The use of antiseptics in midwifery : their value and practical application / by Robert Boxall.

ANTISEPTICS IN MIDWIFERY.

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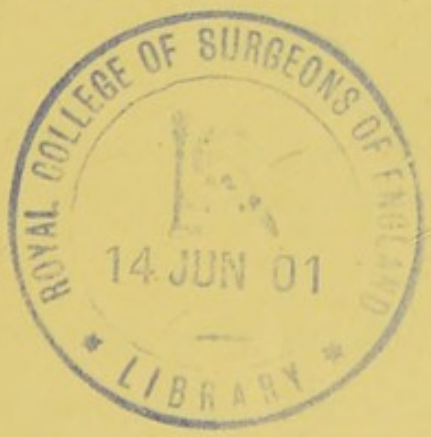

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THE USE OF ANTISEPTICS IN MIDWIFERY,

THEIR

VALUE AND PRACTICAL APPLICATION.*

LECTURE I.

Gentlemen,—The subject which I bring to your notice to-day is one of great practical importance. It should have place in most, if not in all, obstetric manipulations. It forms, therefore, a fitting subject for an introductory lecture in the course of practical midwifery. I shall speak first of the importance of antiseptics in obstetric practice, then indicate the direct objects of each antiseptic procedure and the best way of carrying it out in practice, and finally discuss the comparative value and particular use of various antiseptic agents.

The Importance of Antiseptics in Obstetrics.

Antiseptics are employed in midwifery in order to minimise the risks of blood-poisoning. That this risk is by no means inconsiderable may be judged from the Registrar-General's mortality return under the head of "puerperal

* Two lectures delivered at the Middlesex Hospital, October 10th and 12th, 1893.

fever," in which, as is on all hands admitted, the deaths returned from this cause fall considerably short of the actual number. Yet, taken as it stands, a death-rate exceeding two per 1000 deliveries, from this cause alone, is registered.

But even this mortality, serious as it is, denotes but a small proportion of the total risk. To the death-rate must be added the danger, from the same cause, of illness, and often of serious and protracted illness unattended with an immediately fatal result. I know of no figures comparable to the Registrar-General's mortality return which will represent this morbidity on an extensive scale. But this I do know, that gauged by an accurately recorded hospital experience extending over some years (according to which, for every death from blood-poisoning that took place, some thirty-two cases of illness occurred which were attributable to the same cause), the mortality return must be increased about thirtyfold to represent the amount of illness falling also under the head of puerperal fever, but not immediately fatal. The cases of disease, tubal and chronic pelvic inflammation in one form or another, which crowd the out-patient department of our hospitals, may, in the main, be taken as an index of the more protracted of such cases. Collectively, what a tale of misery do they not represent!

But, great as is the risk, a point has now been reached when it is possible to assert that, by suitable measures in which antiseptics play no inconsiderable part, this risk may be practically avoided.

It is not many years ago that, owing to the ease with which the disease could be spread under the then existing conditions, the mortality and illness from blood-poisoning in our lying-in hospitals often reached appalling proportions, and so far exceeded what was then believed to be that of obstetric practice generally, that demands were made, not altogether unreasonably, for the extinction of such institutions. For example, in 1838, of seventy-one women delivered in the General Lying-in Hospital, nineteen died; in 1861, fourteen died out of

195; and in 1877, nine out of 63. Mark that—one death in every seven confinements. It seems almost incredible.

For many years, as may be seen by the accompanying table, the death-rate exceeded 3 per cent.

Death-rate of the General Lying-in Hospital from 1833.

Period.	Deliveries.	Deaths.	Average death-rate from all causes.
1833—1860	5833	180	1 in $32\frac{1}{3}$ = 3·085 %
1861—1877	3773	64	1 in $58\frac{7}{8}$ = 1·696 %
1880—1887	2585	16	1 in $161\frac{1}{2}$ = 0·618 %
1888—1892	2364	9	1 in $262\frac{2}{3}$ = 0·380 %

Between the years 1861 and 1877, before and during which time thousands of pounds were being expended on structural alterations, the mortality fell to nearly half the previous amount. But even then, at times the mortality was so grave that it was deemed necessary to close the institution, and for three years it remained untenanted. Since 1879, when the same institution was reopened, the service has been conducted upon aseptic principles. Mark the difference in the mortality then. The value of the adaptation of Listerian measures to obstetric practice is evident from the decline in the death-rate which ensued.

It will be observed that the above table gives the total mortality, not merely the death-rate from puerperal fever. Owing to the defective reports, I am unable to dissociate the septic from the non-septic cases in the early years. But the following table, giving the cause of each fatality since the hospital was reopened, shows at a glance that it is mainly by the elimination of septic cases that improvement has been effected. It will be observed, moreover, that the advantage gained at the outset has since been still further improved upon. This secondary improvement followed upon increased experience in the use of antiseptic measures, and their more perfect application since their first adoption.

Deaths from Septic and Non-Septic Causes in the General Lying-in Hospital since 1879.

Year	1880	1881	1882	1883	1884	1885	1886	1887	1888	1889	1890	1891	1892
Deliveries	230	172	325	341	334	395	383	404	497	484	430	463	490
Deaths—													
From *septic* causes	*a* 1	—	*d, e* 2	*g, h, i* 3	*j* 1	*k* 1	—	—	*q, r* 2	—	—	—	—
From non-septic causes	*b, c* 2	—	*f* 1	—	—	*l, m, n* 3	*o* 1	*p* 1	—	*s, t, u, v* 4	*w* 1	*x, y* 2	—
Total deaths	3	0	3	3	1	4	1	1	2	4	1	2	0

a. *Septicæmia, abscess in uterine wall.*
b. Pneumonia, syphilitic ulceration of larynx.
c. Puerperal eclampsia.
d. *Pyometritis, peritonitis, septic phlebitis.*
e. *Purulent peritonitis, suppurating pelvic cyst* (*craniotomy*).
f. Puerperal mania.
g. *General septic infection.*
h. *Septic phlebitis, acute endocarditis.*
i. *Pelvic abscess, pyolymphangitis, perimetritis.*
j. *Pyometritis, septic phlebitis, acute endocarditis.*
k. *Septic phlebitis and general pyæmia.*
l. Advanced pulmonary phthisis.
m. Advanced pulmonary phthisis.
n. Mercurialism and morphism.
o. Puerperal eclampsia.
p. Puerperal eclampsia.
q. *Sloughing of soft parts, parametritic abscess.*
r. *Hospital gangrene.*
s. Hæmorrhage (accidental and post-partum).
t. Accidental hæmorrhage.
u. Accidental hæmorrhage.
v. Exhaustion, prolonged labour, chronic nephritis (Cæsarean section).
w. Exhaustion, prolonged labour, cancer of uterus (Cæsarean section).
x. Rupture of uterus, prolonged labour, hydrocephalus.
y. Syncope, unavoidable hæmorrhage, heart disease.

For instance, in the early part of 1884, perchloride of mercury solution was substituted for carbolic solution and Condy's fluid as the general antiseptic employed, with very marked benefit. Since that time, but three deaths have taken place from septic causes among 3778 patients delivered, and none during the last four years. I may mention, moreover, that these fatalities were the result of dearly bought experience. One death took place when sublimate douche-solutions of weaker strength were tentatively employed, and the remaining two during the two months in which salufer douching was tried instead of sublimate. Apart from these septic cases, twelve deaths have taken place from eclampsia, hæmorrhage, and other accidental complications, such as must inevitably occur in any considerable number of obstetric cases, especially in an institution to which a large proportion of the more serious cases naturally gravitate, and to which several complicated cases were sent after having been days in labour already. But, excepting the cancer case,* in none of the fatalities classed under this heading has septic infection borne any part. Further, as the mortality from sepsis has decreased, less fatal cases of illness from the same cause have diminished in corresponding degree.†

Nor is this experience of the General Lying-in Hospital at all exceptional. It is the same in all lying-in hospitals and maternities where aseptic principles have prevailed, both at home and abroad. If in our lying-in hospitals, which at the outset were in an exceptionally bad condition, it is possible, as has been demonstrated, by antiseptic precautions to reduce not only the actual mortality, but also all septic illness to vanishing point, it should be possible to effect this reduction likewise in private practice. That it does hold good in the private practice of individuals I fully concede, but I regret to add that I can show you that at present it is far from being the general case.

* An account of this case is given in the 'Lancet,' December 2nd, 1893.

† See "Fever in Childbed, Part I, General Hygiene and Antisepsis," in 'Trans. Obst. Soc.,' vol. xxxii, 1890.

On this point, also, I may lay claim to speak with some authority, having recently drawn attention to the subject in the medical press.* But, before discussing that phase of the question, let me also draw your attention to the fact that during last year 1291 women were attended and nursed in their own homes by the trained midwives of the General Lying-in Hospital without one single death; thereby affording additional proof of the efficacy of antiseptics to cope with septic disease, even in spite of the indifferent surroundings met with among the poor of the district south of the Thames.

If, then, this result can be achieved in a lying-in hospital, and can be attained also in one class of the community, and that not the better circumstanced, surely it could and ought to prevail in midwifery practice generally. I now invite your attention for a moment to a larger sphere of practice.

Taking the Registrar-General's reports from 1847 to 1892, I find the death-rate of childbirth, calculated for 10,000 confinements, from all causes to have fallen in London from an average of 54·7 before 1860 to 37·4 since 1880; in the provinces for the same periods from 50 to 48·9 only. The death-rate from puerperal fever has, for the same periods and calculated for the same number, fallen in London from 24·1 to 21·5, but in the provinces has increased from 15·8 to 25·6.

Of course, during the forty-six years I have taken, there have been many fluctuations. I am able to show you the charts illustrating these points; they will be found appended. Under the separate heads of puerperal fever and of accidents of childbirth these diagrams give forcible expression to the amount of fatal illness which is directly associated with the process of parturition. No further words of mine are necessary to bring this fact home to you.

The conclusions are obvious. In London, though the total mortality from childbirth has considerably diminished,

* "The Mortality of Childbirth," 'Lancet,' July 1st, 1893.

the improvement has taken place on account of accidents of childbirth alone, the death-rate from puerperal fever remaining all but stationary. In the provinces, while the total mortality remains at nearly the same level, some improvement has taken place under the head of accidents of childbirth, but the death-rate from puerperal fever has appreciably increased. From this but one inference can be drawn. It is this. No approach towards the general adoption of *efficient* antiseptic measures has yet been made. I say *efficient* advisedly. The main object which I have in view on the present occasion is to indicate how aseptic principles may be efficiently carried out in practice, and to give some reason for their adoption. A death-roll resulting from preventable disease, comprising 313 deaths in London and 2043 in the provinces, returned last year under the head of puerperal fever, besides an indefinite amount of illness productive of serious and lasting consequences, offers sufficient indication of the necessity for pressing the matter upon your notice at the outset of your obstetric career.

The Technique of Asepsis.

Aseptic principles demand the employment of antiseptic measures. For, surrounded as we are on all sides by various sources of septic contamination, strive to avoid them as we may, antiseptics of one kind or another are required in order to destroy septic matter. But I would not, in order to secure asepsis, for a moment counsel the routine employment in general practice of all such antiseptic measures as are necessitated by the service of a lying-in institution. Though I may remind you that, even in private practice, circumstances may occasionally arise which require the most elaborate precautions. But, as a rule, the demands of the case are very different. In private, it is possible to cater separately for the needs of individuals, but, in hospital, it is not easy to discriminate; and therefore, while in both the principle of securing and

maintaining aseptic conditions remains unaltered, the measures adopted call for considerable modification.

As I remarked at the outset, the ultimate object of employing antiseptics in midwifery is to minimise the risks of blood-poisoning—in other words, to secure and to maintain a condition of asepsis. But, unfortunately, the means adopted, ostensibly with this end in view, are often little calculated to minimise the risk, and, in fact, may sometimes positively increase it. For the *technique* is somewhat difficult and the pitfalls many. I would commence, therefore, by asking you, before adopting any antiseptic measure in practice, to consider the more immediate object which it is destined to fulfil; to retain only what is efficient; to reject what is superfluous, and finally to beware of what is dangerous.

Were it possible to regard the parturient tract as being invariably in an aseptic condition at the time of labour, it would, in order to insure immunity to the patient, suffice to guard against the introduction of septic material from without; for the same reason that a test-tube containing sterilised nutrient medium will remain sterile as long as care be exercised to exclude external microbic influences. In that case, the use of an antiseptic in direct contact with the body tissues—in other words the introduction, by means of the douche or otherwise, of any antiseptic into the vagina—would be no more essential than the addition of some antiseptic to nutrient medium in a test-tube.

But, unfortunately, the vagina, even in healthy women, teems with germs and with the products of germs, innocuous for the most part, but sometimes nocuous. As a familiar example, let me ask you to bear in mind the state of the passage after gonorrhœal infection. But, as a rule, until delivery takes place, with the attendant bruising, and often tearing, of the tissues of the cervix, vagina, and perinæum, the germs and germ products, even when toxic, can do no more harm than those which pervade the buccal mucous membrane and external surface

of the body; for till then a suitable site is wanting for their passage into the tissues.

But after labour, both the germs themselves and the toxic principles of their production are liable to obtain an entry through wounds into the tissues, and by so doing to empoison the body. And, in addition, there is always the risk after delivery that they may travel upwards into the cavity of the uterus, where a large absorbing surface, provided not only by the placental site, but by the entire inner surface of the womb, is for a time always open to them. As a rule, however, in contradistinction to the vagina, the cavity of the womb is not the natural habitat of microbes, even in cases where the fœtus dies; for, as is well known, decomposition does not occur unless the membranes be ruptured or the uterine contents be otherwise disturbed, and septic material be introduced from below.

For the reasons detailed above, it is advisable, therefore, to adopt measures in order to sterilise both the tube and its contents, as well as to guard against the introduction of septic material from without.

We have now arrived at this point—that antiseptic measures, in order to prove effectual, must be so adapted as (1) to secure asepsis by destroying septic material, which may be present in the lower part of the parturient canal; (2) to maintain asepsis by preventing the introduction of septic material from without.

The principle of securing and maintaining asepsis, and thereby shielding the patient from the risks of blood-poisoning, is essentially the same in a labour case as in a surgical operation, such as ovariotomy. In order to place the matter before you in a clearer light, I emphasise the fact that the measures adopted with this end in view should be strictly analogous in both instances.

Some time ago, when about to remove a tumour from the pelvis by abdominal section, I asked the patient's own doctor if he would wash his hands and steep them in antiseptic solution in case his assistance were required. He expressed the greatest surprise, saying that he thought

that all such measures had been everywhere abandoned, and that it had been shown that they were quite superfluous. I mention this as an example of the erroneous impressions which now and again prevail on the subject of asepsis and the use of antiseptics.

In order to prevent such misunderstanding, let me briefly mention what are usually considered the essential conditions for insuring asepsis in any such operation.

(1) In the first place, before the incision is made, the skin of the abdomen is well washed with soap and water, and subsequently disinfected. This is done in order to free the field of the operation from possible septic material, lest in any way the surface of the body may have been contaminated.

(2) From the beginning of the operation until the wound is closed, the greatest care is exercised that the hands, instruments, sponges, ligatures, and, in fact, everything brought into contact with the wound or passed through the wound into the abdominal cavity, should be previously rendered aseptic. This is done in order to free what might otherwise serve as vehicles of infection from possible septic contamination.

(3) And finally that the dressings, or at any rate such of them as are in contact with the wound, should be aseptic, and so maintained until the wound has healed. This is done with a view to protect the wound from the possibility of septic contamination after the operation has been completed.

In addition to these there are many subsidiary points, some of a general, others of a local significance, which are of great importance in themselves, and on that account alone demand careful attention; but which, if aseptic conditions be not otherwise secured, may also be of importance in controlling and combating the development of sepsis. Such are—maintaining the general health of the patient; securing to her healthy surroundings, rest both mental and physical, fresh air, and nutritious food; guarding against infection from zymotic and other febrile dis-

eases ; regulating the eliminatory organs, particularly the bowels and kidneys : and, locally, expediting the operation ; controlling hæmorrhage ; avoiding unnecessary examination and manipulation ; limiting the injury done to the tissues to the smallest possible amount ; removing as far as possible all blood-clot and tissue deprived of vitality, and accurately adapting the edges of the incision wound. By attention to these points distinct advantage will be secured.

The counterpart of these matters in obstetric practice is equally important. And, lest it be thought that by dismissing them with casual mention they are to be considered as trivial or of no importance, I feel bound, at any rate, to enumerate them.

The subsidiary points, which are of a general character, are the same, and their importance will doubtless commend itself to all, whether applied to a capital surgical operation or to a labour case, for anything which tends to lower the general vitality of the patient places her in a less favorable position to withstand the onslaught of septic mischief. The innate power of resistance in healthy tissues is a factor of such importance that we cannot afford to disregard it, lest we expose the patient to additional risk by diminishing it. It is an undoubted fact that, whether leucocytes be the active agents in the process or not, the tissues of the body generally offer an active resistance to septic poisons, and up to a certain point are, without extraneous aid, capable of annihilating and destroying them. It is only after this point is passed that the ill effect of the poison can assert itself. Any cause, therefore, which tends to lower the general health will obviously diminish this resisting power, and place the patient at a disadvantage.

All such measures, whether local or general, as are capable of expediting the process of labour and of preventing unnecessary expenditure of energy on the part of the patient under various conditions—normal and abnormal —and of preventing undue loss of blood, also tend in the same direction. These matters I shall have occasion to

discuss with you in detail later in the session. For the present I will rest content with pointing out that all unnecessary examinations and manipulations should be carefully avoided, because each in itself provides a possible means of conveying infection and of inflicting mechanical injury on the tissues locally. When examinations are made or operations in cases of necessity undertaken, care should be exercised to limit the injury done to the smallest possible amount, so as neither to deprive the tissues of their vitality, nor to diminish the power, which they naturally possess, of destroying septic material which may perchance reach them, nor finally to provide additional sites for absorption.

The retention of blood-clot and of portions of the placenta and membranes should also as far as possible be guarded against, not only as entailing the risk of hæmorrhage, but because in the first place, being deprived of vitality, retained products are capable of providing a suitable nidus for the development of septic organisms, and often form, as it were, a ladder for their passage from the vagina to the uterus; and, in the second, because by their presence they retard involution and keep the surfaces in a state capable of absorption.

Finally, by accurately adjusting the edges of wounds about the vulva and perinæum, and immediately closing such lacerations by suture, the area for absorption is diminished in the situation where of all others asepticism is liable to fail.

But these, as I have already remarked, are subsidiary points, and though of such importance as to demand mention, do not immediately concern the special subject of this lecture.

Essential Conditions to be fulfilled.

We have now to consider the conditions which may be regarded as essential in order to insure asepsis in a labour case.

(1) In the first place, before delivery takes place, and absorbing surfaces are laid bare, the vagina should be flushed out, and as far as possible disinfected, and the external genitals washed and similarly treated. This is done in order to free the field from possible septic material.

(2) From the time of delivery until all lacerations have healed and the lochia have ceased, scrupulous care should be exercised that the hands, instruments, and in fact everything brought into contact with the vulva or passed into the vagina or uterus, and so brought into touch with absorbing surfaces, should be aseptic. This is done to prevent the introduction of septic material from extraneous sources.

(3) And, finally, care should be taken that the pad, or at any rate such part of it as is brought into contact with the vulva, should be aseptic, and so maintained until the wounds shall have healed and the lochia ceased. This is done with a view to prevent the possibility of subsequent septic contamination.

It remains to consider by what special means the objects above enumerated may be best carried out in practice.

To wash and disinfect the skin of the abdomen and to render aseptic the field of the operation in a case of ovariotomy, is a comparatively easy matter. But it is far otherwise with the vagina, which is much less accessible than the flat surface of the abdomen. And, owing to the rugose condition of the vaginal mucosa and the presence of tenacious mucus, it has proved an exceedingly difficult matter to render the canal aseptic, even when by the aid of a speculum the folds have been opened out, the mucus mopped away with cotton wool, and an antiseptic solution brought directly into contact with the mucous membrane. Anyone who has treated gonorrhœa in this way will appreciate the difficulty. Such being the case, it is even more difficult to effect the same purpose by merely syringing the vagina with germicide solutions.

But by first washing away the mucus by a full stream

of warm water, and then irrigating the vagina with two quarts or more of solution endowed with strongly antiseptic properties, a great deal may be done to rid the canal of septic material, and to remove at least so much as lies free within it. If no more than that be effected, considerable gain will have been achieved, for what the douche fails to remove or to destroy is not likely to be carried higher up into the canal during the examinations and manipulations incidental to all ordinary labour. And, immediately after delivery is completed, the very best opportunity is afforded of ridding the vagina from any septic material which may remain. During the course of labour the flushing-out process has in some measure been continued naturally by the flow of liquor amnii, and also in the separation of the placenta by the flow of blood, while during the second stage the folds of the vagina have been more efficiently opened out by the passage of the fœtus than could be done by any artificial method. At the completion of delivery the douche is usually called into requisition for other purposes—by flushing out the passage, to aid the removal of detached portions of tissue and of blood-clot, or given at a temperature of 110°—115° F., by stimulating the uterine muscle to action, to prevent the formation and assist in the expulsion of retained products. As, at this stage, it is possible to effect this additional object with but little additional trouble, it is better to combine an antiseptic with the douche. But in employing the douche, especially during puerpery, care should be exercised to wash first the parts about the vulva and the external genitals ; then to douche the vagina, and only after this has been done should the tube be carried (and then only when there is some special reason for it) into the uterus itself. By following out this method of procedure the risk of carrying septic matter from the vulva or vagina into the uterine cavity is reduced to a minimum. Keeping the patient meanwhile in a supine or semi-supine position, the uterus, with one hand placed like a cap over the fundus, may be supervised, and, by now and again

compressing and depressing the womb by pressure through the abdominal wall, any fluid which (even when the uterine tube is not used) may have found its way into the uterus will be expelled, and clot or retained membrane will be washed out with the gush of water as it escapes from the vagina.

For the purpose of washing and disinfecting the vagina some form of apparatus is requisite, because the canal is not accessible to the more ordinary cleansing and disinfecting process applicable to the surface of the body. But whatever form of apparatus be used I must impress upon you that there is nothing special in it. As a means towards an end some apparatus is necessitated by the special requirements of the case; but it must not be forgotten that, whether applied to the surface of the body or to the vagina, the water and the disinfectant are the important factors.

There is an obvious mechanical advantage, however, in having at command the forcible stream of the continuous douche. This may be obtained not only by means of the usual hydrostatic apparatus, which is barely portable, but by requisitioning an ordinary ewer and a length of elastic tubing an apparatus may be improvised which is capable of meeting all the requirements. The tubing can be converted into a syphon by filling the tubing with or without the aid of a small glass funnel, which, if attached, has the additional advantage of serving to keep the tube in place; or by affixing the tubing to an ordinary elastic enema syringe, and working the apparatus till the stream begins to flow, a continuous syphon douche may be produced. According to the height of the reservoir above the patient the force of the current can be varied at will.

Be careful first to fill the apparatus, that the air may be expelled, and to let a sufficient quantity of the solution run through it to warm the tube before inserting the nozzle.

Owing to the readiness with which it may be cleansed and kept clean, a nozzle made of glass or celluloid is

advisable, and for intra-uterine irrigation a double-channelled tube is preferable.

You thus see how simple and portable the apparatus may be without detracting from its practical value. Moreover, the difficulties of a receiver for the solution as it pours away, in the absence of a bed-bath, may be conveniently overcome by pinning together the two corners of the macintosh hanging over the side of the bed, so as to form an improvised funnel, which carries the solution into a receptacle placed on the floor beneath.

For the purpose of washing and disinfecting the external genitals pledgets of absorbent cotton are to be recommended in place of sponges. Sponges, through constant saturation with blood and discharges, are with difficulty cleansed. At any rate, they are not to be trusted. The pledgets of cotton are inexpensive, and can be burnt after use.

By observing the above-mentioned precautions during the course of labour, a reasonable hope may be entertained that, when the labour is over, the canal will have been freed from any septic material which it might have contained, and that, unless reinfected by septic material introduced from without, an aseptic condition will be preserved. Under such circumstances, therefore, the use of the douche during puerpery will only be requisite in quite exceptional cases.

It has been urged that if at the beginning of labour the canal is to be regarded as already impregnated with septic matter, it is useless disinfecting hands, instruments, &c. But at best this is but a poor argument, for even if one source of infection were invariably present (which is doubtful) in the vagina itself, nevertheless no inconsiderable gain would be effected by adopting means to eliminate the hundred and one others of extraneous origin which might be conveyed unless preventive measures be taken. Still less does this argument hold good when means such as I have above described are adopted to disinfect the canal.

And it must be remembered that in any examination or manipulation the finger or instrument, and with it any septic matter adhering, is almost invariably carried to the upper part of the canal, where septic matter is naturally scarce or entirely wanting. I would say, then, that every reason exists under any circumstances for disinfecting the hands, instruments, &c., employed with as much care as in an ovariotomy operation, whether means be taken before the operation is commenced to disinfect the abdominal parietes or not.

The measures employed to disinfect the hands, instruments, &c., should be identical in the two cases.

At the outset the hands should be well washed with soap and water (special attention being paid to the nails), and having been rinsed, should be immersed for at least a minute in strong antiseptic solution. They should be again steeped in the antiseptic solution *immediately* before any vaginal examination is made or manipulation undertaken. I say *immediately* advisedly. There are obvious risks, if the disinfection be performed some time previously, that infection may be picked up in the interval. I need scarcely add that after the examination the hands should be washed to remove the discharges. I may here point out that as either a little soap or a little blood will suffice to throw down mercury from sublimate solution, the necessity for this procedure is rendered obvious.

As regards instruments, it is almost superfluous also to say that they should never be put away in a dirty state, but should invariably be cleansed immediately after use. Instruments of bright metal, *e. g.* the forceps (which are liable to be acted upon injuriously by strong antiseptic solutions), should be kept bright by rubbing, and should be disinfected immediately before use by steeping in boiling water. Others, such as gum-elastic catheters, celluloid and india-rubber tubes and syringes, which would be injured by the high temperature, after having been washed and rinsed in water, should be soaked in strong antiseptic solution. Ligatures should be treated

by steeping in boiling water immediately before use, and sponges should be steeped in the same way.

These measures as applied to the hands, instruments, &c., demand no special apparatus, but are, nevertheless, of the most vital importance to asepticism.

The pad occupies the same relation to the labour case as the dressings to ovariotomy, and, like the pledget of cotton in the test-tube to which I previously alluded, is intended to obviate the entry of micro-organisms from without. Now, in order to prevent the access of microbes which are ever present, and are wafted about in the atmosphere, to the nutrient medium within the tube, the crudest form of cotton is found to be sufficient,—that is, provided the cotton be required to act solely as an efficient filter to the air as it passes in. But if the cotton become saturated it may be otherwise. In that case it is necessary to renew the pledgets before the microbes reach the portion saturated; otherwise, being deprived of filtering power, the plug becomes no longer capable of preventing the microbes from spreading to the rest of the tube contents. Under such circumstances, advantage would accrue from combining with the plug an antiseptic agent to destroy the microbes. But the same end would be gained by constantly renewing the plug before it became saturated.

Owing to the discharges incidental to a labour case, the pad must inevitably soon become soaked through unless renewed, and, owing to the close proximity of anus and urethra, the dressing is apt to become soiled and saturated and to require frequent renewal. The same may happen also in an ovariotomy where there is much discharge, and drainage is employed.

Pads of absorbent cotton, or of wood-wool enclosed in gauze or lint, should be used in place of diapers, and burnt immediately after use, the cost being no greater than the washing of the diapers. I bring to your notice the kind of pad in use at the General Lying-in Hospital. These pads are of the simplest possible construction, consisting merely of a handful of wood-wool wrapped in a square of

gauze twisted together at the ends in order to retain it in place. The material may be impregnated with some antiseptic, though this adds considerably to the expense, and if they be changed frequently is not requisite. Certainly the clean dry pad is an additional source of comfort to the patient. It is scarcely necessary to add that in changing the pad, as in renewing the dressings after ovariotomy, any excess of discharge should be removed before the clean dressing is applied.

The special means by which an aseptic condition of the parturient canal may be attained and maintained have been considered, but I have purposely reserved for separate mention the precise form of antiseptic agent which should be employed, the strength of the solutions, and the most convenient method of preparing them. This will form the subject of the next lecture.

LECTURE II.

Gentlemen,—In the previous lecture I merely made mention of antiseptic solutions in a general way. In the present it remains to consider the choice of a suitable antiseptic, and the preparation of solutions for use.

The Chemical Incompatibility of Antiseptic Agents.

In deciding on the antiseptic for use in any individual case, whether it be a surgical or an obstetric case, it is advisable that as far as possible the same antiseptic agent should be used for all purposes. For if more than one be employed there is always a danger, unless special care be exercised in their selection, that they will interact chemically, and that one will thereby counteract the antiseptic power of the other. All these antiseptic agents, as I some years ago pointed out, are chemical bodies possessing definite chemical properties, which the mere fact

of being antiseptic does not prevent them from exercising. The possibility of reducing the strength of the solution, or of altering its nature, through the chemical incompatibility of the materials employed as antiseptics, has an important practical bearing. For if the solution be too attenuated the object in view will fail in its accomplishment, and if too concentrated considerable damage will in many cases be wrought, not only locally on the tissues to which the application is made, but possibly also on the body generally, as the result of absorption. The borderland between safety and success is, in many instances, a very narrow one. The necessity of maintaining a standard strength of the solution is, therefore, important.

I must refer to my original communication* for particulars; it is sufficient for the present purpose to state that, taking Corrosive Sublimate, Carbolic Acid, Iodine, Salicylic Acid, and Condy's Fluid as examples, I showed that many instances occurred in which, when brought into contact with one another, or with certain lubricants, chemical action took place; and I here reproduce the annexed table for purposes of reference.

	1. Sublimate.	2. Carbolic.	3. Iodine.	4. Salicylic.	5. Condy.	6. Olive Oil.	7. Vaseline.	8. Glycerine.	9. Soap.
1. Corrosive Sublimate Solution (Bichloride of Mercury) .	—	—	×	—	—	—	—	—	×
2. Carbolic Solution (Phenol) .	—	—	×	—	×	×	—	—	—
3. Iodine Solution (Iodine and Iodide of Potassium) .	×	×	—	—	—	—	—	—	×
4. Salicylic Solution (Salicylic Acid)	—	—	—	—	×	—	—	—	×
5. Condy's Fluid (Permanganate of Potassium) . .	—	×	—	×	—	×	—	×	×

NOTE.—Wherever a × occurs, interaction takes place between the two substances in the corresponding horizontal and vertical columns.

* "The Chemical Incompatibility of Antiseptic Agents," 'Brit. Med. Journ.,' vol. i, 1888, p. 898; and 'Lancet,' vol. ii, 1888, p. 993.

The crosses in the table, which occur at certain intersecting points of the horizontal and vertical columns, indicate that interaction takes place between the agents which stand at the head of these columns, as follows :— Corrosive Sublimate and Iodine, Corrosive Sublimate and Soap, Carbolic Acid and Iodine, Carbolic Acid and Condy's Fluid, Carbolic Acid and Olive Oil, Iodine and Soap, Salicylic Acid and Condy's Fluid, Salicylic Acid and Soap, Condy's Fluid and Olive Oil, Condy's Fluid and Glycerine, and Condy's Fluid and Soap. I give the above merely as examples ; I must ask you to draw on your chemical knowledge for other instances in dealing with other antiseptics.

In condemning these admixtures as chemically incompatible, I am prepared to admit that in some instances the newly formed compounds may possibly be powerful antiseptics, though this remains to be proved ; and I submit that any observations made with a view to determine this point are practically valueless unless either these newly formed compounds be isolated and used in pure solution, or the admixture be made in such proportion that at least no appreciable excess of either one or other of the original antiseptic constituents be suffered to remain in the solutions employed. Take, for instance, this, which is commonly known as Iodised Phenol, as an example. It is an admixture of Tincture of Iodine and Carbolic Acid. In the presence of water the free Iodine disappears, as is seen at once by the decolorisation of the solution. But that it is still capable of acting as an antiseptic, after water has been added, I do not deny, for it contains much more Carbolic Acid than is necessary to destroy all the free Iodine present. But that it possesses antiseptic powers superior to the unaltered Carbolic Acid remaining in solution is extremely doubtful.

One of the least commonly recognised but constantly occurring examples of the use of an antiseptic agent in combination with another body, whereby it is rendered inert, was to be found, at any rate until quite recently, in

the employment of carbolised oil for various antiseptic purposes. In fact, at one time, as a lubricant supposed to possess antiseptic properties, the employment of carbolised oil was almost general. And yet it has all along been recognised that in cases of carbolic poisoning, olive oil proves one of the best antidotes. Moreover, many years ago, Koch of Berlin showed that anthrax spores are capable of living and developing after having been immersed in carbolised oil (1 in 20) for four months. And yet the fallacy survived, and even in the minds of some still survives, that carbolised oil is a reliable antiseptic product. But that this product contains no free Phenol, unless the strength be raised above 1 in 8, is easy of demonstration. The application at the onset of a little chemical knowledge would have settled the point at once, without requiring years of clinical experience to draw attention to the fallacy by slow degrees.

The Comparative Value and Special Use of Various Antiseptic Agents.

Perchloride of Mercury.—Out of the whole list of antiseptic agents there is none which has proved as efficacious as Perchloride of Mercury or Corrosive Sublimate. Though it possesses certain drawbacks, they are, on the whole, more than counterbalanced by its advantages.

For disinfecting the hands and certain instruments 1 in 1000 solution should be employed; and for the douche given before and immediately after labour, 1 in 2000.

It may be conveniently prepared (1) from concentrated solution 1 in 50, which corresponds in strength for antiseptic purposes to pure Phenol, and requires dilution to the same extent.

℞	Hydrarg. Perchlor. . . .		ʒj
	Acid. Hydrochlor. Dil. . .		ʒss
	Inf. Rosæ Dulc.,		
	Glycerine, āā q.s.		
	Aquæ	ad	ʒvj

The Concentrated Corrosive Sublimate Solution. Poison. One ounce of this solution added to one pint of water makes 1 in 1000 solution.

Or (2) from powder, which has the advantage of portability.

℞	Hydrarg. Perchlor. Pulv. . .	gr. x
	Acid. Tart. Pulv. . . .	gr. xl
	Pulv. Cocci	gr. j

To make 1 powder. The Corrosive Sublimate Powders. Poison. One of these powders dissolved in one pint of water makes 1 in 1000 solution.

In either case acid is added in order to prevent precipitation of the Mercury in the form of a white deposit, and consequent deterioration of the solution on standing awhile by the slight alkalinity of water, such as that of London. The colouring matter is added in order that the solution, being devoid of smell, may be recognised by the pinkish tint artificially imparted to it, and, if made to a standard colour, the strength of the solution may always be checked by the same means. The addition of a small quantity of glycerine is necessary to dissolve the sublimate in the concentrated solution.

Most of the tabloid preparations which have been introduced contain no free acid, and on standing, the solutions become milky for the reason above assigned. I cannot, therefore, recommend them. But in the so-called "soloids" of corrosive sublimate, manufactured by Burroughs, Wellcome, and Co., this objection has been overcome by the addition of pure Chloride of Sodium. One "soloid" dissolved in one pint of water makes a solution strength 1 in 1000. A considerable supply of Sublimate in this form can be conveniently and safely carried even in the pocket.

Prepared in accordance with the prescriptions which I have given, solutions of Sublimate will maintain their strength provided care be exercised to prevent contamination with soap—which throws down the mercury as an insoluble mercurial soap—or with bright steel or copper, which deposit it in the metallic state. Very little contami-

nation of either kind, in virtue of the attenuated strength of the solution, is sufficient to deprive it completely of antiseptic power. Blood and serous discharges also precipitate sublimate from solution. Hence the necessity of cleansing the hands and instruments before immersing them in Sublimate solutions.

From an extensive personal experience I am of opinion that Sublimate solution is far less irritating to the hands than Carbolic solution of corresponding strength, and less irritating to the tissues locally where used as a wash. It exerts a slight astringent action on the parts, which in the early stage of labour would be disadvantageous were it permanent. But the astringent effect so soon passes off that the astringency can scarcely be considered as offering an appreciable drawback to its use.

The sole remaining drawback to the use of Sublimate as an injection, and the most serious, is the possible risk of mercurialism, even when employed only during and immediately after labour. But this risk may be reduced to a minimum by following out the directions given above for administering the douche, so as to prevent retention of the solution ; by insuring, as far as possible, the removal of blood-clot ; by duly obtaining and maintaining retraction of the uterus, and by immediately closing lacerations about the vulva by sutures, so as to diminish the area for absorption. The special object of effecting the removal of blood is to prevent the albumen from first precipitating the mercury and "fixing" it, as it were, in considerable quantity, as so-called Albuminate of Mercury. This precipitate, after being gradually redissolved by the excess of albumen, is again rendered liable to be absorbed into the system in the form of soluble albuminate.*

Even under these favorable conditions some slight absorption may yet take place ; but, by promoting a free watery flow from the kidneys, and above all by obtaining daily evacuation of the bowels by giving salines in small

* Vide "The Use of Acidified Corrosive Sublimate as an Antiseptic," 'Brit. Med. Journ.,' vol. i, 1888, p. 295.

doses two or three times a day, so as to increase the power of elimination of both these organs, little risk of injurious effects need be feared, even when the douche is given repeatedly.

Though I must refer to my original communication* on this subject for further particulars, it is well that I should briefly enumerate the symptoms to which the undue absorption and defective elimination of mercury under such circumstances usually gives rise. They are not so generally recognised as they should be. These symptoms are diarrhœa, with tenesmus and occasionally blood, as well as mucus in the stools, accompanied by abdominal pain. In severe cases the colon, and to a less extent the small bowel, particularly in the region of the cæcum, become ulcerated. Let me warn you, if these abdominal symptoms should occur, not to persist in the mercurial douche, and not to check the diarrhœa abruptly by administering Opium. There is often slight albuminuria, soreness of the gums, loosening of the teeth, occasionally vomiting, salivation, a red line at the margin of the gums, and a metallic taste in the mouth; but these are exceptional in comparison with the abdominal symptoms.

You may judge from what I said in the previous lecture that, despite its drawbacks, I have special reason for advocating the use of Sublimate in preference to any other known antiseptic. From the data which I have given, it may be estimated that the net gain effected since the substitution of Sublimate for Carbolic Acid and Condy's Fluid in the General Lying-in Hospital has resulted in the saving of at least thirty maternal lives from puerperal fever, in addition to 700 cases of non-fatal septic illness often leading to permanent disease. Though I am unwilling to ascribe all the benefits to the use of Sublimate, there is ample evidence to show that it has proved an important factor in the elimination of septic influences. This gain, I admit, has been effected at the cost of one

* "The Conditions which favour Mercurialism in Lying-in Women, with Suggestions for its Prevention," 'Trans. Obst. Soc.,' vol. xxx, 1888, p. 304.

fatality, which must in the main be attributed to mercurialism. But, considering that the beneficial results have been achieved at so slight a cost, and that, as the result of experience, we now know better than we did how to recognise the symptoms and to obviate the dangers of mercurialism, I have no hesitation in recommending Sublimate as a douche, provided you pay attention to the points which I have already indicated. The use of Sublimate for douching after labour can only be considered safe in the hands of a doctor who is not only aware of its dangers, but who has also learnt how to recognise these dangers and the means of preventing them under different conditions. Even as a vaginal wash Sublimate should never be used by a nurse except under the direct supervision of a doctor; and in no case, when for some special reason it is considered necessary to carry the tube into the cavity of the uterus, should it be employed save by the doctor himself. No objection from danger of mercurialism can be urged against the use of Sublimate as a douche before delivery. And for external purposes, such as disinfecting the hands, the use of Sublimate entails absolutely no risk of mercurialism. At the same time I look forward to the day when some equally efficient but more satisfactory antiseptic will be found to take its place.

Sulphate of Copper.—In place of Corrosive Sublimate for the douche, Sulphate of Copper has been advocated, more particularly in France, in 1 per cent. solution. It is prescribed by law for the use of midwives, who in France are under State control. I have no personal experience of it in midwifery. The advantages claimed for it are—that it can be recognised by the natural colour of the solution; it is cheap; it is readily obtainable; it is non-poisonous, even if absorbed; and it causes but little local irritation. I doubt whether, save on the single score of colour, it surpasses Perchloride of Mercury in any particular. Certainly on the score of antiseptic power it is inferior to it. I cannot, therefore, recommend its adoption.

Carbolic Acid.—Carbolic Acid is powerfully antiseptic, but somewhat less so than Perchloride of Mercury.

For disinfecting the hands and instruments 1 in 20 solutions should be employed, and for the douche given immediately before and after labour 1 in 40.

It should be prepared from pure Phenol (which, by the way, is not an acid) by the addition of water. It is a poison, but may be recognised by its powerful smell, which to many ladies is objectionable, and on that account Carbolic Acid does not invariably commend itself. It is not incompatible with soap, nor destroyed by metallic instruments.

But let me warn you that merely washing the hands in water with Carbolic Soap is by no means a satisfactory means of disinfection. A little reflection will show that the amount of antiseptic thus engaged must be infinitesimal. At least a quart of strong Carbolic solution is considered requisite for disinfecting the hands. This quantity of solution contains one, if not two ounces of pure Phenol. How many ounces of pure Phenol, think you, are contained in a whole cake of Carbolic Soap? and what portion of a cake of soap, think you, would be used in washing the hands?

In corresponding strength, solutions of Carbolic Acid are more irritating than Sublimate, and are about equally astringent.

Like Sublimate, Phenol is liable to absorption, and to produce injurious effects, usually ushered in by carboluria —indicated by a peculiar smoky tint of the urine, which deepens on standing.

Other Antiseptics.—Iodine solution (two teaspoonfuls of Tincture of Iodine, or one teaspoonful of the Liquor Iodi, to one quart of water, also liable to absorption and to produce a train of injurious symptoms—iodism); Sanitas (one part to three of water); Condy's Fluid (one teaspoonful to one pint of water, the colour of weak claret), and Boric Acid in saturated solution, are all inferior from an antiseptic standpoint, and cannot be so readily de-

pended upon to effect the objects which have been detailed above.

Many other bodies are vaunted as powerful antiseptics, and new ones are being constantly brought forth and "puffed," which are, however, incapable of standing the test of experience. Still less can these be recommended. Let me warn you against them.

Summary.

I would advise, therefore, that Sublimate should be invariably used for disinfecting the hands and instruments, except those of bright metal, and bearing in mind the precautions which I have enumerated, that it should also be used for the purpose of douching; and that when, as may sometimes happen, it becomes necessary to provide a substitute for this purpose, Carbolic Acid should be employed in preference to anything else.

The surface of bright metallic instruments should always be thoroughly cleansed mechanically. After this has been done they should be disinfected by steeping in boiling water, or in 1 in 20 Carbolic solution. From this solution each instrument should be taken as required for use; to a similar solution, each instrument, after having been deprived of blood and other discharges by rinsing in water, should be returned after use, and then thoroughly dried.

Let me caution you against the fallacy of first disinfecting your instruments and then placing them where they are liable to become contaminated before they are used. By placing them, for instance, on a chair, the floor, or the bedclothes, and, in fact, by bringing them into contact with anything which has not been rendered aseptic, the advantage of the previous disinfection may be entirely annulled.

Similarly, beware of reinfecting your hands after having disinfected them. For example, do not wipe

them on a dirty towel or soiled napkin, thrust them into your pockets, use your handkerchief, or handle the bedclothes, furniture, or utensils. But if you are compelled to do any of these things, disinfect again before proceeding. Imagine for the nonce that everything not specially disinfected is coated with lamp-black, and act accordingly.

I have purposely omitted, hitherto, any special mention of the lubricant, because, my object being to lay stress on what is essential, I have endeavoured to avoid giving undue prominence to what, at the best, can exert but slight antiseptic power. To my mind it is a matter of little importance whether the lubricant be antiseptic as well as aseptic, provided whatever it be used to lubricate be previously rendered aseptic. It is only when other means fail that any appreciable advantage can accrue from combining an antiseptic with the lubricant. Considering the small amount of lubricant which is actually used, its antiseptic effect at best can be but trifling. It is essential, however, that the lubricant should be at least aseptic. I would caution you, therefore, not only against the lard, goose grease, and cold cream frequently provided, but also against Oil, Vaseline, and Glycerine, which has been left uncovered, or into which the finger, without previous disinfection, may have been dipped. As an additional precaution, it is therefore an advantage to use a lubricant to which an antiseptic has been added. Mercurialised Glycerine or Vaseline, 1 in 1000, or Carbolised Glycerine or Vaseline, 1 in 20, may be recommended; but Carbolic Oil, in the strength usually recommended, contains no free Phenol, nor will the oil part with it under ordinary circumstances. It may not even be aseptic. In recommending the addition of an antiseptic to the lubricant I feel compelled to lay stress on the fact that only in the light of an additional precaution is this antiseptic lubricant to be regarded, lest it be considered sufficient in itself to insure asepsis, and to take the place of other more efficient measures, and, like Carbolic Soap

et hoc genus omne, reduce antiseptics to a farce and bring discredit on the name.

To sum up, then, I would recommend as necessary—

(1) In every case,—that a solution of Sublimate, 1 in 1000, should be prepared and set apart for disinfecting the hands, &c., during the course of labour; and afterwards, whenever a vaginal examination is made, or operation undertaken; and that, in every case, the vagina should be douched once during the first stage of labour, and again once after the labour is completed, with Sublimate solution, 1 in 2000.

(2) Under certain special conditions arising during the course of labour,—that, if the labour be unduly prolonged, a second douche should be given; and a similar douche should be always given immediately before any operation is undertaken.

(3) Under certain special conditions arising during the lying-in period,—that, if the douche be required for other purposes than for its antiseptic effect, it is always well as an additional precaution to combine some antiseptic, albeit a weak one, *e. g.* Sanitas, Boric solution, or Iodine, with it, even if no fear of septic infection is apparent; and that when given ostensibly to destroy septic material in the passages, a strong antiseptic solution should be used. It seems preferable that the disinfection should be thoroughly effected once for all rather than run the risk of having to repeat the process. And, finally, that whenever the douche is employed for this purpose, particular precautions as to the mode of procedure should be observed upon the lines which I have already laid down.

To recapitulate. I have endeavoured to indicate by reference to the persistent mortality from puerperal fever the importance of the subject to which I invite your attention. I have, further, brought within your cognizance the fact that the mortality from puerperal fever comprises but a part of the total risk to which lying-in women are exposed on the score of septic infection alone. There are more than sufficient dangers incidental to delivery apart

from this to warrant the special plea "for all women labouring of child." The after-effects of illness, even when the patient escapes death, are a serious item. Let me remind you that those attacked by this disease are not the old and decrepit, but women in the prime of life, often the most healthy. On these grounds this disease is a serious calamity from an economic standpoint, serious especially from the point of view of the patient and her family, and serious also on the doctor's account, leading occasionally to the ruination of his practice. I have further demonstrated that, serious as it undoubtedly is, the experience of lying-in hospitals, of outside maternities, and of the private practice of individuals have alike shown that puerperal septicæmia is a disease essentially of a preventable character. In hospital and out of it I have been witness to the advantage gained by the efficient use of antiseptics in cases under my own direct observation; but I am sorry to say that such results as have everywhere been obtained in lying-in hospitals and maternities by the adoption of antiseptic measures in the elimination of septic processes are not, as yet, apparent in obstetric practice generally throughout the country. The natural inference is that no approach towards the general adoption of antiseptic measures has yet been made. That this state of things exists is, on consideration, not a matter for surprise; for but a small proportion of obstetric practice is at present in the hands of those who have been educated in the use of antiseptics in a really efficient manner. Lest I be misunderstood upon this point, let me say at once that I do not consider that the grave mortality which persists ought to be laid entirely to the door of the medical profession, considering that, as far as can be judged, half, or even more than half, the total midwifery practice is in the hands of a class of self-styled midwives, who have but the crudest notions of ordinary cleanliness, let alone aseptic midwifery; and even when a doctor is in attendance a vast amount of mischief may be, and often is wrought by an ignorant and incompetent nurse.

In the foregoing remarks I have striven to indicate the method of insuring asepsis in every-day practice. The safe conduct of a labour case in the hands of a medical attendant is largely a matter of training and experience in antiseptic measures. Feeling confident, as I do, that in the light of recent experience lying-in wards can, with safety to the patients, be established, if not actually in, at any rate in conjunction with general hospitals, I, for one, shall hail with gladness the day when, owing to the additional facilities for bringing these matters more forcibly to your notice at the bedside than is under existing conditions practicable, the Middlesex Hospital reverts to the original intention of its founders, and reopens a special ward for the reception of labour cases.

Let me add that, in these introductory lectures, I have dealt solely with the value of antiseptics from the standpoint of the mother. The infant to which she gives birth may, however, lay no small claim to participation in these benefits,—if for no other reason, at any rate on the score of freedom from ophthalmia—a fertile source of blindness in new-born children. Moreover the patient's attendants—doctor and nurse—may also lay claim to some participation in the benefits of antiseptics in midwifery practice. Many cases of illness, not to say deaths, have occurred through accidental inoculation of the examining finger, which the adoption of antiseptic measures, intended primarily to benefit the patient, would have obviated.

In conclusion, let me urge upon you to master the matter at the outset of your obstetric career, and to be thorough in your endeavours to efficiently carry out in practice the principles which I have endeavoured to inculcate. For rest assured that he who with unwashed hands proceeds to dip the tips of his fingers in a would-be antiseptic solution, prepared by adding an infinitesimal amount of some antiseptic to an indefinite quantity of water, and anon proceeds to examine his patient, under the mistaken impression that he is thereby carrying out

aseptic principles, deceives himself, and at the same time exposes his patient to no inconsiderable danger.

I need scarcely add that in midwifery practice you should as far as possible avoid infectious cases, post-mortem examinations, dissections, and the handling of pathological specimens. If in constant attendance upon septic or infectious cases it is obviously advisable to hand over your midwifery cases to a brother practitioner. But you may ask what further should be done if, for instance, you have been in attendance upon a case of puerperal fever or erysipelas, or performing an autopsy.

Do not go direct from any such focus of infection to a labour case or to a lying-in woman. Let an interval elapse, and if possible take exercise in the open air. Change your clothing. at any rate your cloth clothing. Take a bath—a Carbolic bath or Turkish bath if possible —and let the head be shampooed, for it is most essential that all the parts which have been exposed should be disinfected as well as the hands. Above all, disinfect your hands before leaving the infectious case. It is absurd to omit this precaution at the outset—to put on gloves, then to disinfect your hands and to put on them the same pair of gloves again.

If these precautions be taken, the risk of conveying infection may be at once prevented. Mere abstention from practice, as is sometimes advocated, even though extended over some weeks, cannot be relied upon to obviate the risk. Time may possibly serve to diffuse and to dilute, but certainly will not destroy septic material. Antiseptics, provided they be properly used, will at once destroy septic and all other infectious matter. He, therefore, who would shield his patients from danger must not only use antiseptics, but must learn to use them with intelligence and care.

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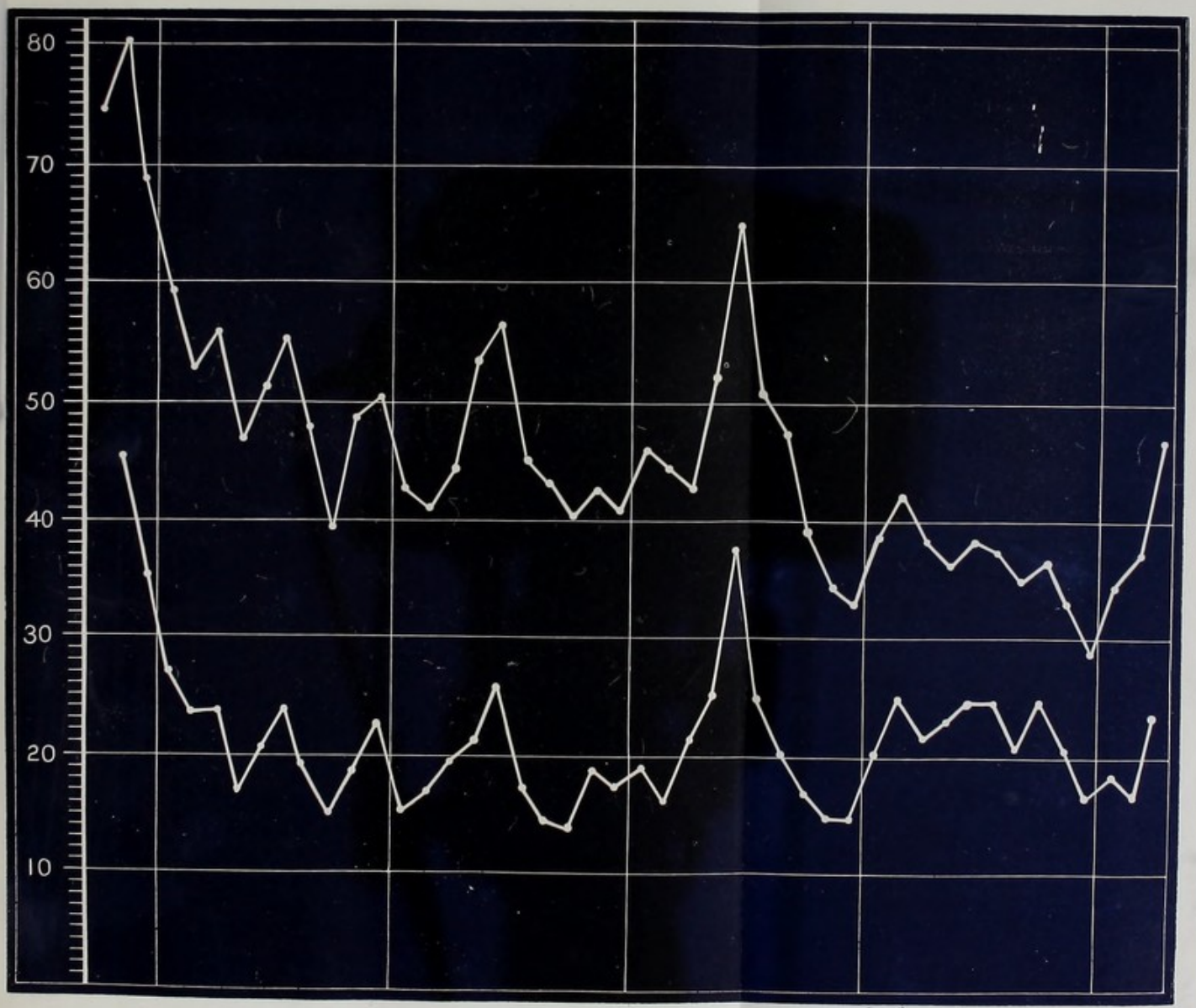
CHART I.—*Death-rate of Childbirth in London.*

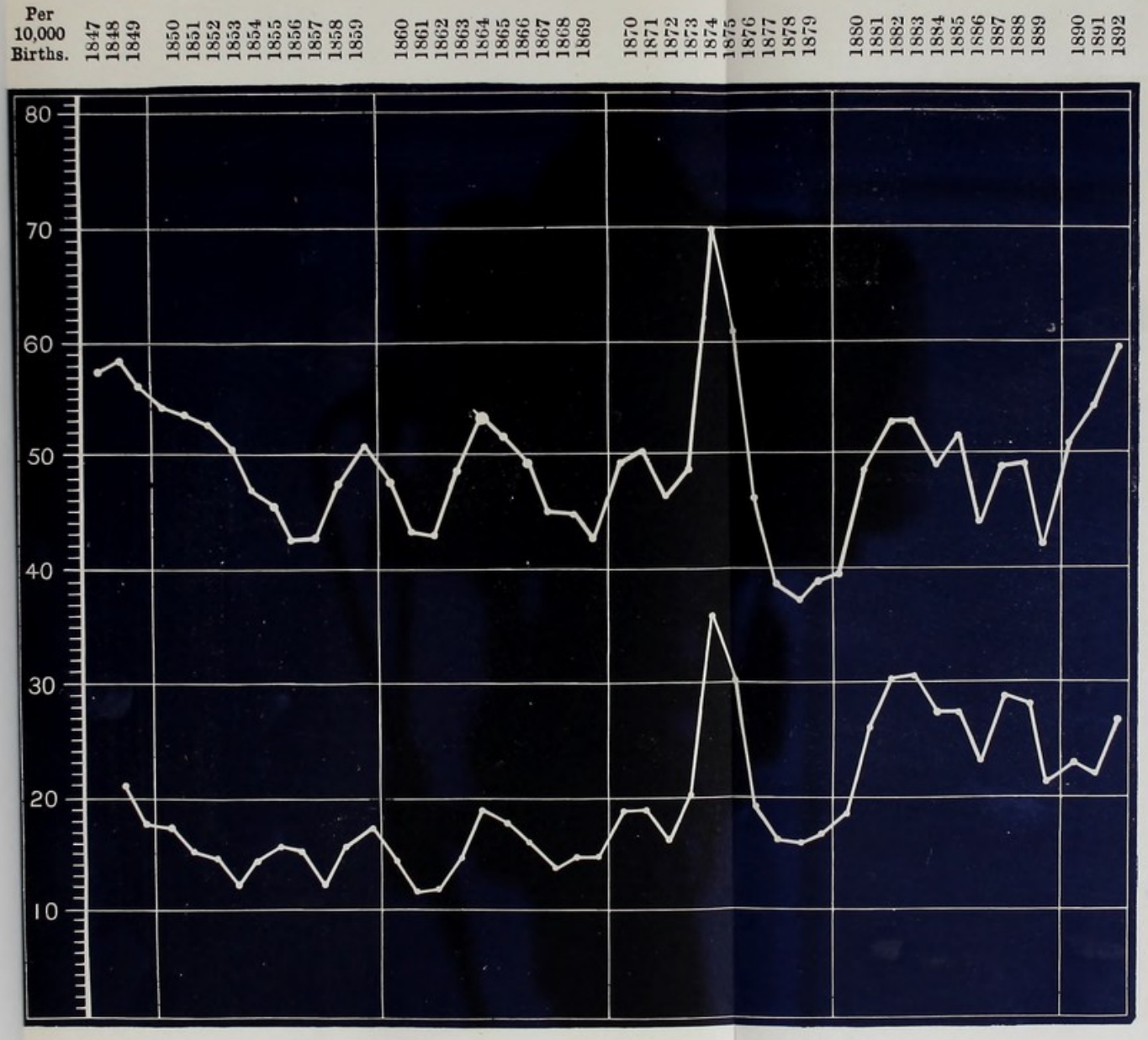


* DEATH-RATE FROM ALL CAUSES.

† DEATH-RATE FROM PUERPERAL FEVER.

EXPLANATION.—The total mortality and the mortality from puerperal fever may be read on the scale in relation to 10,000 confinements. The lower curve represents the mortality from puerperal fever alone. The upper curve represents the mortality from all causes in childbirth, and therefore, in addition to that due to puerperal fever, includes that due to accidents of childbirth also.

CHART II.—*Death-rate of Childbirth in the Provinces.*



* DEATH-RATE FROM ALL CAUSES. † DEATH-RATE FROM PUERPERAL FEVER.

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