The seasonal character of the waves suggested that they might correspond to periods of general lowering of the individual resistance to infection. Dr. H. Kerr, medical officer of health for Newcastle, provided a list of deaths of both sexes occurring from influenza and pneumonia during the years 1925 to 1930. There is a marked similarity between the death curve and the sepsis curve (see Chart 2).

CHART 2.

The difference between the sepsis curve of cases sent into the hospital and cases of a similar character which have been under the care of the hospital remains to be explained. If the seasons or the hospital were entirely to blame, then the curves should have been identical. The following difference existed between hospital and outside cases.

High Sepsis.

	Hospital.		Others.	
	No. of Cases.	Percentage Septic.	No. of Cases.	Percentage Septic.
Haemorrhages ...	25	16	57	21
Abnormalities ...	59	9	50	32
Eclampsia...	8	Nil	18	39
<i>Low Sepsis.</i>				
Haemorrhages ...	21	8	51	13
Abnormalities ...	82	16	77	10
Eclampsia...	4	Nil	22	10

With only one exception the hospital cases showed better results. This suggested that under existing conditions many patients of the industrial class do not get as good medical and nursing supervision as they obtain in hospital. It will be readily understood by anyone with a practical knowledge of the subject that cases sent to hospitals by doctors are not necessarily "doctors' cases, and, even when they are, the doctor in charge has too frequently been without skilled nursing assistance.

Conclusions.

1. The liability to puerperal sepsis is greater at certain seasons than at others.
2. Its incidence can be considerably modified by proper medical supervision and adequate nursing attention.

RESPIRATORY COMPLICATIONS FOLLOWING SURGICAL OPERATIONS DURING A FOUR-YEAR PERIOD.*

BY

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THE subject of respiratory complications following surgical operations has been a source of worry to all concerned, while endless controversies have arisen as to the part inhalation anaesthesia plays as a causative factor. There was a time when almost every post-operative complication except haemorrhage was put down to the latent influence of the anaesthetic. The whole of the anaesthetic vapour necessary to produce anaesthesia passes through the lungs to the patient, while 90 per cent. is excreted by the same route; any abnormal post-operative lung trouble was so easily ascribed to "irritation" from the ether. "Time heals all things," and during the last decade the etiology of respiratory complications has changed; the extensive use of novocain for major surgical procedures, with subsequent pulmonary lesions, has brought forcibly to mind the realization that other factors besides ether irritation enter into respiratory complications.

"I have flowers from many gardens, but only the string which holds them together is my own." In the following analysis of lung lesions following a four-year period in a large general hospital, the only claim I make for originality lies in the compilation of data peculiar to this hospital and geographical situation, and I can only touch upon a few of the salient features.

Series of cases giving the pulmonary complications following surgical operations vary widely in the ratio to numbers of operations, so much so that comparisons are of limited value. An extensive review of the literature dealing with the subject varies in the interpretation of the end-results, yet there is agreement upon some points. Thus, for example, patients who undergo upper abdominal operations and those with gross sepsis have a high ratio of post-operative pulmonary trouble, as compared with patients free from gross sepsis and not submitted to abdominal operations. Considering the magnitude of modern surgical procedures it is remarkable that respiratory lesions are not more frequent.

STATISTICAL RETURNS FROM OTHER HOSPITALS.

For comparative purposes I am including a limited number of reports from other hospitals. These comparisons are not invidious, since such factors as climate, surgical technique, and the type of operation suggest a wide variation in the end-results.

Silk,¹ in 1897, reported 5,000 operations, 13 with respiratory complications. Of these 13 cases, 5 followed operations upon the tongue or jaws. Thirty years ago laparotomies were not entered upon so lightly as at the present day. Mikulicz and Henle² record that of 1,787 upper abdominal operations 143 (8 per cent.) were followed by lung lesions. Mikulicz asserts that as many respiratory complications follow after local as after general anaesthesia; Armstrong³ in 2,500 major operations in Montreal reports 55 cases (2.2 per cent.), and Featherstone,⁴ in a most exhaustive review of the literature, quotes 222 gastric cases from Birmingham, with a morbidity of 10.81 per cent. Whipple,⁵ at the Presbyterian Hospital, New York, reported upon 3,719 patients, of whom 97 (2.3 per cent.) developed post-operative lung lesions. Elwyn,⁶ from the wards of the Mount Sinai Hospital, New York, states that in 299 operations under some form of local anaesthesia 11 patients (2.7 per cent.) contracted some form of pulmonary trouble. In 1922 I published a brief survey⁷ of 7,000 operations followed by 19 respiratory complications.

* A paper read in opening a discussion in the Section of Anaesthesia at the Annual Meeting of the British Medical Association at Winnipeg, 1930.

STATISTICS OF THE HOSPITAL.

The statistics now to be reported consist of 33,066 operations performed during the four years 1926-29; 31,301 operations were under general anaesthesia, and the remaining 2,765 were conducted under some form of local anaesthesia. According to the hospital records there were 55 respiratory complications with 23 deaths.

Methods of Induction.

Before going into a detailed analysis of these 55 cases a few words giving the pre-operative routine might not be out of place; probably about 65 per cent. of the patients would have a preliminary injection of 1/6 grain of morphine sulphate, combined with 1/150 grain of atropine sulphate. We rarely use large doses of morphine. Great care is exercised in excluding from operation patients with a cold or coryza, even if afebrile. In cases with a history of recent respiratory trouble or tonsillitis operation is postponed for two to four weeks.

More than half of this series received ether dropped upon a thick cotton fabric supported by a wire frame; a mixture of two parts of chloroform with three parts of ether was added in any operation where ether would not induce sufficient relaxation by itself. Nitrous oxide and ethylene were administered by McKesson machines; one in six would be a rough estimate of gas anaesthesia. Post-operative ward treatment varied widely according to the individual clinician. The gravity of the operation ranged from excision of a sebaceous cyst, and brief dental extractions, to thousands of appendicectomies and herniotomies, and severe operations upon patients with grave renal or cardiac conditions. The ages of the patients ranged from 4 days to over 90 years.

One feature which emerges most prominently when first looking at the morbidity of this series of cases is the number of patients with additional pathological changes to that for which the operation was designed to relieve. Kipling states: "Indeed when you come to think of it, had the British Army consistently waited for reserves in all its little affairs, the boundaries of our Empire would have stopped at Brighton Beach."

Nature of Cases with Ensuing Respiratory Complications.

Of the 55 patients with respiratory complications in this report, 13 had sequels of a minor nature, 7 infarcts, and there were 6 cases of pleurisy; the remaining 42 suffered from pneumonic processes. These 42 cases included 9 emergency operations; 16 patients (including 7 of the previously mentioned) had marked elevation of the pulse, temperature, and respiration at the time of operation. Nine patients were over the age of 60, and in 23 (more than half) the operation involved the gastro-intestinal tract, including herniotomies.

Another interesting point is the gravity of sepsis at the time of operation; 23 of the 42 patients with major complications died, and at the time of operation 19 of these 42 had gross sepsis. Of these 19 patients with sepsis, 14 died (73 per cent.). Twenty patients out of the 55 originally mentioned were first-class operative risks with one death; this may be compared with the 35 substandard patients with 22 deaths.

In 1929 of 1,772 abdominal operations (excepting 242 thyroidectomies), there were 6 respiratory complications with two deaths; both patients who died were over the age of 70, and the operations were emergency ones. In the same hospital in 1922, Dr. H. Morrison⁸ reported upon 408 patients operated on for appendicitis, with one death from pneumonia. Broadly speaking, this report agrees with the ratio of respiratory lesions given for 1929—a morbidity of 6 in 1,772 cases.

The sexes were approximately equally affected in this series. Some writers have stated that respiratory complications occur more frequently in males than females, owing to the interference with the abdominal type of breathing rather than with the thoracic type characteristic of women. As regards age, each decade over 40 adds to the operative risk. Fair comparisons of the type of operation are difficult to establish. An American writer has stated that post-operative pulmonary complications occur

in 14.8 per cent. of stomach operations, and in 5 per cent. of operations upon the gall-bladder, averaging altogether 7.7 per cent.

No definite conclusion can be reached as to the influence of the length of operation. A number of the poor risk patients had short anaesthesia periods and succumbed. It might be said, however, that the shorter the time under a general anaesthetic the less interference would there be with the vital processes of the body. Gas anaesthetics carried with them a higher ratio of pulmonary lesions than ether, but in many instances gas anaesthesia was given in preference to handicapped patients. Neuhoff⁹ reports 500 necropsies following surgical operations. Pneumonia was diagnosed previously in 81 cases and found after death in 51 subjects, or 60 per cent. He states also that "a diagnosis of post-operative pneumonia in sick patients is fraught with difficulty, and the classical physical signs of pneumonia do not prove its presence in serious post-operative conditions." In addition, Neuhoff found pneumonia a much more common cause of death in clean wounds than in infected wounds; 11 per cent. in the former, 1.5 in the latter.

Theory of Lung Infection.

The splinting of the abdominal muscles due to pain in the wound and tight binders causes more or less circulatory stasis in the bases of the lungs. This area of stasis is invaded by infection passing up the lymphatics through the diaphragm. Collyros believes that atelectasis and pneumonia are different phases of the one process. He states: "In the atelectatic portion of the lungs the vessels exude a sticky secretion. This secretion prevents the passage of air, and consolidation follows; after consolidation infection follows so easily."

CONCLUSIONS.

1. Post-operative pulmonary complication is a serious hazard to recovery; 40 per cent. of the patients died in this series. Of 13 patients with elevation of pulse and temperature at the time of operation 11 died (84 per cent.).

2. Taking into consideration the number and gravity of modern surgical procedures, pulmonary complications following operations are less numerous than might be expected. In this series 15 per cent. of the patients were 70 years old, and 21 per cent. had elevation of the pulse, respiration, and temperature at the time of operation.

3. Sepsis (gross) at the time of operation is a greater risk than post-operative pneumonia.

4. Careful selection of patients, and pre-operative measures with equal attention to the matter of after-care, will keep the incidence of respiratory lesions down to the minimum, until such time as a definite cause is known for this dreaded operative sequel.

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THE INFLUENCE OF LACTATION ON OVULATION AND OESTRUS.

BY

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ACCORDING to Crew and Mirskaia¹ oestrus and ovulation occur in the mouse within twenty-four hours of parturition, and if no fertilization then takes place there is no second oestrus for an interval of twenty to twenty-five days, which is the normal duration of lactation. This interval, called the lactation interval, cannot be appreciably lengthened by prolonging the actual lactation by means of supplying new litters of young, but on the other hand, if the original litter is removed at a shorter interval—for example, seven or fourteen days after birth—oestrus recurs on the second to fourth day after such removal. They state that, according to the evidence of experiment, lactation causes the