Section of Obstetrics and Gynaecology.

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The Continued High Maternal Mortality of Child-bearing: The Reason and the Remedy.[1]

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SOME STATISTICS.

THE yearly reports of the Registrar-General for England and Wales show that the death-rate directly and indirectly attaching to pregnancy and labour has diminished woefully little in the last seventy years.

ENGLAND AND WALES.

Year	Births	Deaths attaching to childbirth	Proportion per 1,000 live births	Deaths by sepsis	Proportion of deaths by sepsis per 1,000 births	Proportion of deaths by sepsis to total deaths Per cent.
1917	668,346	3,236	4·8	916	1·3	28
1916	785,520	3,978	5·0	1,147	1·4	28
1915	814,614	4,259	5·2	1,253	1·5	29
1914	879,096	4,498	5·1	1,422	1·6	31
1913	881,890	4,295	4·8	1,173	1·3	27
1912	872,737	4,321	4·9	1,280	1·4	28
1911	881,138	4,322	4·9	1,334	1·5	30
1910	896,962	4,277	4·7	1,274	1·4	29
1909	914,472	4,600	5·0	1,429	1·5	31
1908	940,383	4,521	4·8	1,395	1·4	30
1907	918,042	4,672	5·0	1,465	1·5	31
1906	935,681	4,944	5·2	1,640	1·7	33
1905	929,293	5,164	5·5	1,734	1·8	33
1902	940,509	4,205	4·4	2,003	2·1	47
1892	897,957	5,194	5·7	2,356	2·6	45
1880	881,643	3,492	4·0	1,659	1·8	47
1870	792,787	3,875	4·9	1,492	2·8	38
1860	684,048	3,173	4·6	978	1·4	31
1859	689,881	3,173	5·1	1,238	1·8	39
1858	655,481	3,131	4·8	1,068	1·6	34
1857	663,071	2,787	4·2	836	1·2	30
1856	657,453	2,888	4·4	1,067	1·6	37
1855	635,043	2,979	4·7	1,079	1·7	36
1854	634,405	3,009	4·7	954	1·5	31
1853	612,391	3,063	5·0	795	1·3	26
1852	624,012	3,247	5·2	972	1·5	30
1851	615,865	3,290	5·3	1,004	1·6	30
1850	593,422	3,252	5·5	1,113	1·8	34
1849	578,159	3,339	5·8	1,165	2·0	35
1848	563,059	3,445	6·0	1,365	2·4	39

[1] At a meeting of the Section, held May 1, 1919.

The ratio between the number of deaths directly due to pregnancy and labour, and those returned as merely associated with pregnancy and labour may be exemplified by the returns of the Registrar-General for England and Wales for the five years 1911 to 1915.

Thus in 1911 there were 3,413 "direct" deaths, or 3·87 per 1,000 births, and 909 "indirect" deaths, making a total of 4,322 deaths "direct" or "indirect," or 4·91 per 1,000 births.

In 1912 there were 3,473 "direct" deaths, or 3·98 per 1,000 births, and 848 "indirect" deaths, making a total of 4,321 "direct" and "indirect" deaths, or 4·95 per 1,000 births.

In 1913 there were 3,492 "direct" deaths, or 3·96 per 1,000 births, and 803 "indirect" deaths, making a total of 4,295 "direct" and "indirect" deaths, or 4·87 per 1,000 births.

In 1914 there were 3,667 "direct" deaths, or 4·17 per 1,000 births, and 831 "indirect" deaths, making a total of 4,498 "direct" and "indirect" deaths, or 5·12 per 1,000 births.

In 1915 there were 3,400 "direct" deaths or 4·18 per 1,000 births, and 881 "indirect" deaths, making a total of 4,259 "direct" and "indirect" deaths, or 5·27 per 1,000 births.

It is to be noted that the ratio is between the number of maternal deaths and the number of live births and not the number of labours or pregnancies.

The Scottish statistics are as follows :—

SCOTLAND.

Year	Births	Deaths attaching to childbirth	Proportion per 1,000 live births	Deaths by sepsis	Proportion of deaths by sepsis per 1,000 births	Proportion of deaths by sepsis to total deaths Per cent.
1915	114,181	698	6·1	262	2·3	37
1914	123,924	746	6·0	288	2·3	38
1913	120,516	708	5·9	201	1·6	29
1912	122,790	675	5·5	231	1·9	34
1911	121,850	699	5·7	214	1·7	30
1910	124,059	710	5·7	229	1·8	32
1909	128 669	699	5·7	214	1·7	30
1908	131,362	676	5·1	241	1·8	35
1907	128,840	686	5·3	235	1·8	34
1906	132,005	717	5·4	275	2·0	38
1880	124,570	620	4·9	204	1·6	33
1870	115,390	583	5·0	202	1·7	34
1864	112,333	628	5·5	254	2·2	40
1863	109,341	571	5·2	195	1·8	34
1862	107,069	435	4·0	130	1·2	30
1861	107,009	511	4·7	203	1·9	39
1860	105,629	564	5·3	236	2·2	41

Those are disappointing figures, though they cannot be taken entirely at their face value, first because a somewhat different method

of computation has been adopted of recent as compared with more remote years, and secondly because there has undoubtedly been, over the period under consideration, a progressive improvement in the thoroughness and accuracy with which certification has been carried out.

Thus for some years past, deaths certified as *directly due* to pregnancy and labour have been classified separately from those certified as *merely associated* with pregnancy and labour, whereas before the "direct" and "indirect" deaths were all included together. Moreover, in recent years, deaths from certain diseases, not previously held to be the direct outcome of pregnancy, such as pregnancy nephritis without eclampsia, have been included under the head of deaths directly due to pregnancy.

These amendments in the method of computation and the improvement which has probably taken place in the accuracy of certification operate unfavourably towards the figures of recent years.

The excessive maternal mortality from child-bearing in the United Kingdom and its scanty diminution was forcibly commented on by Sir A. Newsholme in a report on the subject in 1915.[1] He therein showed that a high maternal mortality is associated with a corresponding increase in the number of stillbirths and of infant deaths in the early weeks after birth. He gives the following figures :—

In England	the present	average is	1	maternal death	for	every	250	registered	births
In Ireland	,,	,,	1	,,	,,	,,	191	,,	,,
In Wales	,,	,,	1	,,	,,	,,	179	,,	,,
In Scotland	,,	,,	1	,,	,,	,,	175	,,	,,

and states that "on general grounds there can be no reasonable doubt that the quality and availability of skilled assistance before, during, and after childbirth are probably the most important factors in determining the remarkable and serious differences in respect of mortality in different districts."

The following tables are also given by him :—

DEATH-RATES PER 1,000 BIRTHS FROM PUERPERAL SEPSIS.

Years	England	Wales (including Monmouth)	Scotland	Ireland
1881—1890	2·56	3·11	2·42	2·83
1891—1900	2·22	2·99	2·01	2·62
1901—1902	2·10	3·24	2·29	2·22
1903—1910	1·62	2·05	1·93	2·04
1911—1914	1·39	1·67	1·44	2·01

[1] A Report on Maternal Mortality in connexion with Child-bearing : Forty-fourth Annual Report, Local Government Board, 1914-15.

DEATH-RATES PER 1,000 BIRTHS FROM ACCIDENT AND DISEASES OF CHILD-BEARING OTHER THAN SEPSIS.

Years	England	Wales (including Monmouth)	Scotland	Ireland
1881—1890	2·08	2·99	3·03	4·24
1891—1900	2·74	3·95	2·71	3·98
1901—1902	2·33	3·65	2·66	3·99
1903—1910	2·13	3·21	2·37	3·41
1911—1914	2·47	3·91	4·26	3·19

from which it will be seen that though some diminution has occurred in the mortality due to puerperal sepsis, in England particularly, yet the mortality due to diseases and accidents of child-bearing other than sepsis has, except in the case of Ireland, risen appreciably.

He further gives the following table dealing with the total death-rates in different periods of years:—

TOTAL DEATH-RATES PER 1,000 BIRTHS FROM ALL CAUSES.

Years	England	Wales (including Monmouth)	Scotland	Ireland
1881—1890	4·64	6·10	5·45	7·07
1891—1900	4·96	6·94	4·72	6·60
1901—1902	4·43	6·89	4·95	6·21
1903—1910	3·75	5·26	5·30	5·45
1911—1914	3·86	5·58	5·70	5·20

from which it appears that comparing the period 1881-90 with 1911-14, the total mortality has declined 17 per cent. in England, 9 per cent. in Wales, and 26 per cent. in Ireland, whilst in Scotland it has remained much about the same.

Now whichever way these figures are viewed they are thoroughly unsatisfactory, for they show that over a period during which enormous advances have taken place in every other branch of our profession, obstetrics alone, as judged by its results, has advanced very little. Something is wrong somewhere, and this applies not only to British obstetrics but to obstetrics all over the civilized world.

In a very exhaustive and important report by Dr. Grace Meigs, of the Department of Labour of the United States of America,[1] it is shown that during the twenty-three years ending 1913, no definite decrease in the death-rate of child-bearing can be demonstrated in the death registration area of the United States.

Further it is shown from a study of the death-rates of fifteen foreign countries, that only five of them—England and Wales, Ireland, Japan,

[1] "Maternal Mortality from all Conditions connected with Childbirth in the United States and certain other Countries," 1917.

New Zealand and Switzerland—have effected any diminution in the mortality of child-bearing in recent years, and of these, England and Wales, and Ireland, are the only countries which show a falling off in the percentage of deaths due to puerperal sepsis.

It is to be remembered that of the total deaths an undue proportion follow first pregnancies and labours, because puerperal sepsis and pregnancy toxæmia, which as we shall see are the two chief causes of death, are conditions which specially afflict women bearing children for the first time. The death risk of these, therefore, is considerably greater than the general averages given.

THE CHIEF CAUSES OF DEATH.

What are the chief causes of death directly due to pregnancy and labour? A perusal of the English and Welsh figures for 1912, 1913, 1914 and 1915, which may be taken as characteristic of all years, show that in importance they rank as follows:—

(1) Sepsis, including phlebitis.

(2) Pregnancy toxæmia, including nephritis, eclampsia and vomiting.

(3) Hæmorrhage, either before, during, or after labour.

(4) Embolism and other causes of sudden death.

The numbers of deaths due to these causes in the years named are as follows:—

	1912	1913	1914	1915
Total deaths directly due to pregnancy and labour	3,473	3,492	3,667	3,408
Deaths from—				
Sepsis	1,280	1,173	1,422	1,253
Pregnancy toxæmia	662	797	787	663
Hæmorrhage	610	616	595	556
Embolism and sudden death	298	267	275	242

Sepsis.—Puerperal sepsis, including under that term septicæmia, pyæmia, phlebitis and all its other manifestations, is thus seen to be still by far the commonest cause of death. The figures would probably be higher still did they include every case in which bacterial infection of the birth canal determined the fatal issue. For in the tables of deaths not directly due to, but associated with, pregnancy it is seen that pneumonia and influenza figure largely, a suspicious circumstance, seeing how often pneumonia is the most striking feature of puerperal sepsis and how frequently in septic cases the mistaken diagnosis of influenza is made. Moreover surgical experience has shown that embolism after operations is probably in most cases due to slight sepsis; for if the charts of patients thus dying be examined it will usually be found that

the temperature has been slightly abnormal for some days preceding the catastrophe. Further the frequency of sudden death after operations by embolism has diminished of recent years concurrently with the improvement in rapidity and smoothness of convalescence which modern surgical technique has achieved. Septic infection of the wounds caused by labour will probably never be entirely abrogated because in a certain proportion of the cases the process is one of auto-infection. Nevertheless in by far the greater number the infection is carried into the birth canal by fingers or instruments, a largely preventable occurrence. During the ten years 1906 to 1915 the mortality from septic infection in England and Wales has remained very nearly constant, but with a slight tendency to fall. In Scotland, however, although the material difference is small, the figures indicate a slight tendency to rise. Comparing the years between 1870 and 1902 with those between 1906 and 1915 we find, however, that in England and Wales there has been some improvement. Thus the mortality due to sepsis per 1,000 births was:—

In 1902	2·1 per 1,000
In 1892	2·6 ,,
In 1880	1·8 ,,
In 1870	2·8 ,,

whereas in the ten years, 1906 to 1915, it never exceeded 1·7 per 1,000 for any one year.

The year 1870 brings us back to the initiation of "Listerism," and one would naturally suppose that in the years prior to this great event the mortality from puerperal sepsis would be found to be considerably higher than in the years after it. But—and this is a very striking circumstance—the Registrarial figures show nothing of the kind: on the contrary, in the year 1860, the death-rate from sepsis is returned at 1·4 per 1,000 births, a figure as low as any of those of recent years, except 1913, when it was 1·3. No doubt it may be argued, and with justice, that in these earlier times certification was much less accurately carried out than nowadays, and that, in all probability, many deaths really caused by puerperal septic infection were not recognized as being due to such. But after every excuse has been made and every explanation offered in the attempt to adjust to our satisfaction these jarring figures the uncomfortable question still suggests itself: Have we so much improved on the practice of pre-Listerian days that we have a right to expect greatly improved results?

It is true that devastating epidemics of puerperal septicæmia no longer ravage our lying-in hospitals, and that from being the most

dangerous places for labour to take place in they are now become the safest. But, after all, the number of women confined each year in lying-in hospitals forms such a trivial proportion of the yearly total of confinements in the country at large, that even so great a reduction in the institutional death-rate as has been accomplished in the last forty years would not distinctly affect the death-rate of labour in general. The diminution that has been effected in the death-rate of institution-conducted labour has been so dramatic that it has obscured the wider issue, and most of us if asked whether obstetric practice had not greatly improved in the last forty years, would, thinking in terms of the lying-in hospital, have returned an emphatic affirmative. But the hard figures dispel this comfortable illusion. They show that the great wave of progress initiated by Lister and swelled by the host of workers in surgery treading after him, has passed over obstetric art and left it not greatly changed.

Taking the conduct of labour in general, not much more than a bowl of antiseptic lotion stands between the practice of to-day and the practice of the sixties. But a bowl of antiseptic lotion is not Listerism, though it was misconceived as such by many of the older surgeons in the seventies and early eighties, and apparently, with the addition of rubber gloves, is still misconceived as such by many obstetricians up to the present day. The principle of antiseptic surgery as conceived by its great founder was the creation of aseptic conditions; in the wound primarily, and therefore as a corollary in all that surrounded or touched the wound. Now the problem of how to achieve such conditions is an exceedingly difficult one, even as regards those regions of the body most favourable for its accomplishment; and most of all difficult in connexion with labour; and yet the immense amount of thought and endeavour that has been expended on the effective application of the antiseptic principle as far as recognized surgery is concerned, stands in marked contrast to the apathy on the subject which distinguishes the practice of obstetrics. One reason for this is that that method of infection of the birth canal wherein septic organisms are conveyed from individual to individual has received disproportionate attention, probably because it is the most obvious and was responsible for the striking epidemics that afflicted lying-in hospitals in the past. But even in those days by far the larger proportion of the cases of puerperal sepsis were probably due, as they are now, to infection by the bowel organisms of the patient herself. For special conditions of propinquity and rapid carriage are necessary for infection

from extrinsic sources and such only obtain in the minority of labours. The problem of preventing extrinsic infection moreover is relatively simple as compared with the prevention of infection from intrinsic sources—for example, the wearing of sterile-rubber gloves practically renders impossible the conveyance via the attendants' hands, of organisms from one patient to another, but it in no way diminishes the possibility of the carriage of anal organisms into the vagina. Thus, although the antiseptic measures employed in lying-in hospitals fall far short of those in use in general surgery they have sufficed practically to abolish extrinsic infection, in spite of the fact that the first requisite for its extensive occurrence, the collection of a number of patients under one roof, remains as before. But intrinsic infection producing more or less pyrexia is quite common still. The symptoms are rarely severe, however, for the infection is probably considerably modified by the antiseptic measures taken and moreover the cases are promptly treated. In home-conducted labour, on the other hand, in which extrinsic infection was probably always a subordinate cause of puerperal sepsis, the adoption of antiseptic measures on the average considerably less thorough than those employed in lying-in hospitals, though potent to a certain extent against extrinsic infection, has had little effect on the far commoner intrinsic infection, against the occurrence of which nothing less than a most elaborate antiseptic technique will suffice.

Besides the immediate loss by death of a number of fertile women each year, the scarcely diminished prevalence of puerperal sepsis is of national importance on account of the far greater number of cases of acute illness that it occasions short of death. It is impossible to assess accurately the mortality of the disease in relation to the number of persons attacked because only the worst examples as a rule are officially certified. Taking all cases of severe illness however caused thereby, I believe that a death rate of 20 per cent. would not be far from the mark; that is, that for every one woman that dies, four more are very seriously ill. This morbidity is injurious to the nation in three ways: first, the community is constantly deprived of the working activities of a certain number of its members; secondly, a considerable proportion of these women are rendered sterile by the disease, whilst others are discouraged from further child-bearing; and, thirdly, a certain number of children perish because they have to be withdrawn from the breast.

Pregnancy Toxæmia.—By far the larger number of deaths falling

under this head are caused by pregnancy nephritis and eclampsia, pernicious vomiting on the average only accounting for between thirty and forty deaths per annum in England and Wales. There are rare cases of eclampsia in which the onset is absolutely acute and without any premonition whatever, but, in by far the larger number, forewarning signs such as albuminuria, headache or vomiting are present for some considerable time before the onset of the fatal seizure. Most of the deaths from eclampsia are either the result of failure to observe the premonitory signs, or to adopt the right treatment when the condition is obviously declared, and the same applies to the deaths from pernicious vomiting.

Hæmorrhage.—About two-fifths of these deaths are due to placenta prævia, the remainder to other forms of ante-partum hæmorrhage and to post-partum hæmorrhage. Deaths from hæmorrhage in pregnancy and labour are almost entirely preventable. In lying-in hospitals where skilled supervision of labour obtains, practically the only deaths from this cause are those in which the patient is admitted having already lost a great quantity of blood.

Embolism and Sudden Death.—The probable relation of embolism to latent sepsis has already been commented on. Certain of the cases classified under the above head may possibly be due to such disasters as rupture of the uterus, but, beyond all gross physical causes, death from sudden heart failure occurs occasionally after labour, not only in women, but in the lower animals. These deaths from unexplained cardiac failure must be looked upon as unpreventable in the present state of our knowledge.

If it be true then, as it undoubtedly is, that of the number of deaths directly due to pregnancy and labour the greater proportion could be prevented, the scantily diminished yearly mortality constitutes a standing reproach to the community at large and to the medical profession, and in particular to the teachers of obstetrics. The remedy lies in nothing less than a radical change in the conception of midwifery, both by the profession and the public, and a complete revision of the attitude of thought that dominates the teaching and practice of the art.

MIDWIFERY A SURGICAL ART.

Pregnancy is a state induced by the growth of a neoplasm ; labour is a process accompanied by self-inflicted wounds, and the puerperium is the period of their healing.

Midwifery concerns itself with the treatment of these three, and is a pure surgical art, for the diseases of the new-born child are the province of the physician.

The product of conception causing hepatic breakdown or renal disease or convulsions or menacing hæmorrhage or pelvic impaction is no less a life-endangering neoplasm than an hydatid cyst, an adrenal tumour, a glioma, a uterine fibroid, or an incarcerated ovarian cyst, and the problem of its treatment is a surgical problem.

Normal unassisted labour is an operation that the patient performs on herself, and should have the environment proper to any other operation that involves a breach of surface. Still more is this necessary in cases in which manipulative interference or operative assistance may be required.

BUT NOT RECOGNIZED AS SUCH.

Unfortunately the conception of midwifery as a department of surgery is still very far from being established. Let us examine the reasons.

Founded on the art of the female midwife, obstetrics is the oldest special branch of our profession, but, unlike the others, it arose not as an offshoot, the result of the exuberant growth of medical knowledge, but more or less as an independent subject, which in process of time became grafted on to the main stem. That that process is not yet complete is shown by the fact that medical art is still divided into three primary divisions — medicine, surgery and midwifery — some examining bodies even granting a separate diploma in the last named subject.

The isolated position of midwifery is early brought to the notice of the medical student. His text-books of physiology do not deal with the function of reproduction; the diseases and disasters of child-bearing receive no mention in the lectures on general pathology; the obstetric curriculum is divorced from the rest of his studies as though the morbid processes with which it concerns itself were fundamentally of a different nature to the rest of disease. He sees in some institutions its exponents, though styled physicians, practising their calling almost entirely by operative means. In the theatre attached to the lying-in wards he witnesses labour conducted with the circumstances of modern surgery, whilst in the extern department he finds the same procedures carried out under conditions which would make any of the operations of recognized surgery unjustifiable. He finds that at the London Uni-

versity the M.D. degree may be taken in obstetrics, and that an essential feature of the examination is a paper, not on surgical pathology, but on general medicine, including tropical medicine!

What wonder, then, if, in the face of all these anomalies and contradictions, a conception of midwifery as a separate art, to which the tenets of surgery only partially apply, grows up within the student, from him passes on to the practitioner, and finally reaches the public.

THE CONSEQUENCES.

The ill-results that follow from this false conception are accentuated by those flowing from another error perpetuated by the foolish reiteration of the word "natural" as applied to child-bearing, without comprehension of all that "natural" implies.

Childbearing *is* a physiological process, but it stands alone amongst such, in that while the rest of them are exercised on behalf of the individual, reproduction occurs for the benefit of the race at the cost of the individual. The toll thus levied on the female is exacted from civilized and uncivilized women alike; animals, whether domesticated or wild, whether high or low in the scale, do not escape it.

The analogy between reproduction and other natural acts has been so much harped upon that the public has come to think little of the dangers of pregnancy and labour, the latter of which, amongst the uneducated classes, is regarded as analogous on a larger scale to defæcation or micturition. These two errors are responsible for maintaining great public ignorance of the necessity for proper supervision during pregnancy and pre-arrangement against the time of labour, and, as a corollary, a disinclination to spend on these events an amount of money commensurate with their importance.

In the practice of recognized surgery the medical man postulates certain surroundings and accessories as a necessity for the successful performance of his work, and without them, except under great emergency, he refuses to undertake the case. Moreover, the public, educated as regards recognized surgery, supplies his requirements without demur, or being unable to do so, appreciates at once the necessity of having the patient transferred to a hospital or home.

But in obstetrics a vicious circle obtains. The want of understanding of the dangers of child-bearing and the "surgicalness" of midwifery results in the public under-rating the requirements of the art. Hence has been established a custom by which childbirth takes

place under conditions that sicken the surgical soul. The attitude of the public in turn reacts on the medical man. He finds when he begins practice that it is customary to conduct labour under conditions that he feels to be faulty, but in the face of long usage, he hesitates to undertake the task of changing them.

The conversion of the lying-in room into some semblance of an aseptic operating theatre, efficient assistance, and an independent anæsthetist are looked upon by many as academic ideals—unessential and not to be pressed for in everyday work.

There are still in all great cities numbers of houses unfit for the habitation of human beings. In such surroundings, with insufficient material, scanty light, and inadequate assistance, the difficult operations of obstetric surgery are frequently performed, and no vigorous voice is raised in protest against the custom.

Most of us are familiar with the general surgeon who relates, in tones of proud accomplishment, the occasion when he successfully operated for, say, a strangulated hernia in a dirty cottage by the light of a single candle and the assistance of only the anæsthetist and the village nurse.

But what of the obstetric surgeon, who by evil custom amidst similar surroundings, plays the part of operator and anæsthetist in his single person, not on one exceptional occasion but over and over again in the course of his professional life!

But the absence of the conception of the "surgicalness" of midwifery is by no means limited to the poorer classes. Consider the average lying-in room in the average middle-class house. A double bed, unwieldy and inconvenient, is the first object that strikes the eye. By the side of it stands a commode. In one corner is the baby's cradle, in another is the cast-clothes basket, in the third is the washstand, and upon it toothbrushes, bottles of hand and hair lotion, and the husband's shaving materials. The dressing table absorbs much of the floor of the room and most of the light of the window. It is littered with brushes, combs, hairpins, trays, boxes, photograph frames, wisps of shed hair and such like rubbish; in the midst of which a bowl of antiseptic solution, in which some blobs of white wool have been immersed, stands forlornly. A large wardrobe, three chairs, and a chest of drawers, the top of the latter piled up with books, knicknacks and various odds and ends, obtrude themselves on the already limited space. The mantelpiece exhibits multifarious articles, none of them bearing any reference to the matter in hand except a bottle of Three Star brandy, a feeding

cup, and a cleaned soap bowl containing the time-honoured but ridiculous sheaf of threads for tying the cord. Under the dressing-table are several pairs of boots; whilst airing in front of the fire, partly on the fender and partly on the floor, is a heap of baby linen. Amidst these surroundings lies the unfortunate woman on whom a surgical operation, fraught with very definite risks, may presently be required to be performed. Were the nature of it any other than obstetrical the room would not be left in a state of such utter unpreparedness, but would be cleared and converted as far as possible into an impromptu operating theatre.

Pregnancy considered as an Abdominal Neoplasm.

The product of conception is as truly a neoplasm as any other uterine tumour, and should be regarded as such. It differs from the rest of them only in this, that it usually undergoes spontaneous cure. But even in this regard it is not peculiar, for a uterine fibroid may be expelled or be absorbed. It all other respects it is strictly comparable with the other new growths. It may become malignant or be malignant *ab initio.* It may become infected, impacted, or twisted. It may rupture into the peritoneal cavity, or cause pressure symptoms by its size. It may give rise to severe hæmorrhage or undergo pathological changes as a result of which the possessor suffers from acute toxic absorption, and its final expulsion may be accompanied or followed by shock, hæmorrhage or sepsis.

In the present state of our knowledge we have no specific treatment for the results of abnormal pregnancy beyond surgery. When the neoplasm is endangering life, it must be got rid of, and at all times, seeing its potentialities for harm, its possessor must be kept under medical supervision.

It may be said that this is already common obstetric teaching, but it is not. The student is instructed in the diseases and accidents of pregnancy and their appropriate treatment, but the big general principle is *not* taught him: he is taught to see the trees, but not the wood. Nearly all the deaths caused by abnormal pregnancy are due either to lack of medical supervision, whereby the menace of the neoplasm is not discovered until it is too late to save the patient anyhow; or, the danger being discovered, to tardiness in applying the general surgical principle that a life-endangering tumour should be got rid of as soon as possible.

LABOUR CONSIDERED AS AN OPERATION.

Labour, even normal labour, should be considered as an operation. The first requisite for safety, therefore, is asepsis of the operation area, or birth area, as we will call it. The vagina should be regarded as a wound, into which the passage of anything unsterilized, in a fumbling half-sighted manner, and without previous antiseptic preparation of the surrounding skin, is a hideous transgression of the ritual of modern aseptic surgery.

And under the term obstetric operation I would include not merely the more obviously mechanical procedures such as forceps extraction, craniotomy, and so on; but every manual assistance to delivery, even if it run to no more than the hooking down of an arm, a single stitch in the perinæum, or a vaginal examination.

The wearing of boiled rubber gloves during the conduct of labour has become increasingly common of recent years. A layer of rubber between the hand and the patient prevents the transference of organisms from one to the other. So far, so good. But organisms from the patient's skin, or from bed-clothes, furniture, or any other unsterilized surface, are carried as well by the gloved as by the ungloved hand, and it is the organisms from these sources, and particularly the patient's skin, that are, and always have been, the chief agents of puerperal sepsis.

With the anus as a centre there exists a zone over which intestinal organisms are spread with a lessening intensity from centre to periphery. That is the reason why the likelihood of infection of a wound increases the nearer it is to the anus. This was strikingly exhibited, to my own observation, in the wounds in the late war. All must have noticed that when a game bird or hare is hung it is the inner and upper thigh which first becomes "high." Now nature has made the mistake of placing the birth area almost in the middle of this danger zone. The problem set us is how to prevent or minimize the results of this mistake. To prevent the conveyance of organisms from the adjacent skin into the wound, the up-to-date operator in recognized surgery prepares the skin beforehand with powerful antiseptics and further attaches towels or rubber sheeting in such a way as to cut the skin out of the operation area altogether. It is urgent that such principles be applied to labour, for the skin of the ano-perineal region is the most heavily infected of any skin-area in the body. Could we achieve sterilization of the birth area or only relative sterilization, the mortality of childbirth

would be nearly halved right away and the morbidity much more than halved.

The recent introduction of the non-irritant yet powerful antiseptics belonging to the aniline group goes far to place at the service of the obstetrician the means of achieving sterility of the birth area. The investigations carried out by Dr. C. Browning and myself, showed that sterilization of the ano-perineal area could be effected by the use of "violet-green," and I have suggested that during labour this antiseptic should be applied by compress to the vulvo-perineal skin until such time as the head is about to be born. Further I think that this antiseptic should be used as a lubricant every time a vaginal examination is made, and before any operative procedure is undertaken within the vagina the canal should be thoroughly swabbed out with it. It has been objected that the baby's head will be stained, but this is a small price to pay for protection against sepsis. Instead of violet-green, flavine can be used, the colour of which is not so aggressive, while it is nearly as powerful an antiseptic.

Such measures would go far towards sterilization of the birth area, but a danger remains—namely, that due to the eversion of the anal canal and the expression of mucus or fæces during the last phase of the second stage. Provided that the lower bowel has been thoroughly emptied beforehand, I conceive it would be possible to insert into the rectum a suppository composed of one of these non-irritant antiseptics sufficient to sterilize a mere escape of rectal mucus.

As however absolute sterility of the anal region will probably never be able to be effected, we must seek to cut the anus out of the birth area. This can be done by fixing over it either by clips or stitches, a large gauze pad soaked in a strong non-irritant antiseptic. It is impossible to fix sterilized towels round the orifice of the vagina in the same way as they are fixed to the edges of an operation wound.

Having created a state of asepsis in the birth area, the next point is to keep it aseptic. This is attained by rendering sterile all that is to come in contact with the birth area and all that environs it. The problem is simple compared with that which we have just considered, for we have only to copy the ordinary arrangements of a modern operating theatre. The lying-in chamber should be cleared as in preparation for a surgical operation. All maternity nurses should be thus instructed. At the present time not one in fifty does so. This is partly due to want of teaching, and partly to the ignorance of the patient and her relatives who object to the removal of the bedroom

trumpery. This is a matter for education. The obstetrician must, of course, be gowned and gloved as befits a surgeon engaged in an operative procedure, in which the avoidance of sepsis is all-important. At a cost of less than a sovereign a tin containing a complete outfit of sterilized gowns, towels swabs and gauze can now be obtained. The day will come, I hope, when public opinion will cause them to be at the free service of the poor. Without such an outfit the aseptic conduct of labour is impossible, and the layman, niggardly of all expenditure where childbirth is concerned, must be made to realize that no money is ever better spent.

And still considering labour as a surgical operation I now pass to another necessity for its proper conduct: the birth area must be *accessible.* In the second stage of labour the side posture is that always adopted in this country but it is a bad one; for it gives a poor exposure of the parts for purposes of sight and touch, and, by placing the anus nearest to the attendant renders more likely the conveyance of bowel organisms into the vagina. For all operative purposes, except Cæsarean section, even for examination only, the lithotomy position is the proper one. If the patient is not anæsthetized she should be placed across the bed with her feet on a couple of chairs or rests. But when under an anæsthetic she should be secured by Clover's crutch or the leg rests of an operating table. The idea of a surgeon performing curettage or ligaturing piles without an anæsthetist is admittedly ridiculous, but in obstetric work the practitioner, still to this day, is frequently diffident of asking for such assistance, because by custom the public expects him to combine the offices. Now an absolute necessity, in the problem of how to render aseptic the technique of assisted labour, is an independent anæsthetist. Even where the anæsthetic is to be administered merely for the sake of relieving the patient's sufferings during the last phases of the second stage it should not be given by the obstetrician, for at any minute it may be necessary for him to turn his attention to the birth area. Equally faulty is the practice of the nurse acting as administrator and leaving the medical man to manage the delivery unassisted. Both these methods are irreconcilable with an aseptic technique even in a straightforward case, whilst in circumstances of difficulty or emergency the result is hopeless chaos. Further it is impossible for the obstetrician to guard his gloved hands against contamination, unless he has besides the anæsthetist, efficient assistance. For the proper conduct of assisted or operative delivery four persons are required—the operator, the anæsthetist, the two assistants, one or both of whom may be nurses,

provided they are properly trained. Finally, we have to consider the action of the obstetric surgeon himself and the principles that we, as obstetric teachers, need to impress upon him.

Given that every factor in the labour is normal, the safest method of delivery is self-delivery free of any interference with the birth canal whatever. Patients deploring the fact that the child was born before the arrival of the attendant have sometimes reason to bless their good fortune instead. Every manipulation within the birth canal, even the single examination to determine the position of the presenting part, carries with it a definite risk of conveying sepsis, which must be balanced against the advantages of the interference. This does not imply that there is no possibility of sepsis after absolute self-delivery. Sepsis by auto-infection may, and does, occasionally follow such labours, but it is rare. It follows, therefore, that interference in labour should never be undertaken needlessly. But—and this is the point so essential to be taught—when interference is necessary, either on account of obvious abnormality, or doubt as to the exact state of affairs, it must be carried out with *surgical thoroughness.* More harm has been done by single, slovenly, internal examinations than by all the deliberate set operations of obstetrics put together.

And, setting aside for the moment interference on account of obvious abnormality, the teaching should emphasize the importance in obstetric work of *being sure;* for of all departments of surgery there is none in which cardinal decisions have to be reached and acted upon so quickly. A mistake in judgment results in untoward happenings, at the best to be palliated but never entirely to be rectified. Such mistakes will of course at times occur, even with the utmost precaution, for no one is infallible. There are, however, two axioms that should be instilled into the student's mind in this connexion.

The first is that a plan of action decided on and carried out in a determined, thorough, and surgical manner, even though it be not the best suited to the conditions of the case is better than wavering measures, conceived in uncertainty, and performed in a timid and unsurgical way.

The second is, that when it is realized that a mistake in judgment has been made, that course should be immediately adopted which most surely minimizes its ill results to the patient. And in this matter I hold very strongly that the safety and well-being of the mother is the obstetrician's chief concern in all cases, and in difficult labour his sole concern. I mean, that if two courses are open to him, both of equal

risk to the mother, but one having a lesser risk to the child, he should choose that one, but in every other case he should choose that which is best for the mother. For in labour it is not only the patient's life that has to be preserved, but her health and her capacity for further child-bearing, and questionable gain it is to deliver a living child by means that rend the reproductive apparatus to pieces.

Such severe labour, especially when followed by sepsis, quite frequently leaves the woman sterile, or although fertile, unwilling to undergo the trials of childbirth again; while others, on account of uterine displacement or weakness of the pelvic floor, have their usefulness as members of society permanently impaired.

Let it not be thought that I am imputing lack of skill to the practitioner in general. Far from it. The skill is there but it is discouraged by the absence of the accessories and conditions necessary to make it effective.

The Puerperium considered as a Period of Post-operative Convalescence.

The wound in the uterus left after the separation of the placenta is entirely comparable with that left after the vaginal enucleation of a large uterine fibroid, and the perineal wound caused by the child's head with that incurred in the performance of plastic enlargement of the vaginal orifice.

The wounds of labour are more likely to become infected than those of the gynæcological operations I have cited, because labour is a larger operation involving more bruising of the tissues, and, under present conditions, is not performed under anything like the same conditions of surgical asepsis. Moreover sepsis, if it occurs, tends to run a much more severe course, because of the enormous venous and lymphatic hypertrophy that accompanies pregnancy.

The general management of puerpery should be conducted in the same way as the convalescence after any other vaginal operation. The wound in the uterus is inaccessible, and we have no means of dressing it, but we can help to secure drainage by propping the patient up in bed. The perineal wound, if it was aseptic when it was sutured, needs no dressing. I believe that it is very rare for any wound to become infected *after* it has been sutured. But to close an already infected wound is disastrous.

The teaching that has for a long time obtained in text-books, that

all perineal lacerations should be sutured, urgently requires to be supplemented by the proviso that, before doing so, they must be sterile, otherwise it is far better to leave them open and at least secure drainage. To close up with sutures an insignificant perineal laceration which is already infected by the passage over it of fingers recently contaminated by the anus, directly makes for serious sepsis. That recently infected—even heavily infected wounds, can be sterilized before suture by the application of antiseptics has been proved conclusively during the war.

Septic perineal lacerations can be treated by the direct application of antiseptics, but for sepsis of the placental site we have at present no treatment beyond supporting the patient's strength—and he who thinks otherwise deceives himself.

The whole teaching on the subject of the treatment of puerperal uterine sepsis needs to be revised. Consider the problem. The patient is suffering from the effects of an acute toxæmia originating from organisms sequestered in the uterine sinuses, veins and lymphatics, and perhaps in other situations still more remote from the uterine cavity. To remove or kill the organisms or neutralize their toxins is the only solution of the problem, and we can at present do neither the one nor the other. Instead, what is done? The uterine cavity is douched or explored with the finger and scraped—a futile proceeding, for the organisms in the cavity are not those causing the symptoms. But it is worse than futile, it is dangerous, for the necessary manipulation frequently dislodges thrombi and liberates organisms into the blood stream at large. The rigor that so frequently follows these proceedings is characteristic of the entry of injurious matter into the circulation—you see it in malaria when the stretched blood corpuscles rupture and the spores escape; and after intravenous infusion, especially of foreign serum.

I have over and over again seen cases of relatively slight puerperal fever converted into examples of virulent sepsis by these mistaken methods of treatment. They are perpetuated by the continued teaching of that gross error that puerperal sepsis is commonly caused by fragments of the gestation retained in the uterus.

It is astonishing how blindly unobservant we all are and how stiffly we become obsessed with what is taught us, though it fly in the face of the obvious. *There are no gross retained pieces in the uterus in puerperal sepsis; not once in a hundred times.* A variable quantity of soft débris can be scraped out of any puerperal uterus, septic or

not septic. We must get rid of all that German teaching about "septicæmia" and "sapræmia," and the "germs that flourish on dead tissue" which is so dear to the heart of the student, and start to think for ourselves.

The placental site infected by organisms originally derived from the bowel is from the pathological standpoint exactly comparable with the infected wounds of the late war. Gas gangrene is uncommon in puerperal sepsis, because the muscle of the uterus is unstriped, and the *Bacillus aërogenes* flourishes chiefly in striped muscle; while, moreover, the extensive bruising and laceration that in war wounds aids the development of this organism is absent. But in all other respects the obstetrician has always been familiar with those results of profound wound sepsis which have come as a surprise and a revelation to a generation whose experience has been limited to the results of wounds as modified by the practice of Listerism.

Owing to the anatomical position of the placental site, the methods which in the later phases of the war were applied with such conspicuous success to infected bullet and shell wounds, are only very partially applicable to the major wound of labour. These methods were of three kinds:—

(1) The immediate sterilization of the wound by strong antiseptics before the infection had time to become profound.

(2) Progressive sterilization of wounds already profoundly infected by the continuous application of antiseptics until such period as the wound became aseptic, after which closure might be effected (Carrel).

(3) Immediate excision of the whole wound before the organisms implanted in it had time to multiply at all.

The first method has a scope in these cases in which it is known at the time of the labour that the uterine cavity has probably been infected as the result of intra-uterine manipulation or instrumentation. In such it is possible by the immediate application of a strong antiseptic to destroy the infecting organisms. The antiseptics of the aniline group are peculiarly suitable for such immediate sterilization.

The second method which was developed by Carrel and Dakin with most successful results is not capable of satisfactory application to the profoundly infected placental site, for more is demanded than the mere continuous application of an antiseptic. Previous excision of the wound, or, if this be impossible, very thorough cleaning up of it, together with removal of all damaged and dead tissue, and the freest drainage is required. It is impracticable to do this in severe puerperal sepsis, for

the placental site is too inaccessible to allow of thorough cleaning up, whilst excision of it is impossible short of removing the uterus, and by the time the patient is sufficiently ill to suggest such a drastic step the organisms have, as a rule, spread beyond the uterine wall. Moreover the technical difficulties of arranging irrigating tubes so as to be sure of reaching every part of the infected uterine surface are great. The method might be successful could it be carried out in the earliest stages of puerperal infection, but the manipulations necessary to the proceeding carry with them a risk of dislodging infected thrombi, which probably outweighs the advantages to be gained.

The third method, which was the culminating achievement in the treatment of war wounds, is utterly inapplicable to the major wound of labour. It would necessitate the performance of hysterectomy at the close of every confinement in which there was a possibility of infection of the placental site.

The attempts that have been made to destroy the organisms of puerperal sepsis or neutralize their toxins by antidotal sera, vaccines and the intravenous injection of bactericides have all up to the present been dismal failures. It is true that many patients thus treated recover, but so do patients not so treated. All of us are a great deal too much inclined to mix up *post* and *propter hoc*. My own opinion after an extensive trial of all these methods of treatment is that they are useless.

A method of curing puerperal sepsis will doubtless be discovered in the future, but until then prevention is our only weapon. And thus I come back to the urgent necessity for regarding labour as a surgical operation fraught with risks of sepsis *against which nothing short of a very elaborate antiseptic technique will suffice.*

CONCLUSIONS.

The conception of midwifery as a surgical art necessitating for its successful prosecution the full gamut of modern surgical requirements implies nothing less than a complete alteration of the conditions under which it is at present practised, and until this change is accomplished no satisfactory diminution of the mortality of child-bearing can be expected.

The co-operation of the public is essential, and this will not be secured until it is made to understand that the national and individual advantage accruing from the change are worth the large sum of money which will have to be spent on it.

In the present state of affairs the slight demands made on behalf of his art have resulted in the public habitually underpaying the obstetrician, though the outfit and skill demanded of him are at least as great as those required in other departments of surgery, while the time, trouble, and general wear and tear that attendance on a confinement involves, is out of all proportion greater. *Midwifery, in fact, does not pay,* except in so far as it serves as an introduction to other forms of practice; a pernicious thing, for underpaid work can never be the best work.

On the other hand it is essential that the monetary cost of child-bearing—cost to the husband and wife, I mean—shall not be so high as to discourage reproduction. It may with much justice be argued that the expenses of childbirth up to a certain equitable figure should in all cases be born by the nation to whose advantage the child is brought into the world.

The passing of the Midwives Act and the recent establishment of ante-natal clinics in many parts of the country are both steps in the right direction, but much more is needed.

A midwife single handed, still less than a doctor single handed, does not comply with the requirements of labour, which like any other operation demands " team work " for its proper conduct.

No figures are available giving the yearly number of recognized surgical operations performed in this country, but the total must be considerable. The larger proportion of them take place in hospitals, a smaller proportion in nursing homes, and the remainder in private houses.

When the public has been made to understand that labour itself is a surgical operation there will be a similar distribution of confinements. This will necessitate the establishment of large lying-in hospitals all over the country, maintained out of public funds, either national or municipal. Besides free beds there should be paying wards and separate rooms for such as can afford them, the amount to be paid being arranged according to the patient's financial position, judged, perhaps, on their rate assessment.

These hospitals should be the centres for the teaching of midwifery, both to medical students and midwives, the former of whom should be resident in them for at least three months.

Extern departments as they are at present carried on should be abolished. They perpetuate all the worst features of midwifery as practised to-day, the inadequate surroundings, the wretched light, the

meagre assistance and the dirt, and lead the student to think that the régime of the labour ward is an academic ideal unrealizable in general practice.

Women unable or unwilling to enter the lying-in hospital would fall into two classes: First, those whose means enabled them to command the necessities for the surgical conduct of labour in a nursing-home, or in their own home; and, secondly, poor patients whose entry into hospital was impossible on account of domestic reasons or the sudden onset of unexpected labour.

This latter class might be dealt with by having attached to the central hospital an extern team—i.e., an obstetric surgeon, an anæsthetist, and two nurses, with a complete outfit and a motor car to carry them. The team should be able to be summoned free by the medical man or midwife in attendance on the case, for given such a team the requirements for the surgical conduct of labour could be constructed in the poorest room, just as they can be for an emergency operation in recognized surgical practice.

In the staffing of these large hospitals the medical men of the town or district should take a large part and be paid for doing so, but a certain number of resident obstetricians would also be required. Patients taking private rooms should be attended by their own medical man, and should pay him an adequate fee. The permanent resident staff should be at his service and should co-operate with him in the conduct of the labour, the routine of which he would already be quite familiar with, having been trained in that or a similar hospital.

Such is a rough sketch of what is required before we can hope to see a progressive diminution in the mortality of child-bearing comparable with that already effected and continuing to be effected in every procedure of recognized surgery.

Let me not be misunderstood. I want to see midwifery not necessarily more "operative," but more "surgical," which is quite another thing. I want to see it taught and practised as a branch of surgery. The difficulties in the way of attainment are great, for we have to undo the results of fifty years of cramped outlook and "laissez faire." The whole edifice of obstetrics needs to be set in order, but the foundations, the primary concept for which we, as teachers, are entirely responsible, first of all.

DISCUSSION.

Sir FRANCIS CHAMPNEYS: I notice that Mr. Bonney's tables are based upon the ratio between the number of maternal deaths and the number of *live births*. Why is this method adopted? The results are somewhat strange to me, and would seem to show that practically no improvement has taken place since 1849. In 1910 I replied to a somewhat similar statement by Sir William Sinclair from figures furnished from the Registrar-General's Reports, and embodied in Appendix A of the Report of the Departmental Committee on the working of the Midwives Act 1902, p. 24, by the following quotations: "From Table A, giving the annual death-rates from puerperal sepsis per million of females living, it would be seen that the death-rate in 1902 was 118, and in 1907 it was 81. The census of 1901 showed that in England and Wales there were 16,800,000 women. The saving of life in 1907, as compared with 1902, was 37 per million. In other words, the lives of more than 621 women were saved in 1907 which would have been lost in 1902. Table B, calculated in the proportion of 1,000 births, showed the same thing, and these results were graphically set forth in diagrams A and B. Diagram C, showing the death-rates from puerperal sepsis and accidents of childbirth to 1,000 births, shows that this rate prior to 1903 was never below 4·41; in 1907 it was 3·83. Striking evidence was given before the Departmental Committee to the same effect. As regards infantile mortality, Dr. Robinson, of Rotherham, stated that while the death-rate in cases attended by midwives was 101 per 1,000 in 1907, the death-rate in cases not attended by midwives was 194; in 1908 the mortality in midwives' cases was 92, in non-midwives' cases 195." I have been favoured by Dr. Stevenson, of the General Register Office, Somerset House, with a continuation of the figures up to and including 1911, and now give the calculation up to that date which is arrived at by substituting the results of 1911 for those of 1907: "From Table A, giving the annual death-rates from puerperal sepsis per million of females living, it would be seen that the death-rate in 1902 was 118, and in 1911 it was 72. The census of 1911 showed that in England and Wales there were 18,672,986 women. The saving of life in 1911, as compared with 1902 was 46 per million. In other words the lives of 859 women were saved in 1911 which would have been lost in 1902. Table C, showing the death-rate from puerperal sepsis and accidents of childbirth to 1,000 births, shows that this rate prior to 1903 was never below 4·41; in 1911 it was 3·67." These figures show that the passing of the Midwives Act was followed by a sudden and considerable fall, and that the improvement since this has been gradual and comparatively slight. It would seem that the great initial improvement in the puerperal mortality must have been due to improvement in the midwives; we may hope for still further improvement not only in cases attended by midwives but by medical

practitioners, but can hardly expect so striking a change in the future.[1] So far from the subject being buried in a general gloom of despair three things plainly emerge from the above considerations: (1) That the bringing into operation of the Midwives Act was marked by a sudden and striking drop in puerperal mortality; (2) that this must have been due to the operation of the Act upon the practice of midwives only; (3) that no such marked improvement took place in the mortality from accidents and diseases of child-bearing other than sepsis. These facts are clearly evident also from Sir Arthur Newsholme's tables quoted by Mr. Bonney. In order to ascertain where the defect lies it is important to know by what class of attendant patients are delivered; and, with this object the Central Midwives Board some years ago asked the Registrar-General to allow a space to be left in birth certificates for the name of the person actually delivering the mother, but this application was not successful. I agree with Mr. Bonney that the present loss of life and health is not satisfactory, and that we must do all in our power to reduce it.

Mr. Bonney says: "The year 1870 brings us back to the initiation of 'Listerism,' and one would naturally suppose that in the years prior to this great event the mortality from puerperal sepsis would be found to be considerably higher than the years after it. But . . . the Registrarial figures show nothing of the kind." The history of antiseptics is one of the most curious on record. The discoverer of antiseptics was not Lister in 1870 but Semmelweis in 1847. The medical world would have none of him, and he died in despair, insane. Had they not been so stupid and prejudiced obstetrics would have been in the van, and surgery would have followed in the rear. As it was, the order was reversed, and those who refused to enter the promised land had to wander some forty years in the wilderness. Now, although Listerism was initiated in 1870, antiseptic midwifery was only started in any London lying-in hospital in 1880, when it was set up at the General Lying-in Hospital by Sir John Williams and myself. The methods of Lister had to be adapted to obstetrics, and we had to feel our way, but the results were immediate and striking. Antiseptics in midwifery were only absorbed gradually and slowly into private practice; I doubt whether they are even now thoroughly and universally carried out. I should like to know the facts on which Mr. Bonney founds his statements that: "Even in those (past) days by far the larger proportion of the cases of puerperal sepsis were probably due, as they are now, to infection by the bowel organisms of the patient herself." It is plain that Mr. Bonney considers the anus the chief source of septic danger. How does he account for the following facts: A ruptured perinæum has no special tendency to become septic; it generally heals quickly and healthily; operations on the perinæum and rectum have no special dangers from sepsis? How could these things be if the anus were such a plague spot as Mr. Bonney thinks? The presence of bowel organisms is undoubted, but they seem to do no special

[1] *Proceedings*, 1910, iii (Sect. Obst. and Gynæcol.), pp. 231, 232: *see* also *Journ. Obst. and Gynæcol. of Brit. Emp.*, 1914, xxv, pp. 304, 305.

harm. The case with the other end of the alimentary canal is much the same. The mouth of an average man is so septic that the rinsings from it if injected into mice are generally fatal. And yet we do not get septicæmia from the extraction of a tooth or from biting our tongues. I suppose that in this case Nature has placed the dock-leaf near the nettle, and that a natural immunity has been created and maintained by antibodies. Nature is not so foolish as Mr. Bonney imagines.

I cannot agree with his condemnation of "German" teaching about "septicæmia" and "sapræmia," nor that it should be got rid of. A case of sapræmia is one of the most picturesque of medical experiences, though such cases can usually be only suspected and not proved until they are over. Innumerable times have I seen a patient gravely ill with the usual symptoms completely and quickly convalescent after removal of retained products, usually after a single and severe rigor.

With much of what Mr. Bonney says I agree. Midwifery needs developing on a large scale throughout the country, with large and well-equipped lying-in hospitals within the reach of all, and with the organization of team-work. As to the delivery of every parturient woman in an institution I do not believe that it would be feasible, even if desirable, but I believe that the nation is determined that insanitary homes, in which a woman cannot safely be confined, shall become a thing of the past. Finally, Mr. Bonney's picture of the "average lying-in room in the average middle-class house" does credit to his imagination. I think it must be a "composite photograph," for I cannot believe that he has ever seen all the articles enumerated in his inventory in the same room at the same time.

Dr. HERBERT SPENCER: There are many points in Mr. Bonney's paper with which I am in agreement, such as the treatment of the septic uterus, the need for an increased number of lying-in beds, and for improvement amongst certain practitioners of their antiseptic and aseptic methods. But I think Mr. Bonney, in calling labour a surgical operation, has been led into a somewhat illogical position. His paper deals with maternal mortality and its prevention by those antiseptic and aseptic measures which every student learns, and his remarks about the modern conduct of labour are too sweeping and are an unmerited aspersion upon the great bulk of practitioners and nurses. The statistics given by Mr. Bonney are admittedly inaccurate, owing to altered methods of registration in recent years; but it is also unfair to give the percentage of maternal deaths to the number of live births instead of the number of labours. In any case, if labour is a surgical operation (as Mr. Bonney maintains), the obstetrician can congratulate himself, for a mortality of 1·3 per 1,000 from sepsis can be shown for no other surgical operation of importance. Mr. Bonney is mistaken in regarding organisms from the patient's skin as the chief cause of death in puerperal sepsis. Is it true that Nature has made a mistake in placing the birth passage near the anus? It seems to me more probable that there has been no mistake, but that Nature, in placing

it there, has given woman fifteen years to become immune to the action of the rectal micro-organisms. Everyone must have been struck with the uniform success of plastic operations for old complete ruptures of the perinæum, in which no antiseptic is applied to the raw surface, which must be infected with the *Bacillus coli.* The suggestion to disinfect the rectal contents during labour by inserting a suppository seems to me to be unpractical in view of the action of labour on the rectum. Mr. Bonney's picture of the shortcomings of maternity nurses in preparing the lying-in chamber is exaggerated, and only less highly coloured than the antiseptic he recommends. I think British mothers would object to have their babies' heads stained green. Every obstetrician agrees as to the importance of gloves, aseptic clothes and dressings and antiseptics for the skin; but the ordinary antiseptics, especially perchloride of mercury, prevent deaths from sepsis in the practice of those who employ them properly. However convenient to the obstetrician the clinic may be, I maintain that in a decent private house a patient can be attended as safely as regards sepsis, and, in some respects, more safely than in a clinic. No doubt there is a need for more lying-in beds for patients with inadequate houses, but a large proportion of pregnant women will always have to be delivered at home. Outdoor maternities show a very low mortality from sepsis, and are a valuable training-ground for students. Mr. Bonney admits that the "extern team" could deal with the cases in the homes of the poor, but the motor-car with its obstetric surgeon, anæsthetist, two nurses, and complete outfit would not suffice for the attendance of half-a-dozen women at the same time.

Dr. AMAND ROUTH: The question of how to lessen the maternity and infantile death-rate has been the theme adopted by most Presidents in their inaugural addresses. In 1911 I took up the subject and showed that in the previous twenty years the total maternity death-rate had gone down from 6·5 per 1,000 living births to 4·7, the deaths due to sepsis from 2·6 to 1·4, and the proportion of septic deaths to total deaths had been reduced from 45 to 28 per cent. There seemed then to be reason to hope for further progress, founded upon the better education of midwives and medical students in antiseptic midwifery; the substitution of trained midwives for the 12,500 untrained midwives put on the Roll of Midwives by the Midwives Act of 1902; and the enforced notification of cases of puerperal septicæmia throughout England and Wales in 1911. This hope has not been justified, for the improvement between 1892 and 1910 has not been continued. (The total maternity death-rate per 1,000 living births in 1917 having been 4·8, and the death-rate from sepsis 1·3, whilst the percentage of cases of sepsis to the total deaths remained at 28 per cent., almost identical figures.) Mr. Bonney's views that obstetric examinations, manipulations and operations should be treated as surgical cases is obviously correct, and his proposals, so far as they are practical, are also entirely justified. His view that puerperal septicæmia is not infrequently due to infection from intestinal organisms is however not proved by him, nor do I think his consequential proposals to prevent such infection

are practical. The germs present in the bowels are: *Streptococcus fæcalis*, *Bacillus bulgaricus*, *Bacillus coli communis*, *Bacillus acidi lactici*, and *Bacillus enteritidis*. What evidence is there that any of these ever produce septicæmia? It would have been more convincing if Mr. Bonney had brought bacteriological evidence to prove that normal intestinal organisms can produce puerperal septicæmia. Mr. Bonney blames Nature for placing the birth area near the intestinal exit. In all mammals, except monotremes and marsupials, the allantois becomes attached to a definite region of the uterine wall, and a placenta is formed in the higher mammals with interlocking of maternal and fœtal tissues necessitating a tearing of the fœtal from the maternal portions of the placenta at birth, whilst in the lower mammals there is a so-called discoidal placenta where there is no such intimate interdigitate union, and the fœtal placenta separates easily from the maternal placenta. Roughly speaking a common cloaca does not exist in placental mammals, except in some rodents where the placenta is discoidal, so that Nature has deliberately placed the recto-vaginal septum between the uro-genital and the intestinal exits wherever there is a birth separation of the placenta which involves an intra-uterine wound. This difference between amphibians, reptiles and birds, on the one hand, and placental mammals on the other, proves that the question of a "danger zone" was duly considered by the Creator, and no further separation of the intestinal and birth areas was considered necessary than has been provided. If intestinal organisms were as infective as suggested, hosts of mammalian animals would die of puerperal septicæmia. Think of what happens when a litter of pigs is born in a pigstye. Surely, too, the results of operations in what Mr. Bonney calls "the danger zone" are prima facie evidence that normal intestinal organisms do not infect wounds in the same individual owing to natural immunity. One has only to name operations for piles, fistulæ, and for torn perinæums ruptured even into the bowel itself. Such operations prove successful even though fæces may be contaminating the wounds during the operation. Operations on perinæums ruptured into the rectum, weeks after the occurrence, with intervening daily soiling of the rupture area by fæces are frequent, yet the plastic operation is quite successful. I believe that cases of auto-infection are very rare, and that the anal area is not a source of infection apart from abnormally virulent organisms, or organisms which have become virulent during acute intestinal affections. Individuals are immune against their own normal organisms. As regards treatment of early localized septicæmia, the prompt exploration of the uterine cavity under anæsthesia, if the temperature is going up *early* in the puerperium, and the gentle use of a blunt flushing curette or a bunch of gauze held in forceps, followed by a free application of a 1 in 4 iodine solution all over the mucosa, and especially over the raised placental site, will stop the large majority of infections before the pelvic veins are involved and the septicæmia generalized. And in all such septic cases I strongly recommend twenty-drop doses of liq. ferri perchlor. every three hours, even in apparently hopeless cases, for I have seen many such cases recover in puerperal and other cases of acute sepsis which had been given up by others.

Dr. RUSSELL ANDREWS: There is one point on which I cannot agree with Mr. Bonney absolutely—viz., that in septic cases there is seldom retention of a piece of placenta. From a teaching point of view this is a dangerous statement. In cases that come under my care retention of a portion of placenta occurs much more commonly than in .1 per cent., sufficiently frequently to justify a warning as to the danger of omitting to examine the placenta carefully in every case of labour. I agree, however, that in the large majority of cases of puerperal sepsis the uterus is empty. Some such scheme as that which he has sketched is necessary for the treatment of patients who cannot pay a fee which is large enough it make it worth the while of their medical attendant to devote, if necessary, many hours to their case. It is greatly to be regretted that a doctor, who is going to receive a fee of a guinea, or 30s., for attendance, cannot, from a purely business point of view, wait for the natural termination of a tedious labour. Some do, but there is a great temptation to hurry the delivery. It is not uncommon to have patients sent into hospital on account of so-called obstructed labour, repeated attempts at delivery with the forceps having failed, when the only obstruction is the incompletely dilated cervix. Among the cases of puerperal sepsis which come under my care there is a very high percentage of cases of forcible extraction with the forceps with tearing of the cervix and vagina and perinæum. A remark made to me some years ago by a doctor who had sent into hospital a patient with eclampsia is pathetic and instructive: "I can't help feeling that I did the right thing in sending her into hospital, although of course I lost the guinea!"

Dr. LAPTHORN SMITH: I agree with everything Mr. Bonney has said. Although there has been an immense improvement in the care of the parturient woman since the Midwives Act has come into force, much yet remains to be done. Some of the most necessary things she requires she does not get; such for instance as fresh air, sunlight, and plenty of water. And yet they cost nothing. No one who has not actually seen it would believe the conditions under which many thousands of confinements take place. In mentioning the insanitary contents of the crowded room and the small amount of air space, Mr. Bonney has understated rather than exaggerated the unclean surroundings. The windows closed to keep out the air, a shawl or shirt pinned over the window to keep out the light for fear of giving the baby sore eyes, the lack of pure cold water for fear of giving the mother a chill when her system is craving for it to make good the loss by perspiration, respiration, urination and defæcation, as well as the large amount required for lactation. Another thing from which even the poorest might benefit but from which she is debarred by prejudice, is drainage. The prehistoric nurse will not allow her to lift her head from the pillow, and as a result large clots and decomposing débris from the uterus remain for ten days in the vagina, as a most favourable culture medium for bacteria, which are absorbed through the placental site or leak through the tubes into the peritoneum. If she sat up on a chamber six times a day to pass water and sat up in bed for meals and nursing she would

get drainage. Then again there are many very busy practitioners who are opening abscesses and dealing with pus all day who are suddenly called to a confinement only to find that there are no facilities for disinfecting their hands. The untrained nurse may just have left an infected case. The woman runs a double risk from which two pairs of rubber gloves boiled in the tea kettle would save her. I would like to hear that they were used at every one of the thousands of confinements which take place every year. Then again there is the large number of deaths from eclampsia, not one of which would take place if every pregnant woman was instructed to have her water examined at least once a month during the last four months. Doctors, midwives, and ante-natal clinics should all combine to make this fact known. Then there are the tears of the cervix and perinæum due to the too early application of the forceps, or as Mr. Bonney has said, before the cervix is half dilated. The doctor who produces these tears will often tell you that he has never seen a tear of the perinæum ; and I quite believe him, for he does not look for them, and even if he did he would not see them in the badly lighted room. But if both tears of the cervix and perinæum were immediately repaired under aseptic conditions the mortality and morbidity of childbirth would be greatly lessened. Why does the harassed general practitioner do those things which he should not do, and leave undone the things he should do? Mr. Bonney and several other speakers have given the explanation. It is the pitiful fee of one guinea for spending a night in such a place as has been described, and then making ten visits free and paying for the cab and the chloroform out of his own pocket. Until all women can be taught to look upon a confinement as a serious matter, not to be entrusted to any inefficient practitioner, but to a well trained and decently paid doctor, who alone should have the choosing of the nurse, and to put herself in his hands during the whole of her pregnancy, there is not much chance of abolishing the death-rate. It is not always because the people cannot afford to pay a decent fee but because they have not been educated up to it. I am sure that most of the deaths from puerperal diseases occur among the class above described. Would it not be far better that all these women should be sent into a hospital for confinement under aseptic conditions, where, if they were sent in early, there would be no deaths. By so doing, senior medical students and midwives would be able to gain valuable experience by seeing them delivered by a master of the art, who would show them over and over again how an ideal delivery should be conducted.

Mr. HAROLD CHAPPLE: Like Mr. Bonney, I wish to see midwifery conducted on modern surgical lines. In spite of the assurances of some of the speakers that all is well, there is no question that many women die annually and very many more are permanently crippled as a result of childbirth. In the majority of cases the cause is sepsis. Nor is the reason far to seek, as the circumstances under which labour is conducted are, to those of us who are trained in modern methods of asepsis, often pathetic in their complete disregard of the requirements of modern surgery. The interior of

the uterine cavity is sterile, as we have proved many times from swabs taken from the uterus in cases requiring Cæsarean section. The treatment of an infected uterus is at its best so unsatisfactory that our utmost endeavour should be to render it impossible for that organ to become infected. Yet there are still many men who might hesitate to place an infected hand or instrument into the peritoneal cavity, but show in practice no such regard for the uterine cavity in the full knowledge of the tragic sequelæ that are not only possible but all too frequent.

Dr. F. J. MCCANN: This is a question of the greatest national importance. It must be confessed that in our war against puerperal infection we have suffered a heavy defeat. The number of deaths has been large and continues to be large, whilst the number of wounded and permanently disabled has never been estimated. The latter are numbered not by thousands but by tens of thousands. Consider the loss to the community in wage-earning capacity through chronic ill-health, and the expense even to the poorest women entailed thereby. The remedy is hospitals, hospitals and again hospitals. State subsidized hospitals should be established throughout the country. I desire to see in every village a maternity hospital as well as the village church, where the gospel of cleanliness would be taught. The great advantage of a hospital in this regard cannot be overestimated, for it is no exaggeration to state that some women are thoroughly washed for the first time in their lives during their residence in the hospital. The question of child-bearing mortality is closely bound up with the question of the housing of the poor, for it is the environment of the parturient woman which so often militates against her smooth recovery. Her surroundings are squalid, dirty, and insanitary. An important housing scheme is about to be provided, but this is not enough unless the householders are taught to be clean. The gospel of cleanliness must be preached to the people, and here there is a fruitful field of work for the clergy and the health visitor. These reforms require both time and money, but two changes might be brought about without delay: First, the provision of cheap obstetric outfits for the poor, say at a cost of ten shillings. Now that there is a maternity benefit, this money is better spent on an "outfit" than on beer to celebrate the occasion. When required, additional funds might be forthcoming from the various charitable societies. Secondly, accommodation should be provided at the hospitals for cases of puerperal infection. It is a blot upon our hospital system that women suffering from puerperal infection should be so often denied admission, and left to die in their own homes without the skilled nursing and attendance which they so urgently require.

Mr. S. G. LUKER: I endorse the opinions expressed by Mr. Bonney. With regard to the origin and source, however, of the organisms causing puerperal infection, I cannot entirely agree with him that the case against the bowel organisms is a strong one, in acute septicæmia cases, at any rate. The result of bacteriological investigations carried out mostly by Dr. Western on a large

number of puerperal septicæmia patients admitted to the isolation ward at the London Hospital shows that *Streptococcus pyogenes* is almost always the organism found in acute generalized infection. On only two occasions has *Bacillus coli* been found in blood culture. Further, on general bacteriological principles, individuals are considered to be more or less immune to their own organisms, as is shown by the rarity of general infection after operations on the anus, rectum and abdomen, where injury to the gut is present.

Dr. R. A. GIBBONS: Mr. Bonney says that there are no retained products in puerperal sepsis, not once in a hundred times, and that we must get rid of that German teaching about septicæmia and sapræmia. With this I cannot agree. My experience shows that in certain cases where the temperature has risen suddenly after confinement, judicious exploration of the uterus and removal of retained membranes, or a piece of placenta, with subsequent antiseptic irrigation of the uterus, is followed by a drop in the temperature. If the uterus is found to be empty, internal manipulation is contra-indicated. With the rest of Mr. Bonney's paper, I am in full sympathy. I hope the day will come when there will be established all over the country lying-in hospitals, with men on the staff who are fully paid, and who can devote themselves entirely to the work of the institutions, and to consulting obstetric practice only, outside. I also hope that these institutions may be centres from which a regular obstetric outfit can be sent to any house asking for it, and in small towns and villages where there are no such institutions, charitable centres may be formed for the distribution of these outfits, which should include sterilized sheets, &c., to the poorest people. In my own practice, my nurses are instructed to have sheets, nightdresses, towels, &c., sterilized before they are likely to be required, and the tin containing these things is only opened when the patient is in labour. In ordinary houses asepsis is almost impossible, but I believe education is the only means which will bring about improvement in the present method of managing the ordinary lying-in room in the vast majority of cases. But although it is almost impossible to secure perfect asepsis in the lying-in room, every attempt should be made to do so. Some think that the mere fact of wearing india-rubber gloves seems to be sufficient, whereas gloves are dangerous in giving a feeling of security unless every precaution is used during the time they are worn, and I have numerous small sterilized towels with which to cover the glove if anything excepting the patient has to be touched.

Mr. GORDON LEY: I cannot agree with Mr. Bonney that the vast proportion of deaths from eclampsia are preventable. I am of opinion that not more than 10 per cent. of eclampsias have symptoms of more than thirty-six hours' duration before the onset of the fits and in a very large proportion the symptoms are of a much shorter duration. I am in complete agreement with Mr. Bonney with regard to the extreme danger of clearing out a uterus. This should never be done unless there is every reason to believe that there is something retained. Further, I feel certain that if it is done it should be performed on the earliest possible occasion, that is, on the advent of pyrexia.

Mr. VICTOR BONNEY (in reply): My paper was intended to provoke criticism. I wanted to get obstetrics moved out of the rut in which it has stuck so long. Some of the speakers have demurred to the elaborate technique I advocate, but the orthopædic principle of "over-correction of a fault" is the right one to apply in dealing with the backward condition of obstetric art. The régime of a modern operating theatre supplies many examples of precautions the direct effects of which on the operation are probably small, but which are valuable in helping to keep the standard of asepsis up to the highest possible pitch. In regard to the virulence of bowel organisms, a great distinction must be drawn between tissues which are their normal habitat and those to which they are entirely foreign. In the case of the latter the results of infection are very serious. As an example I may cite the abdominal wound in "interval" appendicectomy. If the stump of the appendix is allowed to touch the wound suppuration results in a large proportion of the cases. Still more striking examples are the radical abdominal operation for cancer of the cervix, in which a wound of the bowel is invariably followed by sepsis, so violent that the patient usually dies of it, and abdomino-perineal excision of the rectum, in which the recovery of the patient almost entirely depends on the care that is taken absolutely to prevent the implantation of bowel organisms into the great cavity left after the extirpation. The investigation carried out by Mr. A. Foulerton and myself fifteen years ago showed that *Bacillus coli communis* is present in the uterus in most of the severe cases of puerperal sepsis. I may also remind you that puerperal sepsis occurs chiefly in primiparæ, in whom a rupture of the perinæum is invariably present, and this creates a culture surface for intestinal organisms. The passing of the Midwives Act was immediately followed by a fall in the mortality, but that rate of improvement has not been maintained. This is what one would have expected. Most of the good to be obtained from the Act has already been conferred, and further marked improvement can only be effected by a radical change in the conditions under which midwifery is practised.