to the series of Peet and Isberg (1948) have already been stated.

Smithwick's (1949) most recent assessment of his results suggests that sympathectomy does not much influence the prognosis of malignant hypertension, though all agree that retinopathy and headache can usually be improved. Where operation can be expeditiously performed it is certainly worth while if for the rest of his life the patient is protected from blindness and rendered comfortably free from headache; but this group of cases has the highest operative mortality (Peet and Isberg 1948). We shall continue to use the operation in selected cases in an attempt to preserve vision. We remain open-minded about the effect of operation on prognosis.

The final consideration is whether operation is justified in an attempt to relieve severe headache alone. Those of our patients who had suffered incapacitating headaches previously are emphatic in their assertion that it is worth while. It is particularly impressive to be told by a 50-year-old woman, who has had four operations and spent a week in an oxygen-tent with nearly fatal pulmonary œdema, that she would go through it all again for the relief that it has afforded. The same patient takes small account of the fact that, whereas she could do full housework before the operation, she now does virtually none on account of exertional tachycardia and fatigability. We conclude that sympathectomy may be justifiable as a symptomatic measure for the relief of crippling headache; but in a few patients relief may be bought at the price of new symptoms. In cases of this kind it would be useful to know what is the least surgical procedure compatible with relief.

We set out originally to assess the merits of the more extensive Boyd operation, as compared with the Smithwick operation, in the reduction of blood-pressure. Our "successful" cases are so few as to make this impossible. Symptomatic relief is about the same in both (and in the "Adson+"), but the more extensive operation appears to produce more often symptoms of exertional tachycardia and fatigue; we are not much encouraged to continue with it. It is not our intention to become surgical apologists, nor to guess whether accessory sympathetic ganglia, such as those described by Boyd and Monro (1949), or nerve degeneration could be responsible for our failures. All we can say is that sympathectomy, as now performed by competent surgeons, has a very limited rôle in the treatment of hypertensive disease.

SUMMARY

The results of sympathectomy in 80 cases of hypertension are presented and discussed.

Many of the good results recorded by others are attributed to inadequate appreciation of the benign and variable course of mild hypertension.

In this series only cases in which the prognosis was judged to be unfavourable—usually with resting diastolic blood-pressures of 120 mm. Hg or more—have been subjected to operation.

In only 11 of 80 cases was a significant and lasting reduction of blood-pressure achieved. Most of these cases were young women, under 40 years of age, suffering either from essential hypertension or from renal hypertension with good renal function.

Headache and retinopathy are sometimes relieved by a sympathectomy which has failed to reduce blood-pressure.

Sympathectomy should very rarely be advised in hypertensive disease. Some of the indications are defined.

We should like again to express our appreciation of the work done in this study by Prof. A. M. Boyd and his surgical team, and also to thank our medical colleagues for permission to follow up some of their cases after operation.

References at foot of next column

THE RELATION OF PROPHYLACTIC INOCULATIONS TO THE ONSET OF POLIOMYELITIS

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AN epidemic of poliomyelitis commenced in Melbourne, Victoria, in January of 1949, and later spread to the country areas of the State of Victoria and to the adjoining State of South Australia (July–August). The incidence in the other States of Australia was low during this period. The epidemic in Victoria is now subsiding.

Early in the epidemic, attention was directed to a few patients who had been given an injection of pertussis vaccine, or of a mixture of diphtheria toxoid and pertussis vaccine, shortly before the onset of their symptoms. The parents of these children were naturally inclined to blame the inoculations for the development of the disease, though their medical attendants either dismissed the possibility of any causal relationship or else considered the effects to be due to a radiculitis caused by the vaccine. It was decided to inquire for a history of immunisation in the course of a routine investigation of reported cases; though any real association between inoculation and poliomyelitis infection was then considered highly improbable. Considerable evidence, however, will be presented to show that such an association has existed in this epidemic.

METHOD OF INQUIRY

There were 375 cases of poliomyelitis notified in Victoria from January to August, 1949. The parents of 340 of these cases were asked whether the child had ever been immunised against diphtheria or whooping-cough, and, if so, the date and the doctor's name. The remaining 35 cases reported during this period could not be similarly investigated, either because of inaccessibility of the patient, or of inability to contact the parents. No selection of cases whose parents were interviewed was made, and every effort was made to interview the parents of every case reported, but in 35 cases this proved impossible.

Of those cases investigated, if any inoculation had been given within three months of the onset, I personally obtained particulars from the parents of the exact dates and of the sites of all inoculations. I then checked the parents' statements with the doctor's records. Occasionally the parents were uncertain of the exact date or site. In only 4 cases confirmation of the parents' statements as to date and site could not be obtained from the doctor. The data of these 4 cases were recorded as doubtful, and they have been excluded from consideration.

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DIAGNOSIS

Of the 375 cases of poliomyelitis reported, 340 were investigated: about 250 of them, including every case of which the particulars are presented in the tables, were fully investigated by me personally. Most of them were admitted to the Infectious Diseases Hospital, Fairfield, Melbourne, where the diagnosis was confirmed by the experienced medical staff. Many were also seen by members of the panel of consultant physicians, appointed by the Consultative Council on Poliomyelitis of this State. Clinically, the cases associated with recent immunisation were indistinguishable from the remaining acute cases of paralytic poliomyelitis seen during this period. Of the patients included in table I, only 1 (no. 161) was not paralysed, a female child aged sixteen months. Her clinical picture was consistent with non-paralytic poliomyelitis. On admission to hospital her cerebrospinal fluid contained 65 leucocytes per c.mm. (70% polymorphs, 30% lymphocytes), and its protein content was 60 mg. per 100 ml.

TABLE I—FINDINGS IN 31 CHILDREN INOCULATED WITHIN THREE MONTHS OF ONSET

Case no.	Age in months	Agent	Days between last injection and symptoms	Limb last injected	Paralysis in injected limb	Paralysis in non-injected limbs: RA	LA	RL	LL	Other injections: days before onset and sites of injections
181	54	P	7	LA	***	**	..	*	0	..
203	25	P	9	RA	****	..	**	0	0	16 (LA)
290	15	P	12	LA	***	0	..	0	0	19 (RA) 35 (RA)
327	24	P	12	RA	**	..	0	0	0	25 (LA) 35 (RA)
372	54	P	20	RA	***	..	..	0	0	41 (LA) 53, 73 (LA)
				LA	**					
56	41	P	26	LL	***	***	**	0	..	33 (RA)
119	17	PD	4	RL	****	0	*	..	..	23 (RA) 23 (LA) 9 (?LL, ?RL) 45 (LL)
				LL	****					
266	67	PD	7	LA	****	***	..	0	0	
1	12	PD	8	LL	****	0	0	0	..	..
178	26	PD	8	LA	****	**	..	**	0	1, 69 (LA)
358	24	PD	10	LL	****	0	0	0	..	..
348	12	PD	11	LA	***	0	..	0	*	42 (RL)
356	36	PD	11	RL	**	*	0	..	0	42 (RL) 73 (RA)
161	16	PD	13	RA	0	..	..	0	0	46 (LA, RA)
				LA	0					
231	32	PD	13	RL	****	*	*	..	***	51 (LL)
179	17	PD	14	LL	**	0	0	0	..	..
94	18	PD	16	LA	***	0	..	0	0	..
222	16	PD	22	LL	***	0	0	0	..	..
215	30	PD	27	RL	**	0	*	..	*	1 (LL)
216	15	PD	28	RL	***	0	0	..	0	..
2	18	PD	32	RL	**	0	0	..	0	..
85	12	D	5	RA	0	..	0	***	*	..
238	84	D	6	RA	0	..	..	0	0	29 (RA)
				LA	0					
209	42	D	8	LA	0	0	..	***	*	..
211	21	D	8	RA	0	..	0	*	0	1 (RA)
186	18	D	11	RA	****	..	0	0	0	..
259	131	D	12	LA	*	*	..	****	**	29 (RA)
248	69	D	13	RA	***	..	***	0	0	41 (LA)
241	180	D	14	LA	**	0	..	0	0	..
364	93	D	60	LA	0	0	..	0	0	(Note: Palate paralysis only)
336	108	D	60	LA	0	0	..	*	0	..

**** Very severe. *** Severe. ** Moderate. * Mild. 0 Nil.
RA, Right arm. LA, Left arm. RL, Right leg. LL, Left leg.
P, Pertussis vaccine. PD, Combined pertussis and diphtheria vaccine. D, Diphtheria toxoid.

TABLE II—RELATION OF SITE OF PARALYSIS TO SITE OF INOCULATION

Agent		Inoculated limbs: Paralysed	Inoculated limbs: Not paralysed	Uninoculated limbs: Paralysed	Uninoculated limbs: Not paralysed	Total limbs
P (6 cases)	Legs	1	..	1	10	12
	Arms	8	2	2	..	12
	Total	9	2	3	10	24
PD (14 cases)	Legs	12	2	2	12	28
	Arms	6	1	5	16	28
	Total	18	3	7	28	56
D (10 cases)	Legs	..	..	8	12	20
	Arms	6	7	..	7	20
	Total	6	7	8	19	40

ASSESSMENT OF THE SITE OF PARALYSIS AND ITS SEVERITY

The sites of paralysis were determined at the initial examination, or at one shortly after the diagnosis had been made. In the majority of these cases, the extent of paralysis of each extremity was initially assessed by me according to the standard scale of the Australian Association of Physiotherapists. The patients whom I did not initially examine were assessed by members of the staff of the Infectious Diseases Hospital, Fairfield. For the sake of uniformity of presentation, both series have been converted to the following scale:

Very severe	(****)	Complete flaccid paralysis.
Severe ..	(***)	Complete paralysis of at least one muscle group.
Moderate ..	(**)	Partial paralysis of at least one muscle group, sufficient to prevent movement of the involved joint against gravity.
Mild ..	(*)	Lesser degrees of paralysis, permitting movement against gravity.
Nil ..	(0)	No detectable paralysis of an extremity.

These findings were, in all cases whose particulars are included in this paper, compared with those of the physiotherapists treating the cases and were found to correspond exactly.

It is emphasised that the inquiry into the site and degree of paralysis always preceded the inquiry as to the site of inoculation. This procedure seems sufficient to ensure against any possibility of bias on the writer's part in the assessment of the site and severity of the paralysis.

FINDINGS

Table I summarises the relevant data of all 31 patients who have received an injection of diphtheria toxoid or pertussis vaccine, alone or in combination, within three months of the onset of symptoms, for whom exact information on date and site of injection could be obtained. The findings in the 4 patients where some degree of doubt existed as to date and site have been omitted. There were no other cases in the 340 investigated in whom a history of an inoculation of diphtheria toxoid and/or pertussis vaccine within three months of the onset was obtained.

RELATION OF THE SITE OF INOCULATION TO SITE OF PARALYSIS

The data in table I on relation of site of inoculation (at any time up to three months before the onset) to site of paralysis are collected in table II.

Paralysis is distinctly more frequent in the inoculated than in the uninoculated extremities in those cases which

received pertussis vaccine either alone or in combination. In the patients given only diphtheria toxoid, a difference in the incidence of paralysis in the inoculated and uninoculated extremities is also evident if we compare the corresponding extremities (the arms), though this difference is not as striking as when pertussis vaccine was used alone.

The difference in incidence of paralysis in inoculated and uninoculated limbs is so great when pertussis vaccine, alone or combined, has been employed, that an exact statistical assessment of significance, which presents some difficulties, hardly appears to be necessary. The cases involving diphtheria toxoid alone are few and it is doubtful whether their statistical assessment would be profitable.

IMMUNISATION HISTORY OF ALL CASES INVESTIGATED

Of the 340 cases investigated a history of previous immunisation against whooping-cough and/or diphtheria was obtained in 211. Of these, 65 received inoculations within one year of the onset of their poliomyelitis. These results are expressed in table III.

TABLE III

Agent	Period preceding onset in which inoculation was received (all cases)		
	Under 3 months	Between 3 months and 12 months	More than 1 year
P	6	3	9
PD	15	8	51
D	10	19	61
Unknown	4	0	25
Total ..	35	30	146

In the remaining 129 cases no history of any immunising procedure against whooping-cough or diphtheria at any period of the patient's life was obtained.

Of the 340 cases investigated, 69 were children under three years of age. The immunisation history of these children regarding pertussis and diphtheria is contained in table IV.

INTERVAL BETWEEN INJECTION AND DEVELOPMENT OF SYMPTOMS

Table I includes all persons who had received a prophylactic inoculation of one of the three agents within three months of the onset of symptoms. It would be expected that the number of inoculations would be the same in each month. That is far from the case, as appears from table V (extracted from table I).

In this table every inoculation received by each subject within ninety days of the onset is included: many patients, of course, received multiple injections in that period.

It is clear that the more recent the injection of any agent, the more likely is its association with the onset of poliomyelitis. This association can be assessed by the χ^2

TABLE IV

Agent	Period preceding onset in which last inoculation was received (children under 3)		
	Under 3 months	Between 3 months and 12 months	More than 1 year
P	3	2	1
PD	13	3	3
D	3	10	2
Unknown	2	0	3
Total ..	21	15	9

Total Inoculated: 45
Uninoculated: 24

TABLE V

Agent	Interval between inoculation and onset of symptoms		
	1–30 days	31–60 days	61–90 days
P	9	5	1
PD	18	6	2
D	11	3	0
Total ..	38	14	3

test, and is significant for diphtheria toxoid alone, as well as for pertussis vaccine, alone or in combination.

INTERVAL BETWEEN THE LAST INJECTION AND ONSET OF SYMPTOMS AND SITE OF PARALYSIS

Many patients received more than one injection. Inspection of the data revealed that the last injection before the onset of symptoms was that usually associated with the location of paralysis. The data are arranged in table I to indicate this relationship.

The fourth column in table I shows the intervals, arranged in order of magnitude, between the last injection (excluding three injections given the day before onset) and the onset of symptoms. The incidence of paralysis in limbs receiving the last injections is shown in the sixth, and that in the other limbs in the next four columns. When pertussis vaccine was used, alone or in combination, 22 of 24 limbs receiving the last inoculation were paralysed, and only 16 of the 60 limbs inoculated prior to this or uninoculated were affected. There is less evidence of localisation in the limb last injected when diphtheria toxoid was used; 4 of 11 of the last inoculated limbs were paralysed, and 10 of 29 of the remainder.

INTERVAL BETWEEN THE LAST INOCULATION AND THE ONSET OF SYMPTOMS

The intervals from the last inoculation before the onset of symptoms to that onset ranged from five to thirty-two

TABLE VI—SEVERITY OF PARALYSIS IN LIMBS INOCULATED WITH PERTUSSIS VACCINE WITHIN 35 DAYS AND IN CONTROLS (CHILDREN UNDER 3)

	Immunised group * (15 cases)					Control group * (48 cases)					
	****	***	**	*	0	****	***	**	*	0	Total limbs
R arm	1	0	1	0	1	0	1	0	3	44	48
L arm	1	3	0	0	1	0	2	1	3	42	48
R leg	2	1	2	0	0	5	3	3	17	20	48
L leg	3	1	1	0	0	3	4	4	13	24	48
All limbs	7	5	4	0	2	8	10	8	36	130	192

* For definition of these groups see text.

days, except in 2 patients in whom this interval was approximately sixty days. These 2 patients received diphtheria toxoid, the limbs injected were not paralysed, and it is quite likely that in them the injections were not related to the attacks of poliomyelitis but were coincidental.

In poliomyelitis following tonsillectomy, the intervals between the operation and onset of symptoms have ranged from three to thirty days. The literature is summarised by Horstmann and Paul (1947). Leake (1935) reported 12 instances in which an attack of poliomyelitis closely followed administration of a poliomyelitis virus vaccine. Of these 12, 6 children had a single dose two days or less before onset of symptoms. Discarding these very short intervals as unlikely incubation periods, the intervals from injection to onset were seven to fourteen days, as in the majority of cases (19 of 30) in this series. In Leake's series also there was a marked, but not invariable,

association between site of inoculation and site of paralysis.

The incubation period of poliomyelitis itself is usually regarded as lying within these same limits, five to thirty days.

RELATION OF INOCULATION TO PARALYSIS IN THE CASES UNDER THREE YEARS OF AGE

In the 17 cases under three years of age receiving pertussis vaccine either alone or in combination within thirty-five days of the onset, full data are available for 16; in 15 paralysis followed in the limb last inoculated before the onset. The paralysis in the limb last inoculated in these cases is shown in table VI.

By contrast the degree of paralysis in each limb of a control group of all children under three (48 in all), notified during the same period as the above 17 cases, who had not received any inoculation within thirty-five days of the onset, and for whom exact information as to the site and severity of paralysis was ascertained, is also shown in table VI.

It is clear that there is a considerable increase in the severity of the paralysis in the last-inoculated limbs of those children under three who received an injection of pertussis vaccine within thirty-five days of the onset of poliomyelitis.

ADMINISTRATIVE ACTION

A report was submitted to the Chief Health Officer (Dr. G. E. Cole) on July 20, 1949, and it was decided to defer action until further evidence had been collected. When this had been done, the Chief Health Officer, in September, 1949, invited Prof. F. M. Burnet, F.R.S., Dr. E. V. Keogh, of the Commonwealth Serum Laboratories, and Dr. H. McLorinan, superintendent of the Infectious Diseases Hospital, Fairfield, to confer with him and officers of his department. It was agreed that there was certainly evidence of some association between prophylactic injections and development of poliomyelitis in the epidemic. This raised questions of great importance from the viewpoint of public-health administration. It was feared that immunisation, particularly against diphtheria, might be prejudiced if the public were informed. The Chief Health Officer, therefore, laid the facts and the opinions of this expert committee before the Consultative Council on Poliomyelitis of the State of Victoria for an opinion whether or not the medical profession and the public should be informed. The council recommended that doctors be advised to discontinue the use of pertussis vaccine during the currency of the epidemic, just as tonsillectomy had been postponed since it appeared to determine an attack of poliomyelitis in rare instances. They also thought that the public should be informed of the facts in regard to pertussis vaccine, alone and in combination. Similar action as regards diphtheria immunisation was considered unnecessary, (1) because the evidence was less certain, and (2) because temporary cessation of mass diphtheria immunisation could readily be arranged.

On Oct. 4, 1949, the Commonwealth Government and the Department of Health in each State were informed of the Victorian findings by the Chief Health Officer acting on the advice of the council. A circular letter was also addressed to all doctors in Victoria, informing them of the position, and a brief statement was issued to the press. The announcements caused no unfavourable press comment; so there is no reason to suppose that the future of immunisation in Victoria has been prejudiced.

DISCUSSION

Evidence has been presented which indicates that an injection of pertussis vaccine, given during an epidemic of poliomyelitis, may determine the onset of paralysis in the immunised child. The evidence that an injection of diphtheria toxoid may have similar effects is, perhaps, less conclusive.

In discussing various possible explanations of this phenomenon, attention will first be directed to those instances in which localisation in the inoculated limb was the prominent feature, following administration of pertussis vaccine, alone or combined.

Any suggestion that the prophylactic agents, on release by the makers, were contaminated with poliomyelitis virus seems highly improbable. No single batch of any one product could be incriminated. The products were made by three different firms—one English, one American, and one Australian. The same immunising agents have been used throughout Australia, but their injection was followed by paralysis only in Victoria, during a severe epidemic of poliomyelitis. Any harmful effects were therefore associated, not with their origin, but with the epidemic prevalence of poliomyelitis.

The chances of syringe transmission have to be considered. The possibility exists of contamination of the hypodermic needle with virus from the doctor's hands or the patient's skin. Or a syringe used to give, for example, penicillin to a child with an undiagnosed fever, which was in reality a non-paralytic attack of poliomyelitis, might later be employed without adequate sterilisation to give a vaccine to another child. But it has also then to be assumed, either that a viræmia occurs in non-paralytic cases, and that the injection of penicillin or other drugs coincides with the viræmia, or that virus is present for a longer or shorter time in the subcutaneous tissues. And since these injections are not intravenous, the chances of contamination of the interior of the syringe would be relatively slight, even if the needle did pierce tissues in which virus was present.

Allowing that local tissue damage caused by the vaccine might favour the successful implantation of a very small dose of virus, these foregoing assumptions are not in harmony with current views of poliomyelitis.

It is conceivable that, in a subject suffering a non-paralytic infection, circulating virus might be arrested and concentrated in tissue damaged by the vaccine, and then travel, perhaps after multiplication, via the peripheral nerves or some other channel, to the corresponding areas in the cord. Again it is necessary to postulate a viræmia and also that the injection itself is given during the period of viræmia, or that the viræmia occurs before the damage done by the vaccine has been repaired.

The final hypothesis to be considered is that proposed by Horstmann and Paul (1947) in explanation of the effect of exercise and other traumata on the development of paralysis. They suggest that local trauma may be reflected in corresponding areas in the cord in the form of central changes, which favour activation of virus already present in the central nervous system. Although the nature of the presumed mechanism is somewhat obscure, the suggestion seems applicable to the present observations, since it merely adds injection of pertussis vaccine to the list of known traumata which influence unfavourably the course of an infection with poliomyelitis virus. But Levison et al. (1945), in experiments on rhesus monkeys, found that trauma to the muscles of an extremity did not influence the site or extent of paralysis, though exercise to the fatigue-point and chilling in the prodromal period had a pronounced effect. These workers injured the tissues by bruising with hammer blows; it is possible that the type of injury may be decisive, and that pertussis vaccine may specifically favour localisation.

None of the hypotheses considered provides a convincing explanation of the observations. Further information, some of which should be obtainable by

experimental procedures, is required. It would obviously be of interest to determine whether pertussis vaccine introduced intramuscularly can modify the course of the experimental infection in the monkey. Two lines of inquiry might be profitable: (1) to see whether, in monkeys infected by the intranasal or oral routes, a subsequent or coincident injection of pertussis vaccine can determine paralysis of the injected limb; and (2) to determine whether a minimal dose of virus, non-infective by the intramuscular route, may become infective if given mixed with pertussis vaccine.

The differences observed between the effects of pertussis vaccine and diphtheria toxoid are in harmony with the presumption that local damage to tissue is a determining factor. Since the local damage following the injection of pertussis vaccine, or combined pertussis-diphtheria prophylactic, is much more severe than that usually following diphtheria toxoid alone, one would expect more striking and frequent effects to follow administration of pertussis vaccine, even if, as is the case in Victoria, many more children are immunised against diphtheria.

In considering, however, the frequency and severity of the effects of pertussis vaccine, in comparison with diphtheria toxoid, it should be remembered that pertussis vaccine is usually given early in the child's life, while diphtheria prophylaxis is often postponed until the child is four or five, and about to enter school. The average age of the children in this series given pertussis vaccine, alone or in combination, was 2·4 years, and of those receiving diphtheria toxoid 5·1 years. Location of the paralysis in the injected limb may be, therefore, a phenomenon more likely to occur in younger children, irrespective of the nature of the prophylactic agent.

One further point remains to be mentioned. A nursing sister developed typical poliomyelitis after an injection of typhoid-paratyphoid vaccine into the left upper arm. Ten days after the injection she felt unwell and remained in bed for two days. She returned to duty, but on the thirteenth day developed general muscle pains and vomiting. She developed considerable weakness in the injected left arm and in both legs. Another nursing sister who received a similar inoculation at the same time became ill after the same interval and was diagnosed as suffering from poliomyelitis. She was not, however, reported as a case, and no further details are available.

SUMMARY

Evidence is presented that in the current epidemic of poliomyelitis in Victoria there has been a relation, in a number of cases, between an injection of an immunising agent and the subsequent development of paralytic poliomyelitis.

I am indebted to the Chairman of the Health Commission of Victoria, Dr. G. E. Cole, for permission to publish this paper.

I wish to acknowledge gratefully the encouragement and guidance given me by Dr. E. V. Keogh throughout this investigation, and his help in the preparation of this paper. Also I wish to thank Dame Jean Macnamara (who is a constant inspiration to workers in the poliomyelitis field in Australia); Dr. H. McLorinan for his courtesy in giving me access to the patients and their records in the Infectious Diseases Hospital, Fairfield; Mr. Alwyn Mathew of the Commonwealth Serum Laboratories, Melbourne; and Dr. H. O. Lancaster of the School for Public Health and Tropical Medicine, University of Sydney, for statistical advice. Finally, I wish to thank the staff of the Health Department in Victoria who have so willingly assisted me in my investigations.

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ULCERATIVE COLITIS

COURSE AND PROGNOSIS

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ULCERATIVE colitis varies so widely in its severity and course that the prognosis is uncertain and the assessment of new treatments is correspondingly difficult. We have investigated in a series of cases some of the factors which may influence the course of the disease and thus have prognostic significance.

MATERIAL AND METHOD

In the eleven years 1938–48 inclusive, 129 patients were treated for ulcerative colitis in the Radcliffe Infirmary. We have analysed their case-records and followed their progress. The follow-up was conducted initially by post and later at a special outpatient clinic for those still living in the area. The response to inquiry was satisfactory, 121 out of the 129 being traced.

A representative unbiased sample of patients must be studied if one is to get a clear idea of the prognosis in any disease. With a chronic and relapsing disease such as this, the total admissions to a hospital include many patients who have previously been treated in other hospitals. A disease may be more lethal in its early than in its later stages, or vice versa. Hence we have divided the patients into two groups:

New cases: 72 patients in whom ulcerative colitis had been present for less than two years before their first admission to the Radcliffe Infirmary and who had had no previous hospital treatment elsewhere.

Old cases: all other patients.

The time limit of two years was set to exclude from the new cases a few patients with the chronic continuous type of ulcerative colitis who had had diarrhœa for years before their first admission to the Radcliffe Infirmary but had not been treated in another hospital.

For the reasons given above we have concerned ourselves mainly with the 72 new cases so far as prognosis is concerned.

RESULTS

Age and Sex

Ulcerative colitis occurs chiefly in the first half of adult life. More than half of the present patients began their illness in their twenties or thirties. The disease may, however, arise at any age after infancy, though rarely before the 'teens or after the fifties. The youngest patient in this series was 5 years old and the oldest 68.

Ulcerative colitis affects both sexes, but different series have yielded very different proportions of males and females. Thus Hern (1931), Buzzard et al. (1938), and Cullinan (1938) had about twice as many women as men in their series, whereas Hardy and Bulmer (1933) and Willard et al. (1938) had roughly equal numbers of men and women. Our series contains nearly twice as many women as men, as follows:

Age-group (years)	*Male*	*Female*	*Total*
0–9	2	1	3
10–19	3	8	11
20–29	12	22	34
30–39	15	24	39
40–49	9	13	22
50–59	3	10	13
60–69	3	4	7
Totals	47	82	129

This sex difference may be partly due to the influence of war, with the removal from the civilian population of a high proportion of men of the most susceptible ages. This view gains support from the numbers of admissions in the war years and in the non-war years, as follows:

	Females	*Males*
Non-war years	29	25
War years (1940–45)	50	21