them as forming a continuous function. Correction of errors of refraction is essential for macular vision; within wide limits such correction is not necessary for field vision.

The questions which have been raised seem to me to be of great importance, not merely from the ophthalmic, but also from the economic point of view. The whole subject requires a much more extensive investigation than it has yet received, and I am specially glad that the gentlemen who are to follow me are very authoritative in such matters.

It may interest the meeting to know that in the eighties of last century I wrote a note to the vice-chairman of the Glasgow School Board to urge that the eyes of all the children under the care of the board should be carefully tested. He replied that neither he nor his colleagues saw any necessity for any such step being taken. Now for centuries before eye-testing became an accurate process many people did a great deal of fine work, and no doubt in these days there was the usual proportion of emmetropic, hypermetropic, myopic, and astigmatic people.

Refractive errors must be carefully corrected for work requiring visual acuteness, but to a great extent such correction is not necessary for field vision. I had no correction till I was five-and-twenty and had possessed myself of a medical degree. I well remember the intense misery of all efforts of reading and writing, for such efforts always brought on frontal headache, and that severely. Field vision, however, caused me no trouble, even although my errors were considerable—namely, in each eye a hypermetropic astigmatism of 1.5 dioptries against the rule and a hypermetropic spherical element as well.

We owe the tests for visual acuteness now in use to Professor Snellen of Utrecht. His tests are all but universally used in all countries, and thus a standard has been fixed which is both convenient and reliable, although, of course, not absolute. Snellen's types, as we all know, consist of ordinary alphabetical letters varying in size with the distance at which they should be read by the normal healthy eye, each letter subtending for the distance at which it should be read an angle of five minutes.

A considerable number of years ago Landolt substituted his broken ring test for letters. It is perhaps a more severe test than that devised by Snellen, and is one on which those who use it place great reliance. The circles in Landolt's rings are also based on the five-minute calculation, but unfortunately, as originally published by Landolt, there is only one ring for each size. That this is not altogether suitable is obvious. It may happen that the opening in the ring corresponds with a meridian that is approximately emmetropic and thus indicate a better visual acuteness than the eye really has. It is quite possible to have the break in the ring clearly seen although there is a good deal of astigmatism. Within recent years a set of types consisting of broken rings has been prepared for the Egyptian Government. For the most part there are several circles for each size, but the break in the ring as printed is either straight up or straight down, or directly to the right or directly to the left. In the official set of types which I possess the circles show defects if these defects involve the vertical or horizontal meridians of the cornea, but may not do so if the meridians of greatest and of least refraction are oblique and not vertical and horizontal. For these reasons I have prepared a series of rings, one of each size, but each ring is capable of being turned by a screw at the back of the apparatus round its own centre.

In testing, suppose the patient at six metres sees the break in the ring corresponding to 6/18, he is asked to look at it as it is turned and to say if the break disappears or if it is quite distinct all the way round. If its distinctness remains, then the patient should be put through the same test with the ring corresponding to 6/12. If the break is not seen at all with the circle corresponding to 6/18 then the circle corresponding to 6/24 should be used, and so on.

The head of the patient who is being examined should be held in the same position all through, for an oblique position of the head may easily give an oblique refraction, and that to the extent of masking an astigmatism.

As a means of detecting the presence or absence of an astigmatism, the rotating discs seem to me to be of considerable service, and they are also a help in detecting roughly the meridians of maximum and minimum refraction. They may even be of some use, if carefully handled in the measurement of astigmatism, but for that purpose they are not equal to the fan which we also owe to Snellen, and which is, so far as I can form an opinion, simply invaluable in the correction of an astigmatism.

A British Medical Association Lecture

ON

THE MEDICAL TREATMENT OF GASTRIC AND DUODENAL ULCERATION.

DELIVERED TO THE SOUTH-EASTERN OF IRELAND BRANCH
OF THE ASSOCIATION AT KILKENNY*

BY

ROBERT J. ROWLETTE, M.D., F.R.C.P.I.,

KING'S PROFESSOR OF MATERIA MEDICA AND PHARMACY IN THE SCHOOL
OF PHYSIC IN IRELAND; PHYSICIAN TO MERCER'S HOSPITAL,
DUBLIN.

BEFORE considering the medical treatment of gastric and duodenal ulceration as it is practised to-day it may be well to refer, first, to some of the essentials of the physiology of the stomach, and, secondly, to the little that is known of the causation of ulcer.

The mucous membrane of the stomach secretes a juice which contains two substances of importance—pepsin and hydrochloric acid. Pepsin is an enzyme which, acting only in an acid medium, digests proteins. In this respect it is important, but its action is not essential to adequate digestion of food, as digestion of proteins is effected in the intestine by the action of trypsin. The main action of hydrochloric acid is bactericidal, but it also activates the pepsin, and is necessary for the production of secretin. It is present ordinarily in strength of from 0.1 to 0.2 per cent. of the secretion, rarely exceeding the latter figure. In normal circumstances gastric juice is secreted when the appetite for food is roused, during the act of eating, and for a little time afterwards. During fasting, however, secretion is almost at a standstill, and the juice becomes nearly neutral in reaction. During digestion, according to MacLean, as the production of hydrochloric acid diminishes there is more and more secretion of neutral chlorides. It cannot be too strongly impressed on the mind that in no concentration of hydrochloric acid which has ever been observed in the stomach has it any digestive action. This is not to say that it may not have an irritative action on an unprotected surface. In health a small meal is completely out of the stomach in two hours, a large one in five or six.

CAUSATION OF ULCERS.

When we come to consider what is known or thought of the origin of ulcer we find little certainty. It is not my intention to recount the various theories that have been put forward from time to time; but there is no doubt that if a portion of the mucous membrane of the stomach, or of the duodenum close to the stomach, loses its self-protective power against the gastric juice it will be digested. All of us who have made *post-mortem* examinations some hours after death are familiar with the considerable degree of digestion which has taken place. Not only is the mucous membrane digested, but not infrequently the muscle is also attacked, so that the contents of the stomach may be set free into the abdomen. In this case, soon after death the epithelium has lost its self-protective power, while the juice lying in the stomach has still peptic action, adequate to produce digestion of some of the tissues of the stomach. If we assume that, from some unknown cause during life—and the cause is unknown—a limited area of epithelium loses its protective power against pepsin, then ulceration of that area is likely to occur. It is noteworthy

* A few introductory paragraphs sketching the development of the treatment of gastric and duodenal ulceration during the past forty years have been omitted.

that the appearance of a gastric or duodenal ulcer is quite unlike that of an ulcer of the ileum or colon. In the latter situation severe inflammation and necrosis precede ulceration; in the former there is no evidence to suggest that there is any inflammation precedent to ulceration, and one never finds any necrotic material. It is noticeable that ulceration of this digestive type—now generally known as peptic—is never found in an area bathed in alkaline fluid. It only occurs in the stomach, in the duodenum (usually close to the pylorus), and occasionally in the jejunum when a gastro-enterostomy has been done and a part of the mucous membrane of the jejunum is exposed to the acid gastric juice. It is a striking fact that trypsin, an enzyme of much greater proteolytic power than pepsin, does not appear to have any capacity to produce ulceration in the intestine. Acidity is found, therefore, to be essential to the occurrence of peptic ulceration, although hydrochloric acid of itself, in any concentration that may be present, has certainly no digestive power.

There are few words in medicine which have been so over-worked as the term "hyperchlorhydria"; and few hypothetical conditions which have been credited with so much active mischief. We know nothing of the relation of acid to the formation of ulcers. We can hardly say that we know anything of its power of preventing the healing of ulcers. But as a practical fact of observation we know that a persistent acidity of the gastric juice is a frequent accompaniment of ulceration, and that it is a frequent source of pain when ulcers are present. We want to note that it is the persistence of acidity of the juice, rather than excess of acidity, which is the important abnormality.

MODERN TREATMENT.

Professor Faber of Copenhagen, in a recent paper, has put forward the view that acid dyspepsia, gastritis, and gastric ulcer are three closely allied conditions, if not, indeed, different phases of the same condition. Whether this be true or not, the practical fact emerges in treatment that if we succeed in keeping the acidity of the gastric juice at a persistently low level, or are able to keep the juice alkaline, gastric ulcer does not occur, and if it has already occurred healing takes place. The clearest proof of this has recently been given by Professor MacLean and his colleagues at University College, London. They have shown, with the help of x rays, that complete healing of ulcers, some of them of many years' standing, can be brought about by what they call the intensive alkaline treatment. This recovery takes place not only in acute cases, but also in chronic.

Let us now face the actual problem of treating a case of gastric and duodenal ulcer on medical lines. It goes without saying that the details of the treatment will depend largely on the special features of the individual case. If there has been severe haemorrhage one proceeds with great caution and very slowly. Of the treatment of haemorrhage itself I will only say that morphine hypodermically and the administration of normal serum appear to furnish us with our best defence. After haemorrhage one would hesitate for a couple of days to give anything but ice or cold water by the mouth. Thirst may be relieved by saline enemata, and, if necessary—though this is rarely requisite—nutritive enemata may be given. The old custom of treating severe cases by rectal feeding for a week or more has properly been abandoned. And, indeed, most of the substances formerly given in this way were not absorbed at all. It may be said in brief that salt, sugar, and alcohol are the only substances absorbable by the rectum which tend to maintain strength.

DIET IN THE ACUTE STAGE.

Except in cases of haemorrhage feeding by the mouth may begin from the first. Our guiding principle in regard to everything to be given by the mouth is simple—give food which does not stimulate the secretion of gastric juice or the movements of the stomach. The old methods of feeding still hold the field—we rely on milk and eggs. At first I am in the habit of giving milk, or milk and cream and albumin water in alternate feeds at two-hourly intervals. The quantity of either given at a time varies from two to four or five ounces, according to what the patient can comfortably take, and to the stage of the

disease. With fluid food of this simple kind, associated with the drug treatment presently to be described, and, of course, rest in bed, pain usually disappears in a few days.

As soon as the pain has disappeared, beaten-up eggs can be added to the diet—at first one, and soon two or three in the day. Food should still be given in small bulk and at intervals of not more than three hours (Lenhart's treatment in its full rigour means over-feeding, as regards patients in this country at least, who are easily nauseated by a large number of eggs or by raw food). In the second week bread-and-butter and biscuits, such as cracknels (which cannot be swallowed unless well chewed) may be added gradually. Also soft milk foods, such as blancmange and well-boiled tapioca, and, later, rice may be added. Acids, jellies, soups, and meat extracts are better avoided, as they tend to excite gastric secretion. In the third week light steamed fish and boiled chicken come into the diet. In the fourth week mutton and light meats generally can be taken, and thereafter the diet becomes very liberal.

GENERAL TREATMENT.

In cases that have been severe the patient is kept in bed until the end of the fourth week, and return to normal activity is gradual. In duodenal ulcer one can usually proceed more rapidly as regards food than in gastric ulcer. During the whole course of treatment close attention to the condition of the bowels is required. Phenolphthalein is convenient and pleasant in the early stages, and, in the later, olive oil, liquid paraffin, and agar jelly—that is to say, the lubricant aperients are better than the irritating. The mouth wants careful attention. In all cases where a patient is receiving only liquid or soft food careful toilet of the mouth by the nurse is required. A mild stimulant antiseptic mouth-wash should be ordered, and the nurse should cleanse the whole of the mouth with this several times a day. Over and above this, however, the condition of the teeth—or rather of the gums—is all-important. Caries has little effect on these conditions except in so far as it interferes with adequate mastication; but pyorrhoea in any of its stages—and only its more severe stages show pus—probably has a direct action on the production and maintenance of ulceration. Whether this is produced by a direct carriage of septic material to the stomach in swallowing, or in some other way, we cannot say. Dental help must be obtained to have the teeth thoroughly cleaned, and further improvement will be obtained by regular massage of the gums and by the use of an autogenous streptococcal vaccine. When the patient is strong enough to stand the operation it may be necessary to have some of the more seriously affected teeth extracted.

DRUG TREATMENT.

It remains to speak of the drugs that will help in treatment, and in regard to this the same principles apply both in the active stage and subsequently. For generations we have relied on what were vaguely called gastric sedatives—bismuth, soda, hydrocyanic acid, and morphine in the early stages to relieve pain. These have been given on empirical grounds, and there is every reason to believe that they were useful. It is, however, necessary for us to inquire in what way they are effective. Two conditions above all others tend to prevent healing of ulcers—active movements of the stomach and the presence of acid gastric juice. Whether the acidity itself is merely irritating, and likely therefore to cause active movement, or whether it is that the pepsin is kept active by a constant acidity, we do not know, but we do know as a clinical fact that every measure which diminishes movements and acidity helps towards the healing of ulceration.

It will be seen that the whole of the treatment which I have been so far describing is based on these general principles. We have kept the patient in bed, and we have been careful, so far as we were able, to give only such food as would excite neither movement nor secretion. In the matter of drugs we must proceed more actively. It is true that it is not always necessary to give anything intended to allay the movements of the stomach, for we refrain from giving anything exciting, and if we give food only in small quantities, then the gastric movements will be reduced to a minimum. As regards secretion the

matter is different. Remembering that pepsin can only act in an acid medium, and that hydrochloric acid may itself be directly irritating to an ulcer, we must endeavour to inhibit the activities of both these substances at one stroke—by rendering and maintaining the gastric juice alkaline.

Bread soda has been for generations a traditional remedy for all kinds of dyspepsia, including, no doubt, many cases of unrecognized ulceration. Sippy gave it a more definite position in the treatment of ulcerative conditions. But the mistake up till recently has been in giving alkali in such small doses as to be comparatively inefficacious. MacLean states that small doses of alkali may only increase the acidity of the stomach by exciting an acid secretion. He holds that the alkali must be given in such quantities as to maintain a perpetually alkaline reaction in the gastric contents. In this attempt we have a choice of various substances. I have already mentioned bread soda. It has the advantage of being easily soluble and diffusible, but the corresponding disadvantage of being readily absorbable and therefore temporary in its action. More stable, and therefore more persistent in its action, is bismuth carbonate, which, however, has the drawback of being rather constipating. Intermediate between the two, and definitely laxative in action, is heavy magnesium carbonate. Sodium citrate is another convenient and pleasant form of administering alkali. There is no need to enumerate other alkalis. By a combination of two or three of these salts, varied according to the needs of the case, we can generally keep the gastric juice under control. I have been in the habit for some time of giving doses of 20 grains of sodium bicarbonate with 10 grains of heavy magnesium carbonate, and I have rarely found it too laxative. It is a definite advantage that it is laxative, as thereby the necessity of giving other aperients is avoided. MacLean recommends a combination of one part of sodium bicarbonate and two parts each of magnesium carbonate and bismuth oxycarbonate. In any case one may vary the combination of the drugs used according to the results they produce—(1) in the relief of symptoms, and (2) in their effect on the bowels.

Apart from the alkalis there are one or two other drugs which have a definite effect of diminishing the secretion of the stomach and its movements, belladonna being the most important. We can often do without it, but I have met cases in which alkalis did not give the desired relief from symptoms, and in which belladonna has been rapidly effective. It is only rarely that doses greater than 5 minims of the tincture—three or four times a day have to be given, but 10 minims may be given for a brief period if thought necessary. A patient taking belladonna, however, should be kept under frequent observation, and should be warned of the first symptoms of poisoning, and ordered to stop it if they appear.

Oils and fat have a definite inhibitory effect on gastric secretion, but this effect is almost negligible unless they are taken on an empty stomach. A tablespoonful of olive oil, with or without 20 grains of heavy magnesia mixed up in it, taken midway between meals, will keep many people comfortable. In cases where olive oil cannot be taken, cream may be given, as it is almost as useful. The time at which medicine is administered is important; it is governed by the time of occurrence of pain and discomfort in relation to food. Some patients with gastric ulcer suffer from pain which comes on twenty minutes or half an hour after taking food; in such cases the medicine should be given within a few minutes of taking food. In other cases of gastric ulcer, and in nearly all cases of duodenal ulcer, the pain comes on later, often only when the stomach should be empty and when hunger should be reappearing. In these the medicine should be administered one to two hours after food—that is to say, a quarter of an hour or so before the period at which discomfort usually appears. Many people suffer from discomfort at night, and special precautions must be taken to prevent this. A fairly big dose of alkali should be taken as the last thing when going to bed. One or two more powders, with a convenient supply of water, should be within reach of the patient. If he awakens at all in the middle of the night then he should take one of the powders. On waking in the morning it is often necessary to take another.

WHAT TO AVOID.

The negative treatment is as important as the positive. The patient must avoid all substances, whether as food or otherwise, which excite gastric secretion or gastric movement. We are now discussing not only his conduct during convalescence, but his rule of life for some time after the ulcer has been cured. While there is any discomfort at all alcohol must be strictly forbidden. Subsequently, only the lightest wines are to be taken, and in strict moderation. I have known several relapses following on the ingestion of little more than a liqueur glass of whisky taken neat. Spirits of all sorts must be abandoned. Wines with low acidity are less exciting than the more acid wines. Some people can take beer or stout without discomfort, but others cannot, and in any case the quantity taken should be of the smallest. Just as injurious as alcohol is tobacco. It has been for many years a clinical observation that tobacco smoking causes acid dyspepsia, and some writers hold that it is an important factor in the production of duodenal ulcer. Nicotine, although it ordinarily diminishes the appetite, increases not only salivary, but gastric secretion. No doubt this is followed by subsequent inhibition. As Dixon puts it, there is salivation during smoking and a dry mouth the following day; what holds of the saliva holds also of the gastric juice. But nicotine has a further action in that it increases the muscular movements of the stomach and bowel after a brief inhibition. People vary greatly in their reaction to tobacco. Some acquire a strong immunity to it, and show no digestive disturbances as the result of its use. Others are more sensitive and easily suffer from acidity, and from a return of the symptoms associated with ulceration. In such cases we must study the reaction of the patient to tobacco, but in all cases we must warn against immoderate smoking. Since nicotine is the only active principle of any importance in tobacco, it is curious that cigarette smoking appears to be more injurious to the stomach than pipe or cigar smoking. This is often explained as being due to the fact that inhalation is more frequently practised by cigarette smokers. But I have frequently seen severe discomfort induced by cigarettes in those who do not inhale. It is quite likely that the heavy cigarette smoker really absorbs more nicotine in a day than the pipe smoker, and, moreover, he is likely to smoke at more irregular and unsuitable times. Smoking does less harm if done immediately after a meal, and it should be altogether avoided when the stomach is empty.

DIET AFTER THE ACTIVE STAGE.

Finally, we have to consider the diet to be observed for at least a year after symptoms have disappeared. In the first place we must continue our practice of giving food at frequent intervals, and the patient should never be allowed to remain with an empty stomach or to feel hungry. If it is difficult to arrange meals frequently enough he may carry a few biscuits in his pocket and break his fast therewith. As regards food, it is easier to enumerate the prohibitions than the permissions, for the diet allowed may be thoroughly liberal. The following classes of food should be definitely excluded:

1. All highly spiced foods; also condiments such as mustard and pepper in any quantity.
2. Acid foods, such as pickles or other food in vinegar, and acid fruits.
3. All foods which are likely to leave a solid residue persisting in the stomach. The worst of this class are raisins and currants, the skins of which lie long in the stomach, also such vegetables as lettuce, and green vegetables generally.
4. Very hard foods such as nuts.
5. Meat extracts and soups, which stimulate the secretion of gastric juice.
6. Very sweet food.

On the other hand, meat, both fat and lean, may be given in moderate quantity, cream and butter freely, bread-and-butter, toast, and biscuits in ordinary quantities. In most cases brown bread, rough biscuits, and porridge can be taken without harm, but the effects must be watched in each case. After gastric ulcer more caution is needed than after duodenal ulcer, and it may be necessary to give

softer food for some time. In every case individual care must be given and each food treated as an experiment. It is clear that the intelligent co-operation of the patient is of the utmost help, and he should be taught to observe with care the foods which cause him any inconvenience. At the end of two years from the cessation of symptoms treatment by medicines may cease and a greater freedom in diet be permitted.

Treatment along these lines gives satisfactory results in the great majority of cases. It is sometimes objected that the time of treatment is long. This is true, but, except for a period of from one to three months at the beginning, the patient is going about freely and is enjoying a liberal diet.

SURGERY.

It may be asked whether surgery is no longer to play any part in the treatment of peptic ulceration. I do not think that we have yet arrived at so desirable a position. Apart from such acute emergencies as perforation, in which almost the whole chance of survival depends on speedy operation, such conditions as pyloric stenosis are only amenable to surgical aid (one must be careful, however, to be sure that there is pyloric stenosis, for many cases that appear to be such clear up admirably under medical treatment). Again, where there are adhesions causing pain and discomfort it may be necessary to operate; but, for uncomplicated ulcer, is operation necessary? I think the indications for operation will in future be social rather than clinico-pathological. An uneducated or unintelligent patient will neglect to follow the careful regime that is necessary for the success of medical treatment. A patient in poor circumstances will find himself unable to provide himself with what is required. In these cases I think surgery offers a better prospect. It is necessary, however, to say that if surgery is to get its best results operation must be followed by care nearly as meticulous as that required for purely medical treatment. It is not my object to put medicine and surgery in competition, but rather to try to place before you a statement of what a patient may nowadays expect from medical treatment.

A STATISTICAL REVIEW OF GASTRIC AND DUODENAL ULCER.

BY

DAVID SMITH, M.D., F.R.F.P.S. GLAS.,
HONORARY ASSISTANT PHYSICIAN, ROYAL INFIRMARY, GLASGOW.

THE purpose of this paper is to give the results of a statistical inquiry into cases of gastric and duodenal ulcers treated in Professor Walter K. Hunter's wards in the Royal Infirmary, Glasgow. The records of patients admitted to hospital in the decade 1913-22 have been examined and their after-histories followed up. This was done in 1927, so that the follow-up comprises histories of five to fifteen years' duration. The total number of cases considered is 214-96 male and 118 female. In a survey of this kind the difficulty which arises is one of diagnosis, the undoubted correctness of which is almost impossible to establish. The surgeon and pathologist alone can give us absolute confirmation. The physician deals with the clinical aspect, supplemented by x-ray examination and chemical analysis of the stomach contents after a test meal.

The cases taken in this review are those which have been considered clinically, radiologically, and chemically to be cases of chronic ulceration. The period of survey did not allow of fractional analysis being considered, as the older Ewald test meal method was then in use.

I have, on the whole, not attempted to differentiate duodenal and gastric ulcers, for I am of opinion that while this is possible in extreme cases, it is almost, if not absolutely, impossible in others. This view of the difficulty of differentiation is upheld when one studies the widely divergent statistics of the incidence of duodenal and gastric

ulcers as compiled by different clinicians and pathologists. Even the surgeon at times finds difficulty in deciding whether an ulcer is duodenal or gastric. His landmark is the pyloric vein, and, like all veins, this is not infrequently aberrant.

HOSPITAL INCIDENCE.

The term "hospital incidence" has been used because in arriving at a percentage we have to bear in mind that we are dealing with patients from a very selected portion of the population, who are more or less considered to be seriously ill and are admitted to hospital wards. The incidence from such a source is necessarily high. In the following table of in-patients and out-patients this is made clear, although we must still remember that the incidence, as shown both by in-patients and out-patients, is that of a selected proportion of the population—namely, the working and poorer classes.

Table I gives the incidence with regard to patients admitted to the wards and that of patients attending my own out-patient department at the Royal Infirmary, Glasgow, during a period of five years—1919-24. The out-patients are included for comparison only, and none of these cases comes within the scope of this review. In all percentages estimated in this paper the figure is taken to the nearest whole number in order to simplify comparison.

TABLE I.

Sex.	Total Patients.	Gastro-duodenal Illnesses.		Duodenal Ulcers.		Gastric Ulc. rs.		Gastro-duodenal Cases other than Ulcer.	
		No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.
IN-PATIENTS:									
Male... ..	2,507	235	9	65	3	31	1	139	5
Female	2,374	330	14	56	2	62	3	212	9
OUT-PATIENTS:									
Male... ..	3,220	312	10	33	1	16	0.5	263	8
Female	5,789	625	11	24	0.4	98	2	503	9

If we analyse the above table it is seen that there is very little percentage difference in ward and out-patient department cases showing gastro-duodenal illnesses, but there is a marked difference in the percentage of duodenal and gastric ulcers in both sexes. In taking a rough estimate of a five years' period (1919-24) in an upper middle-class general practice I find that the clinical incidence of duodenal and gastric ulcer falls below 1 per cent. in both classes and in both sexes. It seems, therefore, that if we judge by hospital ward records alone our estimate of the incidence is much too high. If hospital necropsy records are examined the same high incidence prevails, because the necropsies are undertaken where there is a preceding high incidence of serious illness. The relative frequency of duodenal to gastric ulcers as found at necropsy has been fully worked out by Stewart¹ on 602 necropsies, where he gives the percentages as duodenal 6.8, gastric 5.15, and also by Hart,² whose figures are duodenal 4.6, gastric 7.13. I think, clinically, we must accept figures which are much lower if we are to arrive at an estimate of the incidence in the general population.

SOME ETIOLOGICAL FACTORS.

I do not intend going minutely into the etiology of duodenal and gastric ulceration, but will give some of the data which have been obtained from the survey of the 214 hospital ward cases.

Age.—It is obviously difficult to assess this etiological factor with any degree of accuracy. The age of the patient when admitted to hospital must not be taken, because there is generally a comparatively long history to be considered. Even in carefully recorded clinical histories it is impossible to say that we have elicited the very first symptoms of onset, and, even if we have, the ulcer may