidemic. Paul Barr in 1898, observed thirty-five personal cases in varying stages of pregnancy. Thirty-three were in no wise disturbed, but two had their labor somewhat hastened. There were no postpartum complications. Jacquemier, in 1837, stated that grip had little action upon pregnancy, but that in pulmonic cases premature labor is often produced. He did not observe, as did Cazeaux, that the disease is much more fatal than in the nonpregnant. Jacquemier concluded his paper, however, by saying that no action in pregnancy occurs in simple influenza, but is a grave danger in severe infections. Felkin and Muller, reported by Barr, however, observed premature labor in six out of seven and in fifteen out of twenty-one cases of pregnancy respectively and Schmid in 1897, in reporting 157 cases of influenza in women, twenty-one of whom were pregnant, stated that seventeen of this number aborted and of those not pregnant all but three showed marked signs of disturbed uterine and ovarian function (quoted by Williams). No epidemic in history, however, has exacted the sacrifice of pregnant women, as has the present; a sacrifice that is inestimable because it occurs in young mothers whose potential contribution to humanity and the world is almost beyond computation. Indeed influenza, now recognized as the first, most widespread and destructive of all the acute infections of our time, will be accorded a new position in medical literature. It has been stated by one author that effects of the disease vary according to the severity of the infection and frequency of pulmonary complications. This epidemic has been rather distinguished by the unusual frequency of the respiratory type and this feature plus the profound intoxication, has no doubt been largely responsible for the magnitude of the disturbance in women bearing children. Concerning the frequency of abortion M. W. Hall raises the question as to whether the action of the influenzal bacillus is not



more or less direct on account of its close tribal relation to the bacillus abortus of Bang. E. P. Davis claims the high mortality of acute infections is primarily due to the extra burden the pregnant woman is compelled to bear and which her vital forces are incompetent to withstand.

*Report of Cases.*—The grave nature of the present epidemic in its relation to women in pregnancy is strikingly emphasized by the cases I have collected. The material comprising this report has been gathered from various hospitals of the city, from men in general practice and includes, also, those patients coming under my personal care and those seen in consultation. The total number of cases collected to October 31st aggregated 200 and includes various divisions of the infection, as (1) mild, (2) moderate and (3) severe with pulmonary complications. Of this number 102 or 51 per cent. recovered and ninety-eight or 49 per cent. died. These patients were in varying stages of pregnancy, extending from three months to full term. The history of child-bearing was obtained in 120 and of this number thirty-seven were primipara and eighty-three were multipara. Of the 120 cases studied, abortion or premature labor occurred in seventy or 58 per cent. and in fifty or 42 per cent., pregnancy was not disturbed.

Since the collection of these 200 cases, I have had presented the records of fifty-one additional cases. Thirty by the Woman's Hospital of this city, eight by Dr. H. J. Francis, five by Dr. J. C. Flynn, four by Jefferson Medical College Hospital, two by Dr. W. H. Saunders and one each by Dr. E. H. Van Dusen and Dr. L. Spitz, also eighty-six cases reported from the Cook County Hospital, Chicago, by Drs. J. W. Nuzum, Isidore Pilot, F. H. Stangl and B. E. Bonor, are included, thus making an additional 137 cases or a grand total of 337 cases. Of this number 182 or 54 per cent. recovered and 155 or 46 per cent. died. Of the eighty-six cases reported from Cook County Hospital forty-one or 45.5 per cent. died. The mortality for all cases totaling over 2000 was 31 per cent., thus showing that the mortality in the pregnant is at least 15 per cent. higher than in the nonpregnant.

#### TABLE OF PREVIOUS PREGNANCIES.

*Total number of cases—120*

Primipara.....	37
Multipara.....	83

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120

Para-i .....	21
Para-ii .....	28
Para-iii .....	22
Para-iv .....	1
Para-v .....	5
Para-vi .....	3
Para-vii .....	2
Para-vii .....	2

Total number of cases—200

Source—Hospitals:

	Cases	Recovered	Died
Philadelphia General.....	40	17	23
Women's College Hospital.....	16	12	4
Women's College Hospital (Maternity Dispensary).....	8	2	6
St. Joseph's Hospital.....	9	4	5
Jefferson Hospital.....	7	3	4
Methodist Hospital.....	7	2	5
Episcopal Hospital.....	15	1	14

Physicians:

Dr. E. Q. T.....	9	6	3
Dr. A. P. K.....	9	2	7
Dr. L. S.....	4	3	1
Dr. A. E.....	1	1	—
Dr. H. S.....	1	1	—
Dr. C. C. T.....	7	7	—
Dr. H. F.....	5	3	2
Dr. A. H.....	4	2	2
Dr. G. W.....	1	—	1
Dr. H. H.....	7	5	2
Dr. F. H. M.....	1	—	1
Dr. W. H. J.....	2	1	1
Dr. F. R. W.....	6	4	2
Dr. J. O. A.....	30	22	8
Dr. E. A. Van D.....	2	2	1
Dr. George C.....	4	2	2
Dr. J. S. H.....	5	1	4
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	200	102	98

*Age Incidence of Influenza Complicating Pregnancy and Labor.*— In considering the relation of age, it can be quite safely asserted that the majority of cases follow a well-defined law and naturally, as one would expect, the largest number occurred during the early child-bearing period. Therefore, the disease affected comparatively young women. The large proportion of cases developed between the twentieth and thirtieth year. In this series eighty-seven or practically 72 per cent. were infected during this time. The youngest patient was fifteen and the oldest was forty-four.



TABLE SHOWING AGE OF PATIENTS IN RELATION TO THE DISEASE.

*Total number of cases—120*

Age	Number
15.....	1
16.....	0
17.....	0
18.....	0
19.....	2
20.....	4
21.....	5
22.....	4
23.....	12
24.....	12
25.....	14
26.....	19
27.....	6
28.....	7
29.....	5
30.....	9
31.....	1
32.....	4
33.....	1
34.....	1
35.....	2
36.....	3
37.....	2
38.....	2
39.....	1
40.....	2
41.....	0
42.....	0
43.....	0
44.....	1
45.....	0
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120	

*Course of the Disease.*—Influenza complicating pregnancy does not pursue any distinguished course. The symptoms do not vary from those seen in an ordinary case. The mild cases are ushered in by the usual chill, followed by a moderate elevation of temperature, accelerated pulse, increased respiration, headache and generalized body pain, sore throat, cough, expectoration, depression and prostration. In short a typical clinical picture of the common type of the disease. These patients in our series all recovered and there was no interruption of pregnancy. Sixteen cases of this form are included in this paper.

In moderately severe cases, the clinical picture resembles that of the mild type only the symptoms are more marked. In these cases, recovery is the rule and pregnancy is only occasionally disturbed. In this series, we had twenty-six cases belonging to the so-called moderately infected. Twenty-five of these patients recovered and one died. Abortion occurred ten times and in fifteen the pregnancy continued. The severe, complicated cases are, as a rule, extremely violent in onset and the course is rapid and alarming. Early and extensive pulmonary complications arise. The temperature ranges from 102° to 105° or higher. The pulse becomes extremely rapid and weak. Respirations range from 30 to 60. A low muttering delirium appears. Cyanosis is manifest comparatively early and is quite constant and profound. When this sign becomes evident, abortion or premature labor occurs usually within twenty-four to forty-eight hours, providing, of course, the patient survives. The urine of these severely affected patients, contrary to what one would expect to find, did not show any change, except the usual findings of an acute febrile condition. In the milder cases, the urinary analyses were entirely negative. In none of the cases comprising this report were urinary findings striking. In the severe cases, the disease progressed very rapidly and labor occurred in a large percentage of cases, frequently terminating fatally. There were seventy-eight patients classified as the severe or complicated type and of this number fifty-three died, equivalent to a mortality of 69 per cent. Forty of the seventy-eight aborted or miscarried and in the majority, death occurred shortly after delivery. In some, death took place before the pregnancy was interrupted. In this series, death occurred in forty patients subsequent to delivery and in thirteen the pregnancy was not disturbed. Recovery occurred in thirty women after abortion and in thirty-seven without abortion. Abortion or emptying of the uterus, did not seem to act favorably but rather unfavorably on the progress of the disease, and death usually took place from six to forty-eight hours after delivery.

TABLE SHOWING THE RESULT OF THE DISEASE ON PREGNANCY.

Influenza Mild:			} Mortality . . . . . 69 per cent. Recovery . . . . . 31 per cent.
Recovered	Died		
16 . . . . .	0		
Influenza Moderate:			
Recovered	Died		
25 . . . . .	1		
Influenza Severe:			
Recovered	Died		
25 . . . . .	53		



## TABLE SHOWING THE RESULT OF THE DISEASE ON PREGNANCY.

Recovery:	
Pregnancy interruption.....	30
No interruption.....	37
	<hr/> 67
Death:	
Interruption.....	40
No interruption.....	13
	<hr/> 53

*Influence of the Disease upon Labor.*—In the patients coming under my personal care, the labor has not been marked by any unusual phenomena and this has been the general experience of the physicians who have so kindly aided me in preparing this report. Indeed, in a large proportion of instances the labor was rather precipitate because as a rule it took place between the seventh and eighth or between the eighth and ninth months and, therefore, before the child was mature. The third stage was only occasionally marked by slight relaxation of the uterus and a tendency to rather prolonged retention of the placenta and membranes. In none did severe postpartum bleeding occur and, indeed, no special postpartum disturbances were noted.

*Influence of the Disease upon the Child.*—The children born alive seemed to be fairly normal and practically all continued to improve. Two or three have died since the collection of this report. One of the children died of a typical influenza. In all there were forty-nine babies. Twenty-four of these survived and twenty-five were born dead. In this report, we have, naturally, only included those patients in whom the gestation had reached the seventh month or beyond and in those in whom the labor terminated spontaneously. The twenty-five children reported dead were either stillborn or died within a few hours or days subsequent to delivery.

## TABLE SHOWING RESULT ON CHILD.

Living.....	24
Dead.....	25
	<hr/> 49

*Condition of Placenta and Membrane.*—In no instance was any abnormality observed in the placenta or membranes. Personally I have inspected these structures very carefully and have never observed any gross change. This was also the experience of other

physicians who so generously contributed to this paper. Unfortunately no microscopic studies have been made and whether this will reveal some concealed secret, in the organs mentioned, remains to be determined.

*Source of Contagion.*—In the great majority of cases a history of direct exposure or contact was obtained. Many of the women were infected by their husbands, occupying the same apartment. Frequently the husbands kissed their wives while suffering with the disease. The "good night kiss" in many of the cases, herewith reported, was literally the kiss not only of "good night" but "good-bye." In other instances they were infected by attending sick children or other members of the household or by visiting afflicted relations or friends. This is an extremely important observation and should be to us an object lesson in caring for pregnant women now under our care and in future epidemics. In the present epidemics it has been proven, that if patients are kept from exposure and isolated, the probability of infection is extremely remote. At the outbreak of the present epidemic, twenty pregnant women were being cared for in the Maternity Department of the Woman's College Hospital. These women were isolated, supplied with special nurses and visiting was absolutely tabooed. Not one of these patients contracted the disease.

*Prognosis.*—From what has been stated previously, the prognosis of influenza complicating pregnancy and labor depends largely on the type of infection, its severity and extent of complications. It can be said truthfully that practically all mild cases recover and the pregnancy continues. In moderately severe uncomplicated cases, the majority of mothers get well and only a very small minority succumb. Occasionally the pregnancy is interrupted. In severe complicated infections a high mortality is the rule. At least 69 per cent. of the women die and abortion or premature labor occurs in more than 50 per cent. of the cases. The prognosis for the babies is extremely grave and about 50 per cent. succumb.

*Treatment.*—Concerning the treatment of epidemic influenza complicating pregnancy and labor, there is very little to say. Unfortunately there is no specific, and active expectant treatment in the complicated cases is of little avail. All sorts of drugs have been used and all plans of treatment have been resorted to in the cases coming under our care and I cannot recall a single instance in which any of these measures modified the course of the disease. Whatever we hope to accomplish for these women must be along distinctly prophylactic lines. Early and complete isolation should be resorted



to. No chance of a possible exposure should be taken. These women should occupy separate sleeping apartments. No visiting or visitors should be tolerated and absolute avoidance of all persons who exhibit signs of the disease should be insisted upon. An abundance of fresh air, both by day and by night, should be obtained. The patient should be urged to take exercise in the sun, but only in the neighborhood of her home. She should, under no circumstances, be permitted to travel in any public conveyance. Her resistance should be kept at the highest possible point by generous feeding and the body functions should be carefully regulated. Immunization should be instituted by specific serums and vaccines, if possible, but unfortunately up to this period effective elements of this kind have not been discovered. What the future holds in this line of therapy is still clouded in mystery, but experience with vaccines in the present epidemic has been uncertain and in most cases unsatisfying. The committees appointed by the State Board of Health of Massachusetts to investigate this subject reported that as a prophylactic agency vaccines are only mildly protective, and as therapeutic agencies are of very little value.

#### SUMMARY AND CONCLUSION.

1. Epidemic influenza should be classified as the first and foremost acute infectious disease of our time.
2. No acute infection of the present day is associated with such a tremendous degree of morbidity or a high percentage of mortality.
3. No other acute infection of the present period is so prone to attack pregnant women as is this disease and none more destructive.
4. Epidemic influenza, occurring in pregnant women, of a mild and moderate character, is not associated with grave danger to the mother or her gestation.
5. Influenza, when severe and associated with pulmonary complications, is an extremely serious affection and is associated with abortion or premature labor, in a large percentage of cases, frequently followed by death of both mother and child.
6. The disease in the mother is distinctly a contact infection.
7. Whatever is to be accomplished in view of our present knowledge of the disease, must be done by early and complete isolation.

#### REFERENCES.

- Conklin, W. J. *Handbook of the Medical Sciences*, vol. v, p. 18, 1902.  
 Edgar, J. C. *Practice of Obstetrics*, p. 824, 1905.  
 DeLee, J. B. *Principle and Practice of Obstetrics*, p. 479, 1913.

- Williams, J. W. Text Book of Obstetrics, p. 520, 1917.  
Davis, E. P. Text Book of Obstetrics.  
Barr, Paul. *Journal Des-Sages Femmes*, p. 12, Paris, 1898.  
Lee, Benjamin. *J. A. M. A.*, December, 1891.  
Ball, M. W. *J. A. M. A.*, p. 1336, October 19, 1918.  
Editorial, *J. A. M. A.*, October 19, 1918.  
Editorial Comment, *J. A. M. A.*, September 28, 1918.  
Gilmore, G. H. *Medical Age*, December, 1897.  
Nuzum, J. W.; Pilot, Isodore; Stangl, J. H. and Bonor, B. E.  
*J. A. M. A.*, p. 1562, November 9, 1918.