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THE ULSTER MEDICAL JOURNAL

PUBLISHED BY
THE ULSTER MEDICAL SOCIETY

CONTENTS

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THE ULSTER MEDICAL JOURNAL

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DATES OF PUBLICATION

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THE ULSTER MEDICAL SOCIETY

P.O. Box 222,
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DEPARTMENT OF MEDICAL STATISTICS,
INSTITUTE OF CLINICAL SCIENCE,
GROSVENOR ROAD, BELFAST BT12 6BJ.

.....19.....

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ULSTER MEDICAL JOURNAL

PUBLISHED ON BEHALF OF THE ULSTER MEDICAL SOCIETY

VOLUME 43 1974 No. 2

PERSONAL RECOLLECTIONS OF SIR ALMROTH WRIGHT AND SIR ALEXANDER FLEMING

by

V. D. ALLISON, D.Sc., M.D., D.P.H.

A Lecture to the Ulster Medical Society given on 25th April, 1974

THE youngest, but one, of eight children of an Ayrshire farmer, Alexander Fleming was born at Lochfield Farm, near Darvel, on 6th August, 1881. He received his first schooling at Loudoun Moor School and at the age of 10 he went to the village school at Darvel; two years later he continued his education at Kilmarnock Academy. At 14 years of age he joined an elder brother in London and attended the Polytechnic, Regent Street, as a pupil. In 1897 he took a junior post in the office of a shipping company in the City where, as he told me, he worked for four years at a commencing salary of two and a half old pence an hour. In 1901 he returned to his studies, passed the London Matriculation Examination and decided on a medical career. He chose to enter St. Mary's Hospital Medical School, simply because he had played water-polo against St. Mary's. He easily won the Senior Entrance Scholarship and entered St. Mary's in 1902. As an undergraduate he won almost all the available scholarships, medals and class prizes and qualified as doctor with honours and a University Gold Medal. He was a good shot and a member of the London Scottish team which won the Daily Telegraph Cup at Bisley, two days before his final examination. A member of the hospital water-polo team, he also took part in amateur theatricals.

I first met Fleming in January 1922 when I was granted a Research Scholarship to work with him in the Research Institute, then known as the Inoculation Department, in St. Mary's Hospital. Thereafter he was my mentor and close friend until his death on 11th March 1955, a span of 33 years.

No life of Fleming would be complete without mention of Sir Almroth Wright, an Ulsterman and Old Instonian, who was the Director of the Research Institute. Wright became the greatest influence in directing the trends of Fleming's life

work—devising of methods of enhancing the protective power of blood constituents against bacterial invasion.

Wright was over six feet tall, broad shouldered with a leonine head. He was a man of great intellectual ability, head and shoulders above most of his contemporaries, and he had a wide circle of friends outside medicine. He was one of five brothers who all went to the Royal Belfast Academical Institution. I met two of his brothers who were occasional visitors to the laboratory—Sir Hagberg Wright, Director of the London Library, and Henry Wright, a distinguished general in the Royal Engineers.

Wright was a strong anti-feminist and I can only remember one lady visitor to the laboratory, Lady Desborough, whom he considered to be a good intellectual conversationalist.

In addition to his numerous medical papers, he wrote books and articles on logic and philosophy. He was an outstanding Greek Scholar. He had a phenomenal memory with a love of poetry—he knew by heart much of the Bible, Shakespeare, Milton, Dante, Goethe, Wordsworth and Kipling. He once claimed he could recite from memory some 250,000 lines of poetry. One of his frequent quotations written by Claude Bernard was "In the field of observation, chance favours only the mind which is prepared". How true this was to prove in Fleming's discovery of lysozyme and penicillin. At tea-time in the library he would recite at length from one of the poets and ask Fleming, amongst others, the source. As a legpull Fleming would say "Robbie Burns" amid laughter, but with practice we got to know his favourite poets and knew or guessed the author correctly. Wright developed the vaccine against typhoid in 1897, but it met active opposition when the vaccine was sent to protect troops in the South African War, and some consignments were thrown overboard from transport ships—a second Boston Tea Party!

Among visitors to Wright in the laboratory library, whom I was privileged to meet and to listen to their philosophic discussions over a staff cup of afternoon tea, were—Lord Balfour, a former Prime Minister and an eminent philosopher, George Bernard Shaw, George Birmingham (Canon Hannay) the novelist, Lord Haldane, British statesman and philosopher, Sir William Willcox, Government Toxicologist, and Sir Bernard Spilsbury, Government Pathologist, both members of the medical staff of St. Mary's Hospital. When any one of these was present, the conversation centred round him and Wright, with his colleagues, Fleming and myself (eight in all) as rapt and silent listeners. I remember on one occasion, Wright asked Balfour if he thought Great Britain would ever become Communist. Balfour replied "No" and "Why?" asked Wright. "Because of The Bible, The Salvation Army, Sunday Schools, Boy Scouts and kindred organisation" replied Balfour. On another occasion Wright asked Balfour if he ever read in bed and Balfour replied that he read a detective story in bed nearly every week. In turn Wright was asked the same question and he answered that when he felt like reading in bed, he took one of two books—either a volume of the Encyclopaedia Britannica or a Greek Lexicon! Bernard Shaw, although a great friend of Wright, was very sceptical of Wright's work on the protection of the body against infection

and their disputations were many. About 1928, he wrote an article in "The Spectator", in which he criticised the use by Wright and his colleagues of hypertonic saline, eusol, and Carrel-Dakin tubes in the treatment of war wounds, which were still discharging pus 10 years after the end of the war. This he said proved that "Sir Almroth Wright was Sir Almost Wrong!" In 1906 Shaw produced "The Doctors' Dilemma," a brilliant satire on the medical profession in which Wright was caricatured as Sir Colenso Ridgeon.

Such was the physical and mental environment in which Fleming worked from 1906 for the rest of his life, broken only between 1914 and 1918, when Wright, Fleming and colleagues set up an Army Laboratory in Boulogne to investigate infection of war wounds. Here they were joined by three now well-known Queensmen, Sir Thomas Houston, Sir William Thomson and Dr. John Rankin.

The laboratory in which I worked with Fleming for five years was about 12 feet square, situated in a turret in one corner of the hospital on a mezzanine floor, with two windows overlooking Praed Street, close to Paddington Station. In this room, ridiculous in size according to present day standards, with simple equipment, Fleming made, apart from his other work, his two outstanding discoveries—lysozyme and penicillin.

When I arrived at St. Mary's I knew little bacteriology but by dint of Fleming's tuition and burning the midnight oil, I soon learnt enough to be able to co-operate in some experiments on the power of the white cells of the blood to kill disease germs and the effect of common antiseptics on the white blood cells. Early on Fleming began to tease me about my excessive tidiness in the laboratory. At the end of each day's work, I cleaned my bench, put it in order for the next day and discarded tubes and culture plates for which I had no further use. He, for his part, kept his cultures of disease-producing organisms grown from infections in hospital patients, for two or three weeks until his bench was overcrowded with 40 or 50 cultures. He would then discard them, first of all looking at them individually to see whether anything interesting or unusual had developed. I took his teasing in the spirit in which it was given. However the sequel was to prove how right he was, for if he had been as tidy as he thought I was, he would not have made his two great discoveries—lysozyme and penicillin.

Discarding his cultures one evening, he examined one for some time, showed it to me and said "This is interesting." The plate was one on which he had cultured mucus from his nose, some two weeks earlier, when suffering from a cold. The plate was covered with golden yellow colonies of bacteria, obviously harmless contaminants, deriving from the air or dust in the laboratory, or blown in through the window from the air in Praed Street. The remarkable feature of the plate was that in the vicinity of the blob of nasal mucus there were no bacteria; further away another zone in which the bacteria had grown but had become translucent, glassy and lifeless in appearance; beyond this again were the fully grown, typical, opaque colonies. Obviously something had diffused from the nasal mucus to prevent the germs from growing near to the mucus, and beyond this zone to kill and dissolve bacteria which had already grown. This observation proved to be the beginning of an investigation which occupied us for the next few years. As my scholarship

lasted only one year, I was appointed to a Beit Memorial Research Fellowship for three years to continue our research—research which enabled me to write a thesis for my M.D.

Fleming's next step was to test the effect of fresh nasal mucus on the germ, but this time he prepared an opaque, yellow suspension of the germ in saline, and added some nasal mucus to it. To our surprise the opaque suspension became in the space of less than two minutes as clear as water, the bacteria being completely dissolved. Immediately afterwards he tried the effect of tears from the eye on the germ suspension. A single drop of tears dissolved the germs in less than a minute—it was an astonishing and thrilling moment. For the next five or six weeks, our tears were the source of supply for this extraordinary phenomenon. Many were the lemons we used (after the failure of onions) to produce a flow of tears. We used to cut a small piece of lemon peel, squeeze it in front of an eye while looking in the mirror of a microscope. Then with a glass Pasteur pipette, drawn out to a fine rounded point and a rubber teat, we collected the tears into a small tube, ready for tests. In this way I often collected a quarter to a half a teaspoonful of tears. The demand by us for tears was so great, that laboratory attendants were pressed into service, receiving threepence for each contribution. This gave rise to a cartoon in "Punch", showing a brawny man caning boys, lying over a stool, while their tears poured into a jar on the floor beneath their heads.

Wright, who delighted in constructing new words from Greek roots, gave the name "lysozyme" (an enzyme with power to dissolve) to the substance, and *M. lysodeikticus* to the susceptible organism (showing dissolution). Further investigations showed lysozyme to be present in every tissue and secretion of the human body. Some hundreds of bacteria were next tested for their susceptibility to lysozyme and only bacteria virulent for man (e.g. typhoid, cholera and dysentery organisms) were found to be completely resistant to its action. The conclusion arrived at was that lysozyme was one of the natural defences of the body against infection.

In December 1921 Fleming read a paper on lysozyme before the Medical Research Club (an exclusive club limited to 50 members composed of the most outstanding workers in medical research). I was present at this meeting as Fleming's guest. His paper describing his discovery was received with no questions asked and no discussion, which was most unusual and an indication that it was considered to be of no importance. The following year he read a paper on the subject before the Royal Society, Burlington House, Piccadilly and he and I gave a demonstration of our work. Again with one exception little comment or attention was paid to it. The exception occurred when Fleming went for refreshment, while I attended to the demonstration. An elderly gentleman with a Van Dyck beard showed interest and questioned me about lysozyme. I showed him its properties and its resemblance to other enzymes in the human body and we had an interesting discussion. He thanked me and passed on, but meanwhile I had not realised that Fleming had returned and was listening to our discussion. Fleming said "You are a brave man, do you know who that was?" I said "No", and Fleming said "That was Professor Starling, the greatest living authority on enzymes, but don't worry, you acquitted yourself very well."

By this time, as our friendship grew, I was "Ally" to him and he was "Flem" to me. I had become engaged and married to a New Zealand 'cellist, who had given recitals in London, Australia and New Zealand and was teacher of the 'cello at the London Polytechnic School of Music. My wife and Fleming's wife, Sareen, became great friends and we were frequently invited to spend week-ends at Fleming's house, "The Dhoon", Barton Mills, Suffolk—a house with a large garden, full of fruit, vegetables and flowers, and the river Lark at the end of the garden. There was a boat-house with a punt and rowing boat, and we used to go fishing for dace, chubb and perch, but especially for the killer fish, pike. On one occasion we caught a large female pike, full of eggs. We took it back to the laboratory and tested the tissues for lysozyme which was found in all tissues examined. However to our surprise the highest concentration of lysozyme was in the pike's eggs. Thence it was but a step to test hen eggs, and hen egg white proved to be the most potent source of lysozyme ever found. Diluted almost one million times, it dissolved the susceptible organism in 18 hours at body temperature. Thus ended the collection of tears.

Fleming next sent me to the Ministry of Agriculture Laboratories at Weybridge, Surrey, where I collected tears from the eyes of horses, cows, geese, rabbits and guinea pigs (farmyard pigs were impossible!) Lysozyme was present in variable amounts in all samples. About this time, Dr. Richard ("Dickie") Hunter was acting as Prosector at the London Zoo. He wanted a month's leave and asked me to act as his deputy, to which Fleming agreed. This involved daily visits to the Zoo to carry out post-mortems on any animals which had died. Among the animals on which I carried out post-mortems were, a tiger, a *Macacus rhesus*, a macaw, and numerous fish when the glass front of a tank in the aquarium broke resulting in 100 per cent mortality of the fish. I collected numerous specimens from these animals, which I took back to the laboratory, and all samples were found to contain lysozyme in greater or less degree. Since that time, more than 2,000 scientific papers on lysozyme have been published from all over the world, and some years later Fleming told me his discovery of lysozyme gave him more satisfaction than his discovery of penicillin.

In 1928 came the great discovery of penicillin and again the same sequence of events occurred, when he found on a two weeks old culture plate of staphylococci, grown from an infected wound, a green mould which had caused the golden yellow colonies of the germ in its vicinity to become translucent, colourless and dead. Fluid cultures of the mould killed many different bacteria causing serious disease in man. The name he gave to the extract was Penicillin—the mould was *Penicillium notatum*. This was the first and greatest of antibiotics. Fleming did not realise how impure his extract was, and the penicillin in his extract was little more than one-millionth part of the fluid—the proportion of gold in the sea is greater. Subsequent events are well known—the short life of the mould extract, its lack of damage to blood cells and tissues, its ability to cure certain infections in rabbits, and topically in the human eye and skin infections.

In 1929 Fleming read a paper on penicillin at a meeting of the Medical Research Club, of which I was now a member, and suggested the possible value of penicillin for the treatment of infection in man. Again there was a total lack of interest and

no discussion. Fleming was keenly disappointed, but worse was to follow. He read a paper on his work on penicillin at a meeting of the International Congress of Microbiology, attended by the foremost bacteriologists from all over the world. There was no support for his views on its possible future value for the prevention and treatment of human infections and discussion was minimal. Fleming bore these disappointments stoically, but they did not alter his views or deter him from continuing his investigation of penicillin.

About this time Fleming, through the good offices of Dr. Young, former Chief Medical Officer of the Iraq Petroleum Company, was invited by King Feisal to attend the official opening of an oil-pipe line in Iraq. Our son had just been born and Fleming took the opportunity to bring back a bottle of Jordan water for his christening, taking care to filter it free from germs. He and his wife, Sareen, became godfather and godmother to our son who also later went to St. Mary's and is now an orthopaedic surgeon in the South of England.

Soon after the outbreak of war in 1939, Professor Florey (later Lord Florey, P.R.S.) and his colleague, Dr. E. B. Chain in Oxford, succeeded in purifying penicillin, and were successful in curing patients, suffering from serious infections, with still incompletely pure penicillin—a golden yellow powder, of which I still have a small amount. About this time, in 1942, a patient, very important from the point of view of the war effort, dangerously ill and unconscious with meningitis, was admitted to St. Mary's Hospital under Fleming's care. Despite the best current form of treatment (sulphonamides) by Fleming, the patient's condition continued to deteriorate. Fleming found the infecting organism insusceptible to sulphonamide, but penicillin killed it. Thereupon Fleming phoned Florey in Oxford and asked him for a supply of penicillin for injection into the patient's spinal canal. Florey sent most of his small stock of penicillin by dispatch rider, but said it was still impure and there was a great risk associated with an intrathecal injection. He asked Fleming not to use it until he (Florey) had injected some into the spinal canal of a cat to see if it was innocuous. However the patient was moribund with all hope given up, so Fleming decided to inject the crude penicillin into the patient's spinal canal on the evening he received it. Fleming slept at the hospital that night and early next morning, Florey phoned Fleming and told him the cat had died. Fleming was able to report that the patient's condition had greatly improved, his temperature was near normal, he was conscious and asking for food. Under further treatment with penicillin given intrathecally the patient made a complete recovery.

In June 1940, when invasion of England by the German Army was threatened, Florey and Chain decided that if invasion occurred the penicillin mould must at all costs be prevented from falling into the hands of the enemy. They therefore soaked the linings of their clothes pockets with cultures of the mould and prepared to go to U.S.A. if invasion took place, so that preparation of pure penicillin could be developed on a grand scale. Fortunately the necessity did not arise. However Florey went to U.S.A. in 1941 with cultures of Penicillium and thenceforward the production of pure penicillin grew apace in U.S.A. and England.

In March 1941, during an air-raid, a land mine caused severe damage to

Fleming's house in Chelsea. I was now on the staff of the Ministry of Health in London and the Medical Research Council and had, at the outbreak of war, been sent to Cardiff by the Government, to deal with epidemics which might occur among thousands of children evacuated from the London area and to investigate possible bacterial sabotage by the enemy, e.g. typhoid organisms in water reservoirs. As I was no longer living in London, we offered Fleming the use of our house in Highgate, which he and his wife Sareen gratefully accepted, and they lived there until the end of the war. As I had to attend weekly meetings at the Ministry of Health, London, my home became a pied-à-terre for a night each week, and I remained in close touch with Fleming and his work. Some nights we spent sleeping in the photographic room, almost bomb-proof, at St. Mary's Hospital laboratory after late work.

The miraculous cure of the patient with meningitis led Fleming to decide that production of penicillin on a large scale was now essential and he asked me to raise the matter at one of our weekly meetings at the Ministry of Health, while he for his part would discuss it with Sir Andrew (later Lord) Duncan, the Minister of Supply, an Ayrshire man and a friend of Fleming. I spoke to Sir Wilson Jameson, Chief Medical Officer of the Ministry of Health, and he was sufficiently convinced to refer the question to the Permanent Secretary and the Minister of Health. Both Ministers strongly supported the mass production of penicillin at a meeting of the War Cabinet. The result was the formation on April 5th, 1943, of the Penicillin Committee with Sir Cecil Weir, Director General of Equipment, as Chairman; Fleming, Florey, Sir Percival Hartley (M.R.C.), myself and representatives of pharmaceutical industries (Glaxo, Boots, B.W., I.C.I., B.D.H.) were invited to become members. The main terms of reference were—abundant and rapid production of penicillin, sharing of information on its production between manufacturers in Great Britain and U.S.A. and reservation of penicillin for use by the Armed Forces of the Allies to treat war wounds. It was first used in the North African Campaign, and Sir Ian Fraser was among the first surgeons to administer it therapeutically with striking success. Unfortunately two American research workers took out patents on production methods, which would have given them a monopoly on penicillin production and power to use the word "penicillin" as a trade mark. Fleming was very annoyed and said "I found penicillin and have given it free for the benefit of humanity. Why should it become a profit-making monopoly of manufacturers in another country?" As a result of discussions between the British Government and the Government of U.S.A. the patents were annulled and penicillin could be produced by any manufacturer with the ability and resources to do so.

As time went on, Churchill decided that plans for the mass production of penicillin were lagging, so he formed the Penicillin Production Committee, consisting of Sir Percival Hartley (Chairman), Professor Raistrick (Mycologist), myself (Ministry of Health), with Mr. Denton (Ministry of Health) as secretary. Our terms of reference were to scour the country and find a suitable building for early mass production of penicillin; the Chairman to report progress weekly to the Prime Minister. Numerous buildings were inspected and eventually the factory of Distillers Company at Speke, Liverpool, was chosen. Thenceforward the production

of penicillin by modern methods proceeded apace, using 40,000 gallon tanks in a hermetically sealed system, instead of thousands of bottles.

Fleming developed a method of growing the penicillin mould on black X-ray envelope paper, placed on the surface of a culture plate. In order to preserve the mould growth on paper permanently he obtained a supply of crude spectacle lenses from his brother Robert who was an optical manufacturer. He cut a circle of the paper with the mould growth in the centre and sealed it hermetically with cement between two crude lenses. He made about a dozen of these and gave one to our son, and on it he wrote in his copper plate handwriting, "One of the first cultures of *P. notatum* to be made in this way. Alexander Fleming to John Allison." Thirty years later it is still perfect. Later when Queen Elizabeth (now the Queen Mother) visited St. Mary's Hospital as Patron, he presented her with a similarly preserved culture of the Penicillium mounted in tortoiseshell. He also prepared about a dozen others mounted in imitation tortoiseshell, one of which he gave to me. He wrote on the reverse side, "The mould which makes Penicillin. Alexander Fleming 1948."

Fleming was knighted in 1944 for his services to humanity, and in 1945, Fleming, Florey and Chain were awarded the Nobel Prize for the discovery, purification and application of penicillin in the prevention and treatment of infections in man. Among the more than 50 honorary degrees, medals, fellowships and lectureships conferred on him from all over the world, he was the first foreign citizen to receive the United States Medal of Merit. He was made Honorary Freeman of Darvel, Chelsea and Paddington where he was born, lived and worked.

Fleming the man was short, broad-shouldered and deep chested, and his eyes keen and expressive. His memory was described as phenomenal by his contemporaries, and my close association with him for many years confirmed this opinion. During these years as pupil and friend, I never saw him lose his temper or speak ill of anyone, although on occasions when he was annoyed, his eyes could flash fire and a look was more expressive than the spoken word. I can only remember one serious disagreement between Fleming and his master, Wright. In the publication of a paper on penicillin he wrote, "It is suggested that it may be an efficient antiseptic for application to, or injection into areas infected with penicillin —sensitive microbes." Wright demanded the suppression of this statement, as it was contrary to his own strong belief, that the natural defences of the body, including lysozyme, were alone effective against infection. Fleming did not yield to this demand and this memorable and prophetic statement was published in June 1929, twelve years before penicillin was first used successfully to cure infections in man.

Fleming has been described as taciturn and laconic, but he was a good listener, quick to grasp the essentials of a discussion and give the coup de grâce to any ill-conceived theory. In informal discussions, he delighted to take views opposite to those expressed, although he often secretly agreed with them, and in this way he often extracted valuable ideas for experimental work. He used this technique, as I know by experience, to assess the originality and agility of mind of young workers, and to encourage them in clear thinking and reasoned argument. He was

not a great lecturer, but he had the gift of lucid exposition and made up in sincerity what he lacked in eloquence. His phenomenal memory and quick mind served him well in reading medical journals; his reading was done in short spells and he could not remain inactive for more than half-an-hour or so, whether in the laboratory, at home or at his country house. Like all great men, he had his early disappointments, particularly in the total lack of appreciation by his medical colleagues of his discovery of lysozyme and penicillin. Outwardly he appeared indifferent, but I and others sensed his inward feeling of frustration at the time—vindication and time of glory were still to come.

Although he was fond of people and company and made many friends in different walks of life, he was not easy to know intimately, due perhaps to his modesty and diffidence. He and his wife, Sareen, to whom he owed much, were excellent hosts and entertained much both at his flat in Chelsea and at his country home in Suffolk. He had a keen artistic sense and was no mean performer with water colours. On one occasion at Barton Mills he depicted in water colours a Turneresque painting of his guest, a Professor of Medicine, lying in a hammock in the garden. He was persuaded to enter the painting at an exhibition by the Royal Society of British Water Colour Artists. This he did under the nom-de-plume of "Peter Turnbull", and to his surprise it was accepted and hung, but he bought it back via one of his medical colleagues.

He loved to go to auctions of pictures, old silver and glass, and garden shrubs and bulbs. For example, on one occasion I went with him to an auction of shrubs and bulbs at Moorgate in the City. He bought for £1.75 a sack of 500 "King Alfred" daffodil bulbs. Of these Professor Pannett, Dr. Leonard Colebrook and I, each bought 100 and the remaining 200 went into his garden at "The Dhoon". One day in 1924 in the laboratory he was reading "The Times" and he remarked to me "I see there is an auction of pictures at Sothebys, does anything interest you?" I looked at the list and said "There are some etchings by Whistler which would appeal to me". He said, "Let us go and see them", and off we went to Bond Street. The Whistler etchings were auctioned for £30–£35, a figure at that time beyond my pocket. However another item was a folder containing three unframed etchings by a then unknown artist called Picasso. Fleming suggested I bid for them and as two of them were studies of human heads, I said I would and asked him how much I should bid. He said "Try £3" and to my surprise there was no other bid and I took home my three Picassos. Forty-two years later, I took the Picassos and a lithograph by Sargent, the American painter, which I had bought for £1.75 at the same auction, back to Sotheby's where they were sold for a considerable profit.

The first book on penicillin to be published during Fleming's lifetime was "Miracle Drug" by David Masters. I purchased a copy for our son, then aged 12 years, and on the cover page I have got the signatures of Fleming, Florey and Chain, the three Nobel Prize winners. Fleming wrote, "I hope this will inspire you", Alexander Fleming, March 26th 1947.

Flemings handwriting was small and copperplate and I still have several of his letters. The beautiful neat draughtsmanship of his lantern slides and innumerable

diagrams and tables in black and white and in colour, prepared both for teaching purposes and for illustration in scientific journals, may be seen, preserved and treasured in the Wright-Fleming Institute, St. Mary's Hospital. He was for many years an honorary member of the Chelsea Arts Club and numbered many artists among his friends. He was also a member of the Three Arts Club, and he took me as guest to both clubs, where he introduced me to a number of world-famous artists (Dame Laura Knight, Wilson Steer, Lamorna Birch). He was a keen and expert photographer and applied his skill in this art, both in the laboratory and as a leisure occupation, with excellent results. He played a vigorous game of billiards and snooker and could defeat younger and more experienced players at tennis, golf and croquet. At Barton Mills in the summertime we played croquet and clockgolf at night in semi-darkness with candles placed alongside the croquet hoops or at the hole in clock golf. He was almost unbeatable at chess and draughts and played a good game of bridge.

Of all his leisure activities, there is no doubt that gardening gave him his greatest pleasure—fruit, flowers and vegetables grew in profusion at "The Dhoon." He had "green fingers" and was forever experimenting with cuttings, cross-pollination, grafting, new plants and seeds. His wife was equally fond of gardening and much of the produce of their garden went to the wards of St. Mary's Hospital. Visitors to "The Dhoon" were expected to earn their keep and Sareen and Alec kept their guests busy working in the garden.

Fleming loved to browse in second-hand bookshops and was specially interested in history and books on birds and insects, illustrated in colour. He possessed a good collection of water-colours and oil paintings, and had some fine examples of Georgian silver and old English cut glass.

In less serious vein in the laboratory he gave demonstration of cultures of germs which produced pigments, red, orange, yellow, green and violet—almost the colours of the spectrum. By distributing these germs on culture plates, he produced colour pictures, for example a woman's head, boxers in a ring, a mother feeding her baby from a bottle, a ballet dancer and a reproduction of "The Dhoon". He also constructed bacterial rock gardens, with the penicillin mould as moss and pigment-producing germs as brilliantly coloured flowers. Once when Queen Mary paid a visit to the hospital, he included an exhibition of these bacterial paintings. Her Majesty was not amused and hurried past.

Fleming's work has been of the utmost benefit to suffering humanity, and it was fitting that at the end his ashes were interred in the crypt of St. Paul's Cathedral close to the tombs of Wellington and Nelson and that of Florence Nightingale. On a white marble slab are the words "Remember before God, Sir Alexander Fleming, F.R.S., Discoverer of Penicillin, whose ashes rest beneath this Plaque. Born 6th August, 1881. Died 11th March, 1955". His name will surely be remembered for ever.

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DISTINCTION AWARDS IN NORTHERN IRELAND

by

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Chairman of the Northern Ireland Distinction Awards Committee

IN MAY 1973, 'Health Trends', a publication of the Department of Health and Social Security and the Welsh Office, included an article by the Chairman of the Advisory Committee on Distinction Awards in Great Britain on the work of the Committee with particular reference to the Procedures of Selection. In Northern Ireland, with its number of consultants rather less than one-thirtieth that of Great Britain, the situation is very different, though in many ways the same pattern is followed. It was felt that an account of the work of the Northern Ireland Distinction Awards Committee might clarify the impression of the way in which the Committee carries out its duties.

In September 1970 I was invited by the then Minister of Health to accept the chairmanship of the Committee. Prior to that date I had served as a member of the Committee since 1966, and as vice-chairman. I have also served on the Advisory Committee on Distinction Awards in Great Britain.

Origin of the System

The Distinction Awards system originated at the inception of the National Health Service in 1948, when the Spens Committee in its Report on the Remuneration of Consultants and Specialists recommended that a Committee should be appointed with power to recognise special contributions to medicine in the field of research or otherwise, exceptional ability or any outstanding professional work, by the conferment on selected hospital consultants in the National Health Service of Distinction Awards of different grades. The Government accepted this recommendation and set up the Advisory Committee on Distinction Awards in Great Britain. A similar Committee was set up in Northern Ireland to advise on the allocation of awards to consultants in the health service in the Province. The first chairman of this Committee was Sir Ernest Rock Carling, and he has been followed by Sir Edward Wayne and myself.

The Royal Commission on Doctors and Dentists Remuneration (the Pilkington Committee, 1960) examined the system thoroughly and endorsed it generally in the following terms: –"The common methods of securing differentiation of income are not open to the consultant as far as his health service work is concerned. Unlike some professional men in private practice, he cannot vary his fees in accordance with his professional standing; and unlike the salaried employee in most fields he cannot look forward to promotion. In these circumstances we consider the awards system is a practical and imaginative way of securing a reasonable differentiation of income and providing relatively high earnings for the significant minority to which the Spens Committee referred. We therefore unreservedly support the continuation of the system."

The awards are graded as A+, A, B and C, and part-time consultants receive the appropriate proportion according to their contracts. The number of awards is approximately one-third of the total number of consultants, and, together with their values, is determined in the light of the recommendations of the Review Body on Doctors' and Dentists' Remuneration. Once granted, an award is retained until retirement or until the age of 70, or until cessation of appointment, whichever is the earlier. First entitlement is to a C award, and this and promotion to a higher award is made on the recommendation of the Distinction Awards Committee.

Northern Ireland Committee

In Northern Ireland until 1968 the Northern Ireland Hospitals Authority was responsible for determining the number and allocation of awards having regard to the advice of its Distinction Awards Committee. Since 1968 when the Hospitals Authority became its agent, the Ministry of Health and Social Services, now the Department has been responsible. For the purpose of determining the allocation of awards the Department is advised by the Northern Ireland Distinction Awards Committee, which is appointed by the Head of the Department of Health and Social Services. Members are appointed for three years on a rotational basis, with provision for reappointment, so that vacancies occur at the end of each year when the Committee is reconstituted. The current membership in addition to myself is as follows: –

Vice-chairman:	Sir John A. Stallworthy, F.R.C.S., F.R.C.O.G.
Members:	Professor G. F. Adams, C.B.E., M.D., F.R.C.P.
	Sir John H. Biggart, C.B.E., M.D., F.R.C.P.
	J. S. Loughridge, Esq., M.D., F.R.C.S.
	Professor W. M. Millar, C.B.E., M.D., F.R.C.P.
	Rt. Hon. Sir Herbert A. McVeigh, Lay Member.
	Mr. Justice J. A. McGonigal, Lay Member.

Of these members, three (including the chairman) are consultants from Great Britain appointed with a view to ensuring parity of standards throughout the United Kingdom; three are consultants from Northern Ireland who are of such standing as to have no personal interest in the allocation of awards. The seventh and eighth members are laymen, one a retired Lord Justice of Appeal of the Supreme Court and the other a serving High Court Judge. Their functions are not primarily to involve themselves in matters of professional judgement on the claims of any individual for recognition under the system, but to satisfy themselves that the Committee's procedure in these matters is beyond reproach.

The terms of reference of the Committee are: –"to advise the Department of Health and Social Services which consultants and specialists employed by the Health and Social Services Boards should receive awards for professional distinction having regard to the number of awards available for allocation."

The values of the awards in Northern Ireland are the same as in Great Britain, and the number is in direct proportion to the number of consultants in both countries. The number under each category is likewise in proportion to the number in the corresponding category in Great Britain. At 1st April 1974, the number of consultants in Northern Ireland eligible for awards was 453, and the number of awards totalled 159, composed of 4 A+, 15 A, 44 B, and 96 C. The Committee usually meets once a year to make recommendations for the allocation of awards which have become vacant because of retirement, death or a move to employment outside Northern Ireland, or of additional awards arising from the recommendations of the Review Body on Doctors' and Dentists' Remuneration. Reciprocal arrangements with the Great Britain Committee exist whereby a consultant transfering from Northern Ireland to Great Britain or vice versa will receive an equivalent award in the other country. As in Great Britain the identity of award holders is not disclosed. After each annual meeting, the recommendations of the Committee are considered by the Department, which makes a determination for the granting of the awards. The secretariat for the Committee is provided by the Department of Health and Social Services.

Procedure

Every consultant on first appointment is asked to fill in a form giving any information which he may think of use to the Committee in making its recommendations. Further copies of this form are sent out to all consultants at intervals of a few years, and nearly all consultants have availed themselves of these opportunities to keep the Committee informed of their work. In addition all consultants are asked to let the secretary of the Committee know at any time if they have any fresh information to give, such as higher qualifications, appointments as examiners or membership of important committees or councils, or publications in the medical press. This information is circulated to all members of the Committee.

While the Committee is thus dependent on individual consultants keeping it informed about their personal achievements, it is most conscious in the interests of justice of the need to obtain as much relevant information as possible. This has been achieved up to the present in several ways. The members have paid annual rotational visits to different areas of the Province to meet the consultants in the area. In 1973 the senior award holders in each specialty or group of specialties appeared before the Committee to give their views on the merits of consultants within their particular specialties. The intention is to repeat this exercise at intervals of three or four years. In 1974, as well as making an annual visit to a hospital centre, I have visited the four Health and Social Services Board Areas to meet four consultants from each Board Area to obtain additional advice about the merits of the consultants within the administrative area of the Board. This follows the practice in Great Britain where such regional committees have been established to give advice to the Chairman. The purpose of these meetings was again to supplement the information available to the Committee and to ensure that consultants working in peripheral areas receive the fullest possible consideration. I also have meetings when necessary with the Chairman of the Great Britain Advisory Committee to ensure conformity of standards between the two Committees.

At its annual meeting the Committee first receives a report on any changes which have taken place amongst the consultants, and of the number of new awards in each category which are available. The lists of A, B and C award holders are then scrutinised, together with any new information which is available, and short lists are made for promotion. Careful consideration is then given to the reports of all consultants who have no award, in order to select those to be recommended for C awards. This is perhaps the most difficult task, and it is here that the Committee is indebted to the senior award holders in each specialty who have appeared before the Committee and given it the benefit of their advice. As a result of the additional advice received and the advice which the chairman has received at his meetings with the consultants in each administrative area, short lists in each specialty are prepared for recommendations for C awards. Usually on the second day of its meetings the Committee again reviews the short lists and makes final recommendations to the Minister of Health and Social Services. The waiting lists, especially those for C awards are then again carefully reviewed and carried forward for further consideration at the next annual meeting. It is clear with the limited number of awards available that there are many deserving cases which the Committee feel should receive awards. Once, however, a consultant is on the waiting list there is a good prospect of his receiving an award within the next year or two.

Criteria for Recommendations

In making recommendations every aspect of a consultant's work is taken into consideration. Excellent clinical work receives first attention, but this is not always easy to assess. Teaching junior staff or undergraduates, original research either clinical or basic, external examinerships (which are based on the opinion of colleagues), active work outside the strict fulfilment of the contract, probably in association with medical colleges and societies, are taken fully into consideration.

Certain types of case are relatively straightforward. If, for example, a consultant clearly has international standing in medicine then he is a candidate for an A award (although he might have to wait until an award becomes available). Similarly a consultant with a clear national standing in his specialty is a candidate for a B award when available and a consultant with a clear regional pre-eminence would be strongly placed for a C award.

Conclusion

The Committee welcomes representations from individual consultants on their own behalf or on behalf of other colleagues or from other sources, and will continue to seek information in as many ways as possible in order to enable it to discharge its responsibilities with the utmost impartiality and fairness to all consultants. While it is accepted that the system is by no means perfect, and the members of the profession themselves are divided on its merits, with improved methods of consultation and of supplementing the information available to it, I trust that the Committee is exercising its functions in the best interests of the Northern Ireland consultants, and that it will continue to do so.

EPIDEMIOLOGY OF CLINICAL Q FEVER IN NORTHERN IRELAND

by

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IRELAND was once thought to be free of Q fever (Kaplan and Bertagna, 1955). An investigation of patients, abattoir workers, veterinary surgeons, farm workers and farm animals in Northern Ireland showed that Q fever was present and entered the country sometime between April 1957 and February 1962 when the first known clinical case occurred (Connolly, 1968). In the Republic of Ireland a survey was carried out between 1966 and 1970 which showed that Q fever was present there as well (Hillary, Shattock and Meenan, 1971).

Some epidemiological and clinical data on 57 patients in Northern Ireland with Q fever are reported here.

Materials and Methods

The serological methods were described previously (Connolly, 1968). A four fold or greater rise of Q fever antibody between acute and convalescent sera indicated recent infection and a static Q fever antibody titre of 1: 160 or greater together with supporting clinical and epidemiological data was regarded as evidence of Q fever infection in the recent past. All sera were also screened against adenovirus, psittacosis and *Mycoplasma pneumoniae* antigens and where appropriate influenza virus types A, B, and C, parainfluenza types 1 and 3 and respiratory syncytial virus antigens.

Results

Fifty-seven patients with Q fever were diagnosed between 1962 and 1973. Fifty patients had rising titres of Q fever antibody and seven had static high titres as defined above. A non-specific rise of Q fever antibody has been described in certain adenovirus infections (Van der Veen & Heyen, 1966; Stephens, 1971) but a rise of antibody to adenovirus or the other antigens tested was not found.

Yearly incidence

The yearly incidence of clinical Q fever was as follows: –

1962	3	1965	3	1968	4	1971	5
1963	1	1966	11	1969	6	1972	5
1964	3	1967	2	1970	1	1973	13

Q fever has occurred every year for the past 12 years with higher incidences during 1966 and 1973.

Monthly incidence

The month of the year when the patients' illnesses began was as follows:

J	F	M	A	M	J	J	A	S	O	N	D
6	1	5	18	8	2	3	—	4	4	2	4

Over one half of the patients had their illnesses during March, April and May with a peak incidence during April.

Age and sex

The age and sex of the patients was as follows:

Age in years	0–9	10–19	20–29	30–39	40–49	50–59	60–69	70–79	TOTALS
Male	1	4	8	9	18	7	2	–	49
Female	–	–	2	–	2	1	2	1	8
Totals	1	4	10	9	20	8	4	1	57

Forty-nine patients (86 per cent) were male and there was a higher incidence in the 40–49 year-old age group. The youngest patient was a 3-year-old boy and the oldest was a 73-year-old woman.

Illnesses

The clinical illnesses associated with Q fever infection were as follows:

Illness	*No. of patients*	*Percentage*
Pneumonia	38	67
Influenza-like	10	17
Pericarditis	3	
Myocarditis	3	14
Endocarditis	2	
Meningitis	1	2
Total	57	100

The majority of patients (67 per cent) had pneumonia of the "viral" type. A 49-year-old man had the additional complication of jaundice and another man had swelling of the right parotid gland but mumps serology was negative. Another patient had recurrent bouts of depression after his pneumonia and committed suicide. Three patients had bilateral pneumonia. In some patients the radiological signs of pneumonia were slight and could easily have been missed but pleuritic pain, headache and pyrexia were usually present.

Patients with influenza-like illnesses and pyrexias of unknown origin had severe headache, pyrexia, aches and pains and excess sweating for a prolonged period. In this group a three-year-old boy also had generalised swelling of lymph nodes while a boy of 10 years had pharyngitis and conjunctivitis. Four patients were detected during influenza epidemics when they were clinically diagnosed as influenza but influenza serology was negative.

Seven of the eight patients with cardiac complications had a rising titre of Q fever antibody which indicated that their illness was in the acute stage. Three patients had pericarditis. Two men aged 32 and 46 years developed pericarditis associated with a friction rub and a pericardial effusion, while a 54-year-old woman had prolonged cardiac failure in association with her pericarditis. Three patients had myocarditis. Two men aged 28 and 40 years developed myocarditis with associated arthritis. The younger man also had slight jaundice and supraventricular tachycardia. Another 40-year-old man developed heart block associated with his Q fever infection. Two patients had endocarditis. A 21-year-old man rapidly developed congestive cardiac failure and died. At post-mortem, a large vegetation was present on the mitral valve which contained unidentified organisms. Only a single serum was obtained from this patient before death but it had a high titre (1: 320) of Q fever antibody. A 33-year-old man had a long history of rheumatic heart disease. He developed subacute endocarditis but repeated blood cultures for bacteria were sterile. He was treated for a prolonged period with tetracycline and recovered.

A 22-year-old man had the signs and symptoms of "viral" meningitis in association with his Q fever infection. His respiratory system was normal clinically and radiologically. The CSF contained 48 white blood cells/mm^3 of which 95 per cent were lymphocytes and the protein was 56 mg./100 ml.

Farm animal contact

Thirty-one patients (54 per cent) had a definite history of contact with farm animals mainly cattle. Twenty-four patients (42 per cent) were occupationally exposed and 7 patients (12 per cent) had casual exposure to farm animals. The occupationally exposed group included 8 farmers, 5 part-time farmers, 2 farmers' wives, 2 cattle truck drivers, a cattle dealer, a cattle grader, a veterinary surgeon, a farm electrician, a farm joiner, a farm sack salesman and a sheepskin assessor in a hide company. The part-time farmers worked at other jobs during the day but kept some cattle for their own use. It is of interest that a relative of a part-time farmer arrived by air from North Queensland, Australia to stay at his house just before the onset of his Q fever. Of the 7 patients who had casual exposure to farm animals, 3 patients had parents who owned or worked on farms and exposure occurred when the farms were visited. In addition, the parents of a child with Q fever used a field well which was also used by cattle. A medical practitioner also developed Q fever after a holiday on a cattle farm in Co. Westmeath, Republic of Ireland. Another two patients had contact mainly with horses although one of the patients was known to help a veterinary surgeon from time to time.

Probable direct or indirect contact with farm animals occurred in 10 patients (18 per cent). Eight patients lived in rural areas and included a medical practitioner, a nurse, 3 building trade labourers, a labourer, a textile mechanic who was exposed to dust and chaff when fixing the ceiling of his old house and an evangelist who held tent missions in fields used by cattle. Two patients lived in Belfast and included a child who was on a caravan holiday close to a Q fever infected farm and a Post Office employee who worked near an abattoir.

No definite contact with farm animals could be found in 16 patients (28 per cent) and their occupations had no connection with farming. Only one patient lived in a rural area, the rest lived in towns. In a town a mother and her daughter became ill at the same time with Q fever pneumonia. A blood sample was later obtained from their dog and it contained Q fever antibody. The other patients in this group were a retired company director, two clerks, a road sweeper's wife, a docker's wife, a fitter, a welder, a machinist, a weaver, a typewriter mechanic, a boilerman, a van driver, a chauffeur and a schoolboy.

Unpasteurised milk

Twenty-two patients (39 per cent) regularly drank raw cows milk but all also had definite or probable contact with farm animals. Of the 35 patients (61 per cent) who drank pasteurised milk 19 (33 per cent) had definite or probable farm animal contact. One patient who drank pasteurised cows milk also imbibed large quantities of raw goats milk. Sixteen patients (28 per cent) neither drank raw cows milk nor had any known farm animal contact. Of the five patients aged 19 years or less only one boy aged 3 years drank unpasteurised milk.

Geographical distribution

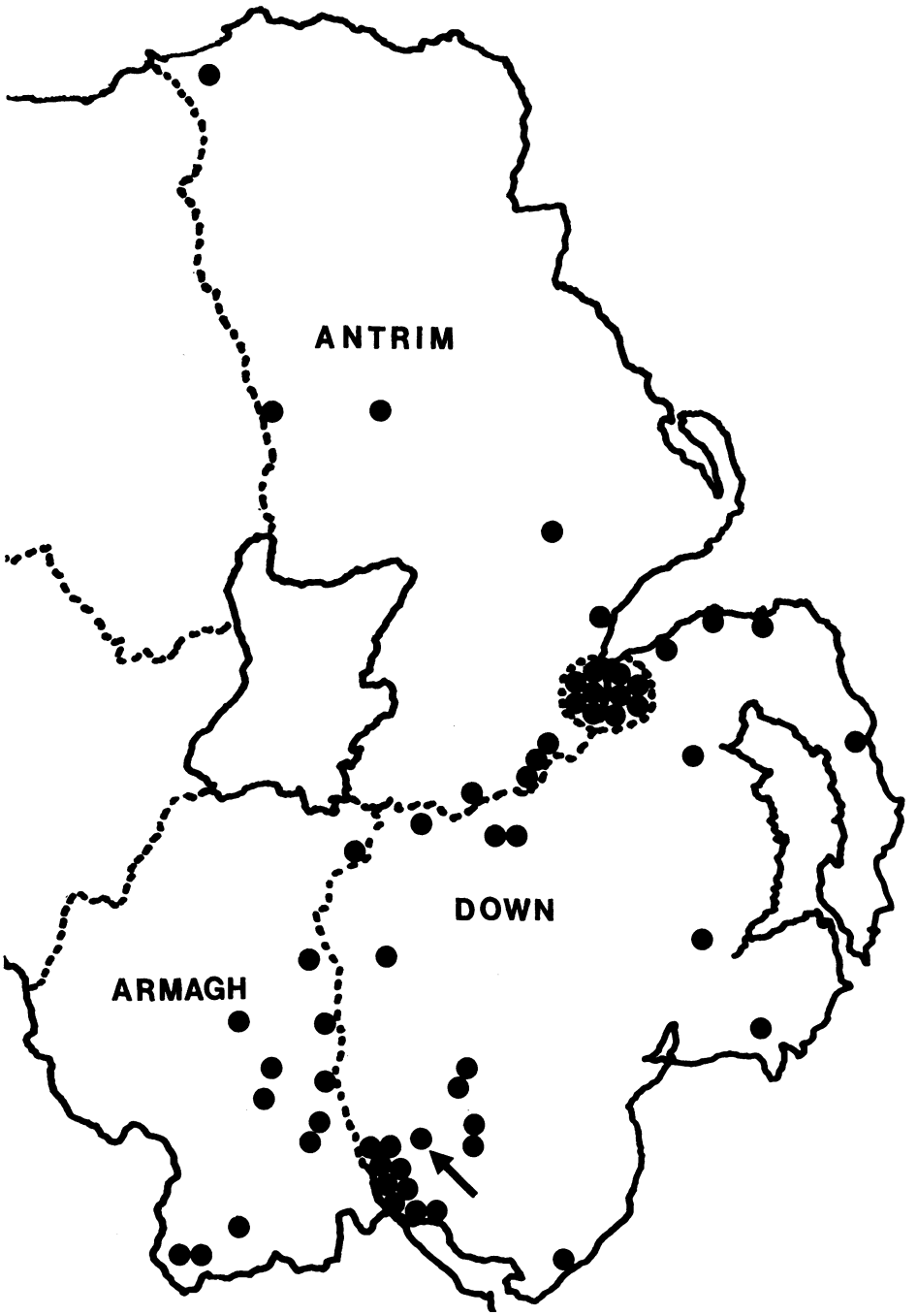
The number of patients with Q fever in each county was: Down (26), Armagh (12), Belfast Borough (10), Antrim (9) and their location is shown in the Figure.

Sera were received from all over Northern Ireland for diagnosis but the patients with Q fever were all confined to Belfast and the three eastern counties. There was a clustering of patients in the South Down and South Armagh region.

Discussion

The results show that Q fever is now endemic in Northern Ireland. The peak incidence of cases during March, April and May could be correlated with the calving and lambing in the spring. Virtually all lambing is between January and May. It is known that apparently healthy domestic livestock may shed enormous numbers of *Coxiella burneti* in milk, urine, faeces and particularly in the placenta (Welsh, Lennette, Abinanti and Winn, 1958). Q fever predominently affected males during their working life but it is difficult to explain the preponderance of cases during the fourth decade of life.

The patients with Q fever were selected in that their illnesses were severe enough to require hospital admission or investigation. It is probable that many other patients have been infected with little or no illness as was shown in the previous survey (Connolly, 1968). The disease is mainly acquired by inhaling contaminated dusts and aerosols particularly in the vicinity of farm animals. It is not surprising therefore that pneumonia or influenza-like illnesses were the commonest illnesses experienced. The heart was involved in 7 patients during the acute stage of Q fever, and another fatal case had endocarditis associated with presumed chronic Q fever. It is important to consider Q fever in endocarditis when bacteriological



Distribution of patients (closed circles) with Q fever in Belfast and the three eastern counties of Northern Ireland. The first known case which occurred in February 1962 is arrowed.

blood cultures are repeatedly sterile so that the correct treatment may be given (Kristinsson and Bentall, 1967; Freeman and Hodson, 1972). Severe headache is a prominent symptom in most patients with Q fever but the CSF is normal. The patient with proven meningitis was exceptional although the Public Health Laboratory Service reported 5 patients (2 per cent) with meningitis or encephalitis out of 231 cases of Q fever during 1967-69 (British Medical Journal, 1970). Additional unusual features of systemic Q fever were present in some patients such as arthralgia, parotid swelling, generalised lymphadenopathy and conjunctivitis. Jaundice was present in two of our patients (4 per cent). Powell (1961) found that abnormal liver function tests were very common in Q fever but clinical jaundice occurred in only 4 per cent of patients.

Seventy-two per cent of patients had definite or probable contact with farm animals. Not only are cattle and sheep imported from other areas of Great Britain where Q fever may be endemic but human exposure may occur at livestock markets where animals from many areas are brought together. Sheep had a three-fold higher incidence of Q fever antibody in one farm studied in Northern Ireland (Connolly, 1968) and also in a more widespread survey in the Republic of Ireland (Hillary, Shattock and Meenan, 1971). Other domestic animals such as horses, pigs, pigeons, geese and fowl may also become infected with Q fever (Babudieri, 1959). Three patients had close contact with their dogs which were shown to be infected with Q fever at some time in the past and one dog brought bits of sheep placenta into the house (Connolly, 1968). Three other patients from rural areas also noted close contact with their dogs just before the onset of Q fever but the dogs were not tested.

Perhaps of more interest were the 16 patients (28 per cent) who had no known contact with farm animals and only one patient lived in a rural area. All of them drank pasteurised milk. *C. burneti* is very resistant to adverse physical conditions and it may be carried long distances on clothes, straw, vehicles and other infected microenvironments (Clarke, Lennette and Romer, 1951). In town dwellers dogs may be a source of infection particularly if they have access to fields or are fed uncooked meat or bones infected with *C. burneti*. The movement of infected livestock either on foot or in vehicles through towns and villages may disseminate *C. burneti* particularly to those who live along the road (Babudieri, 1959). In this group of patients, a docker's wife and a road sweeper's wife may have been infected from *C. burneti* carried home on their husbands clothes. Road sweepers and crew of ships transporting livestock have a high incidence of Q fever infection (Babudieri, 1959). The clothing of people coming from infected areas either in Northern Ireland or abroad (e.g. North Queensland) may carry *C. burneti* which then infects people far from the original source of infection.

The fact that only 39 per cent of patients drank unpasteurised cows milk and all these patients had contact with farm animals would suggest that unpasteurised milk is not an important source of Q fever infection in Northern Ireland. While an outbreak of Q fever probably related to the consumption of raw milk has been described in Staffordshire (Brown, Colwell and Hooper, 1968) and *C. burneti* was isolated from pooled cows milk in Northern Ireland during 1966 (Connolly, 1968)

and again in 1972, most of the evidence points to infection by inhalation of infected dust or aerosols. The percentage of unpasteurised milk sold to domestic consumers in Northern Ireland has decreased every year and only 2 per cent was unpasteurised in 1972/73.

The clinical cases were all confined to Belfast and the three eastern counties of Northern Ireland. The previous survey (Connolly, 1968) showed that three times more veterinary surgeons in practice and ten times more abattoir workers in Belfast and the three eastern counties had Q fever antibody in their sera when compared with the same occupations in the three western counties. On the other hand, 23 per cent of farmers tested throughout Northern Ireland had Q fever antibody in their sera so it is surprising that clinical cases have not been detected in Counties Londonderry, Fermanagh and Tyrone. The clustering of clinical cases in the South Down and South Armagh region would suggest that Q fever may exist across the border in Co. Louth and Monaghan in the Republic of Ireland.

Summary

Fifty-seven patients with Q fever were diagnosed in Northern Ireland between 1962 and 1973. The highest yearly incidence was in 1966 and 1973 and the peak monthly incidence was in April. Q fever predominently affected males during their working life with a maximum incidence in the fourth decade of life. Pneumonia was the commonest manifestation of Q fever but influenza-like illnesses, pericarditis, myocarditis, endocarditis and meningitis also occurred. Seventy-two per cent of patients had definite or probable contact with farm animals and all those who drank unpasteurised milk also had farm animal contact. Dogs may have been involved in infecting three patients. All the patients were confined to Belfast and the three eastern counties of Northern Ireland.

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INTERSEX DISORDERS IN THE NEWBORN
A Brief Summary of Current Views*

by

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and

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"When a woman gives birth to an infant
that has no well marked sex,
calamity and affliction will seize upon the land,
the master of the house will have no happiness".

Babylonian tablet. 1,700 B.C. (Ballantyne, 1894)

FEW congenital abnormalities can be so distressing for parents than the discovery of ambiguous genitalia in their newborn infant. Intersex is the term used to describe such patients, of which there are 3 groups: —

(1) *The Female Pseudohermaphrodite* who has normal ovaries, but masculinized external genitalia;

(2) *The Male Pseudohermaphrodite* who despite testicular tissue, has external genitalia which are incompletely masculinized, or even completely feminized, and

(3) *The True Hermaphrodite* in whom gonadal tissue of both sexes is associated with varying degrees of masculinization of the external genitalia.

The term hermaphrodite comes from Greek mythology. Hermaphroditus was the offspring of Hermes and Aphrodite. A water nymph became infatuated with this youth and prayed to be united with him for ever. Immediately their two bodies were joined and they became as one. "In their double form they are neither man nor woman; they seem to have no sex yet to be of both sexes". (Larousse, 1959).

An understanding of the genesis of these disorders requires a brief review of the embryological events which control the formation of the genitalia (Fig. 1). Prior to the seventh week the fetal gonads are bi-potential and each is associated with both a Müllerian and a Wolffian duct. If the individual's karyotype is 46XX (female) the cortex of the primitive gonad become an ovary. The Wolffian ducts then atrophy and the Müllerian ducts persist to form the fallopian tubes, uterus and upper vagina. On the other hand, if the karyotype is 46XY (male) the medulla of the gonad becomes a testis. Although much is not understood of the factors

* This was presented in part to a joint meeting of the Ulster Medical Society and Ulster Neuropsychiatric Association in May 1974.

controlling gonadal differentiation, it seems certain that the presence of a Y chromosome, even an aberrant Y chromosome, in just a proportion of the somatic cells, will initiate testicular development at least on one side (Ferguson-Smith, 1966).

During the eighth week Leydig cells appear in the fetal testes. Testosterone secreted by these cells diffuses locally, inducing the development of an epididymis, vas deferens and seminal vesicle from the Wolffian duct; it may also induce testicular descent. In addition, the testis secretes another substance which actively suppresses Müllerian duct development. Each testis controls this induction and suppression on its own side. With the exception of testicular descent into the scrotum which is delayed until the thirty-sixth week, these events take place prior to the twelfth week of fetal life.

The external genitalia, in contrast to the internal organs, develop from a common primordium. In the female fetus the genital tubercle becomes the clitoris, the genital folds the labia minora and the genital swellings the labia majora. In the male, fetal testosterone causes further differentiation of these structures. The genital tubercle becomes the glans penis, while the genital folds form the shaft of the penis and by fusion from below upwards move the urethral opening out to its tip. Fusion of the genital swellings forms the scrotum. External genital development is complete by the sixteenth week of gestation.

Our knowledge of these events is largely the result of the brilliant animal experiments of Jost and co-workers in Paris (1958). They demonstrated conclusively the positive role played by the fetal testes in the differentiation of male internal and external genitalia.

The fetal ovary apparently plays a negative role in the genesis of these organs, since in the absence of normal fetal gonads of either sex the Wolffian ducts atrophy and the internal and external genitalia are female.

In this orderly sequence of events, anomalies may occur at any of the three points shown in Figure 1. Abnormalities in each of these three areas of development produce the three groups of intersex already defined. Patients illustrating each group are now described.

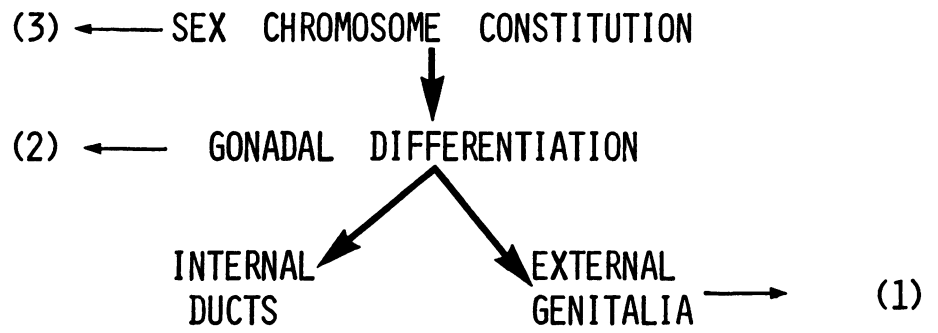

FIG. 1. *The developmental sequence by which normal gonads and internal and external genitalia are formed. Intersex may be the result of an abnormality at* (1), (2) *or* (3).

Case Reports

(1) *The Female Pseudohermaphrodite*

The female pseudohermaphrodite is a normal female, karyotype 46XX, whose external genitalia have been masculinized by androgens in utero. This is usually due to congenital adrenal hyperplasia (CAH), which is the result of an inborn error in cortisol biosynthesis. Hence cortisol secretion is deficient (Fukushima and Gallagher, 1959). Ninety per cent have a deficiency of the 21-hydroxylase enzyme system (Fig. 2). The resultant excess pituitary adrenocorticotrophin (ACTH) causes both cortical hyperplasia of the adrenal and stimulates the unaffected androgen

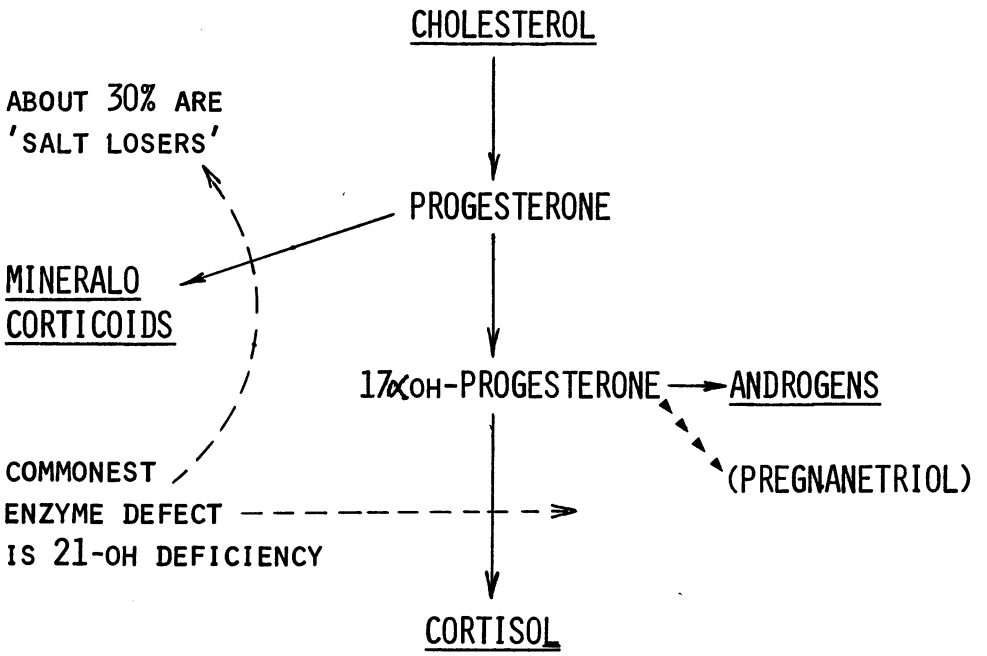

FIG. 2. *A simplified version of cortisol biosynthesis. The 21-hydroxylase deficiency blocks the pathways as shown. Androgens are produced in excess. The accumulation of 17∝-hydroxy-progesterone results in increased pregnanetriol.*

pathway to produce excess androstenedione. This masculinizes the external genitalia in a female fetus. Accumulation of 17∝-hydroxy-progesterone results in an increased excretion of its major urinary metabolite, pregnanetriol. Thirty per cent of infants with this enzyme defect also have inadequate production of mineralocorticoids, such as 11-deoxy-corticosterone and aldosterone. This causes excessive renal salt and water loss, which may lead to circulatory collapse and early death.

Patient MM was a 3Kg female infant born, following a normal pregnancy, in 1954. At the end of the first week of life she began refusing her feeds, vomiting and having diarrhoea. Two older sibs had died—a male of apparent "gastroenteritis" at 3 weeks of age, and a sister at 5½ months from an undetermined cause.

On examination she was mildly dehydrated. The systolic blood pressure was 65mmHg. The external genitalia showed a large phallus with a single small opening at its base. No gonad was palpable.

Investigations: plasma sodium was 133, chloride 91, and potassium 5.7 mEq/L and blood urea 95mg/100 ml. The urinary chloride concentration was 83mEq/L, indicating a salt-losing state. The urinary 17-ketosteroid (17-oxosteroid) excretion was 2 mg per 24 hours. This is greater than the upper limit of normal at this age (Forsyth, 1974) and signifies androgen over-production. On these clinical and biochemical findings the infant was diagnosed as having CAH.

She was immediately treated with cortisone acetate, added salt and DOCA (fludrocortisone acetate has replaced DOCA and salt supplements may not be required). Vomiting and diarrhoea ceased and she began to thrive. The clitoris was made smaller at 4 years of age. Before the onset of menstruation at 12 years of age the common urethro-vaginal orifice was corrected. This patient is therefore an example of abnormality 1 (Fig. 1).

(2) *The Male Pseudohermaphrodite*

The male pseudohermaphrodite, karyotype 46XY, is an individual who has testicular tissue but the genitalia are poorly masculinized and there is incomplete descent of the testes. Within this group various distinct entities are recognised. One such, probably the result of fetal testicular abnormality, is now described.

Patient EK was the youngest child in a family of 5 sibs. Three were normal females. The eldest child in the family, born in 1954, had a small phallus with a single opening at the base and bilateral undescended testes. He was reared as a boy and had repeated operations in a vain attempt to construct a penile urethra. During teenage he developed a personality disorder and became an alcoholic.

EK was born in 1964 with the same type of ambiguous genitalia. On discharge from the maternity unit no definite medical advice was given to the parents as to the sex in which the child should be reared. The parents themselves wisely decided to rear the infant as a girl.

Whenever the child was admitted with a respiratory infection at 2½ years of age, ambiguous external genitalia were noted. The phallus was 1.5cm long with a single small orifice 1 cm below its base. A gonad was palpable at the left external inguinal ring. The karyotype was 46XY.

Because the external genitalia were so poorly masculinized that the phallus would be unlikely to function as a normal penis and plastic surgery had manifestly failed to achieve this result in an older sib, it was decided to continue rearing the child as a girl.

The phallus was therefore reduced in size surgically and exploration of the gonads and pelvic organs carried out. The left gonad, which on frozen section showed testicular tissue, and its associated inguinal hernia were removed. At laparotomy the right gonad with a vas deferens was present in the pelvis. Frozen section biopsy of this gonad showed it was a testis and it was also removed. No uterus, tubes or vagina were present.

At the age of about 14 years the child will require oestrogen therapy to induce breast development. Masculinization will have been prevented by orchidectomy. In adult life a vagina should be fashioned surgically.

This patient had incomplete masculinization; by contrast, the child who will now be discussed, has normal testes but female external genitalia. This curious syndrome of testicular feminization, originally described by Morris (1953), is the most clearly defined disorder within the group of male pseudohermaphrodites. Although normal testes are present, masculinization of both internal and external

genitalia was prevented by end organ resistance to testosterone. However, normal activity of testicular Müllerian suppressor substance is suggested by the absence of a uterus and a short vagina (Federman, 1967).

Patient RL—born in 1974, was the first child of healthy, unrelated parents. The pregnancy was normal. There was an interesting family history. A maternal aunt of the patient had previously been investigated for primary amenorrhoea. The uterus and tubes were absent and the vagina was short. Gonads were normal testes. The karyotype was 46XY. Five other apparent 'females', known to be infertile may also have had testicular feminization syndrome (Fig. 3).

On examination of our patient RL, bilateral inguinal herniae were present and within each, a gonad was palpable. The external genitalia were those of a normal female infant. There was no other abnormality. The karyotype was 46XY.

Surgical exploration confirmed the presence of inguinal herniae and these were excised. Biopsy of each gonad showed them to contain histologically normal testicular tissue.

The testes were left in situ so that they would feminize the patient at 'puberty'. Subsequently they should be removed because of the high risk of neoplasia (Federman, 1967).

Patients EK and RL are examples of abnormalities at 2 (Fig. 1).

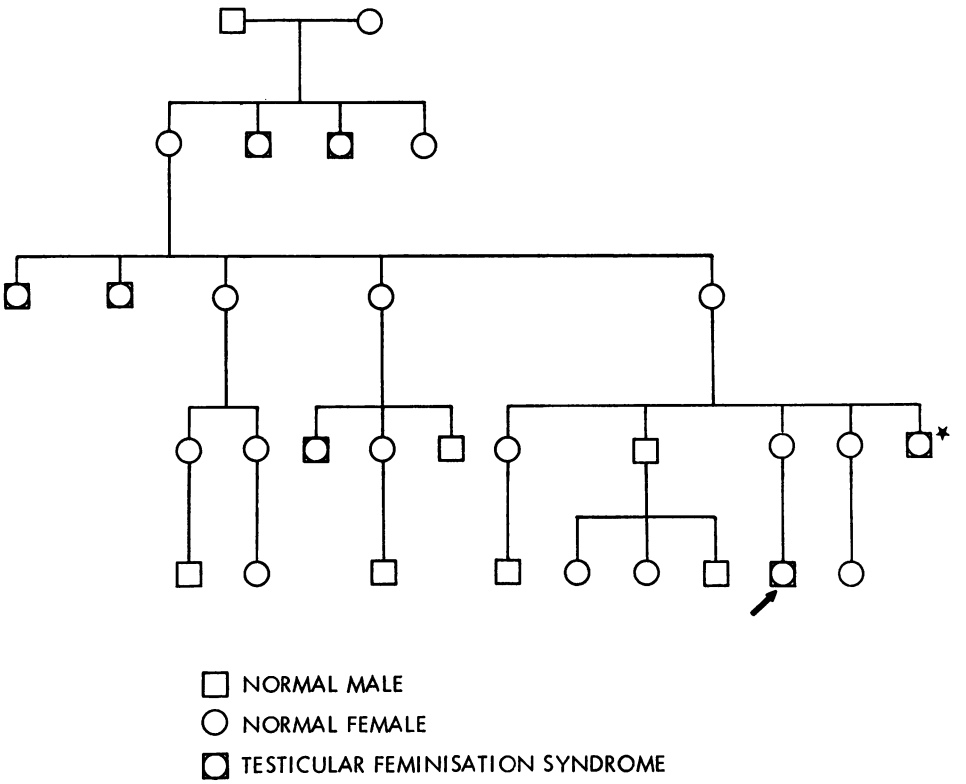

FIG. 3. *Pedigree of patient RL (arrow). An aunt (asterisk) also had the testicular feminization syndrome; other individuals thought to have this disorder are indicated by the same symbol.*

(3) *The True Hermaphrodite*

The true hermaphrodite is an individual in whom there is both ovarian and testicular tissue. In most the karyotype is 46XX (Jones et al, 1965). One explanation for the presence of testicular tissue in a genetic female has been suggested by Ferguson-Smith (1966). He postulates interchange of that fragment of the Y chromosome which carries the testes determining gene(s), with the homologous part of the X chromosome. This anomaly, which probably arises during paternal meiosis, is designated X^y. Cells with the karyotype $46XX^y$ are not however, discernible using present cytogenetic techniques.

In the true hermaphrodite there is a wide spectrum of phenotypic manifestations in both internal and external genitalia; some patients are feminized, while in others almost normal male genitalia are present.

> *Patient PC*—born in 1970, was the fifth child in an otherwise normal family. At birth the diagnosis of CAH was suggested by the presence of a large phallus with a single small opening at its base and no palpable gonad. However there was no pigmentation of the genital or areolar skin and no dehydration.
>
> Plasma electrolytes and the urinary 17-oxosteroid excretion were normal. Chromosome analysis of leucocytes showed a mosaic of 45X and 46XY cells. CAH was therefore excluded.
>
> It was decided to rear the child as a girl, because the external genitalia were so poorly masculinized. The phallus was reduced in size. The labia separated easily and distinct urethral and vaginal orifices were identified. Since no gonad was palpable it was necessary to explore the pelvis, in order to remove testicular tissue which would masculinize the patient at 'puberty'.
>
> Laparotomy was deliberately postponed until 3 years of age so that the pelvic organs could be more easily identified. At operation a normal uterus, tubes and two gonads were found. A vas deferens was also present in the right pelvis. Germ cells were absent on frozen section of each gonad and both were removed. Further histology showed the right gonad was an ovotestis and the left a fibrous 'streak'. Patient PC is therefore an example of abnormality 3 (Fig. 1).

Discussion

Examples of the 3 groups of intersex have been described and current ideas on their pathogenesis and management outlined. In each the earliest physical signs were ambiguous genitalia.

Congenital adrenal hyperplasia (CAH) due to the 21-hydroxylase enzyme deficiency, is the commonest cause of ambiguous external genitalia in the newborn. Its incidence in some communities is as high as 1 in 5,000 live births (Hubble, 1966). The affected infant is a female, whose external genitalia have been masculinized by adrenal androgens before the sixteenth week of gestation. The internal genitalia are normal. One explanation is that they differentiate before the fetal adrenal glands become functional at 12 weeks (Hamilton, 1972). Similar changes in the infant's external genitalia have been described, when progestogens were given to mothers early in pregnancy because of recurrent abortion (Wilkins, Jones, Holman and Stempfel, 1958). CAH should be promptly diagnosed because of the mortality associated with the salt-losing syndrome which is present in one-third of patients with this enzyme defect. Vomiting and diarrhoea occur during the first two

weeks of life and such infants may erroneously be thought to have gastroenteritis. Since this defect is inherited as an autosomal recessive trait, males are also affected. However, since their only genital abnormality may be congenital enlargement of the penis, too frequently they are overlooked. This is well illustrated by the family history of patient MM. A male sib developed severe vomiting and diarrhoea and died at 3 weeks of age presumably of salt loss.

The male pseudohermaphrodite may also present in early life with ambiguous genitalia. The types of genital abnormalities vary considerably as illustrated by the two patients described. Patient EK had arrested masculinization, probably the result of a defect in testosterone secretion by the fetal testes. The absence of female internal genitalia suggests that Müllerian suppressor substance was active. Several hereditary defects in testosterone biosynthesis are now recognised (Visser, 1974). Even in patients with undescended testes per se, recent studies have shown elevated plasma concentrations of follicle stimulating hormone, which is a sensitive indicator of mild hypogonadism. This might suggest that even in this relatively minor genital abnormality, a primary testicular defect is its cause (Lee, et al, 1974).

The syndrome of testicular feminization was diagnosed in early infancy in patient RL. More commonly it presents in adult life with amenorrhoea or infertility. The cause may be a deficiency of the enzyme 5α-reductase within the nuclei of the end organ cells. This enzyme normally transforms testosterone into its more potent metabolite, dihydro-testosterone, which stimulates protein synthesis within these cells (Bruchovsky and Wilson, 1968a; 1968b). The result of this biochemical defect is a life-long resistance to the action of both endogenous and exogenous testosterone (French, et al, 1965). An identical disorder has been produced experimentally in male rats, treated during fetal life with the anti-androgen, cyproterone acetate (Neumann, et al, 1970). The genetic basis of this disorder, which occurs about once in 100,000 of the population (Taylor, 1974), is a point mutation. Various studies have still not resolved whether this occurs on an autosome or on the X chromosome (Polani, 1970).

The true hermaphrodite is probably the rarest of the intersex disorders, though Polani (1970) found 339 patients in the world literature since 1899. The genitalia in general reflect the incomplete effectiveness of the fetal testes in suppressing Müllerian and stimulating Wolffian development. Hence a uterus is almost constantly present, while differentiation of the other ducts usually corresponds to the adjacent gonad (Guinet, 1965). Three-quarters of the reported patients have been reared as males, though some degree of hypospadias is often present. The diagnosis may then be delayed until early adult life, when gynaecomastia develops or menstruation occurs.

In many true hermaphrodites the karyotype appears to be 46XX. An explanation for this chromosome pattern, in the presence of testicular tissue, has already been given. A mosaic karyotype, 45X/46XY, as in patient PC, has been found in 20 per cent of true hermaphrodites (Polani, 1970). This abnormality is probably related to anomalous cell division around the time of fertilization.

All infants with ambiguous genitalia require immediate hospital referral for diagnosis and initial management. The clinical approach to such a patient should

include a full history, with particular reference to the family history. Three of our patients had a close relative with the same disorder.

Clinical examination should note the state of hydration. Pigmentation of the genital and areolar skin suggests increased ACTH secretion, the result of cortisol deficiency in CAH. The genitalia should be carefully examined. If a gonad is palpable in the external genitalia or groin, it is likely to be a testis or ovotestis. Since a normal ovary is rarely found outside the pelvis, the presence of a palpable gonad, associated with ambiguous genitalia, clearly excludes female pseudohermaphroditism. An inguinal hernia in an apparently female child should alert one to the possibility of testicular feminization, because herniae of this type are exceptional in normal female infants.

In the newborn with ambiguous external genitalia, immediate laboratory investigations for the diagnosis of CAH should be carried out, since this is the only intersex disorder in which the survival of the child is jeopardized. In the salt-losing type of 21-hydroxylase deficiency, the urinary chloride concentration is markedly elevated in spite of a low plasma sodium and chloride; the plasma potassium is raised. In the absence of excess salt loss these investigations are normal. Although the 24-hour urinary pregnanetriol is increased in older patients, this may not be the case in the newborn with this disorder, because of differences in the metabolism of 17α-hydroxy-progesterone in early life (Forsyth, 1974). Elevation of the urinary 17-oxosteroids (17-ketosteroids) indicates androgen excess; the mean value at this age is less than 1.0 mg/24 hours (Forsyth, 1974). In the other intersex disorders discussed all these investigations are normal.

Chromosome analysis of leucocytes should be carried out. This will distinguish the male pseudohermaphrodite (46XY) from the female pseudohermaphrodite (46XX). True hermaphrodites show a variety of karyotypes. Although the most frequently reported is 46XX (Polani, 1970), mosaics, as in patient PC, may also be found. Chromosomal analysis is more accurate than the Barr body preparation, particularly in the newborn female, where false negative results may mislead (Hamilton, 1972).

Once the diagnosis has been established, the child is assigned to the appropriate sex and a forthright explanation given to the parents. Ideally this should be done as early as possible, since the sex of rearing and gender identification, which is ingrained in early life, are important determinants of psycho-sexual orientation (Money, Hampson and Hampson, 1955).

A female infant with CAH, in whom the external genitalia alone are masculinized, should be reared as a girl. If adequate cortisone is given both excess ACTH and androgens are suppressed. The size of the phallus may then regress. If this does not occur, it should be reduced in size surgically before school entry. At operation, care should be taken to preserve the sensitive tissue of the glans. Pubertal development is normal, but before menarche a separate vaginal orifice should be ensured. Provided corticosteroid therapy is begun soon after birth, anomalies in the patient's gender role should not appear in adult life (Ehrhardt, Evers and Money, 1968). The female infant with CAH will become a normal, fertile adult.

When parents are known to be carriers of this gene defect, diagnosis in late pregnancy of an affected infant may be possible, by assay of the pregnanetriol concentration in amniotic fluid (Jeffcoate, et al, 1965).

Since fertility is almost never possible in the other groups of intersex, the child should be reared in the sex appropriate to the external genitalia, regardless of the karyotype. It is therefore a simple decision to rear the child with testicular feminization syndrome as a girl, because the external genitalia are completely feminized. It is important that the testes remain in situ to feminize the child at 'puberty'. Female secondary sex characteristics are probably produced by testicular oestrogens, since prepubertal removal prevents feminization (Morris and Mahesh, 1963).

In other male pseudohermaphrodites and in the true hermaphrodite, if the phallus is small with no penile urethra, so that micturition in the normal male fashion is impossible, then the infant should also be reared as a girl. The phallus should be reduced to the size of a clitoris and testicular tissue removed to prevent masculinization at 'puberty'. This policy was followed in patients EK and PC. Each will require oestrogen therapy to promote breast development in their teens. On the other hand, some of these patients may be more masculinized, with virtually normal male external genitalia. Here the decision would be to rear as a boy. Removal of ovarian tissue and internal female organs is then essential.

When sex of rearing is assigned on such criteria, much psychological morbidity, as occurred in the sib of patient EK, may be averted and the controversial question of reassignment of sex will not arise (Armstrong, 1968).

When the diagnosis of intersex is made, subsequent sibs should be delivered in a hospital where facilities are available for its full investigation.

Summary

Four newborn infants with intersex are described. The pathogenesis, differential diagnosis and management are discussed.

Congenital adrenal hyperplasia in a female is the commonest cause of ambiguous external genitalia. This is the only intersex disorder in which survival of the child is at risk. A palpable gonad virtually excludes this diagnosis. With adequate treatment, sexual development and fertility are normal. Hence females with adrenal hyperplasia should be reared as girls.

In the other intersex disorders, since fertility need not be considered, the sex of rearing is determined by the functional capacity of the external genitalia.

Optimal early management of infants with ambiguous genitalia renders anomalies of gender role unlikely in adult life.

We wish to thank Professor I. J. Carré for permission to report these children, Mr. W. Cochran for the details of their surgical management, Dr. N. C. Nevin for the cytogenetic analyses and Mrs. Marilyn McKee for typing the manuscript.

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A CASE OF GROSS NEONATAL OMPHALITIS IN THE UNITED KINGDOM

by

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GROSS cellulitis of the anterior abdominal wall following umbilical infection must now be considered to be an extreme rarity in this country.

Case Report

A 3260 gm. female, full-term infant was born on 3.1.73 in a general practitioner maternity unit, after a normal delivery. The cord was clamped shortly after birth with a Hollister clip and the infant fed well at the breast shortly afterwards. The cord stump was cleaned daily with surgical spirit after gentle bathing on a midwife's knee. The umbilicus was inspected daily by the nursing staff and its condition gave no cause for alarm during the first 6 days of life.

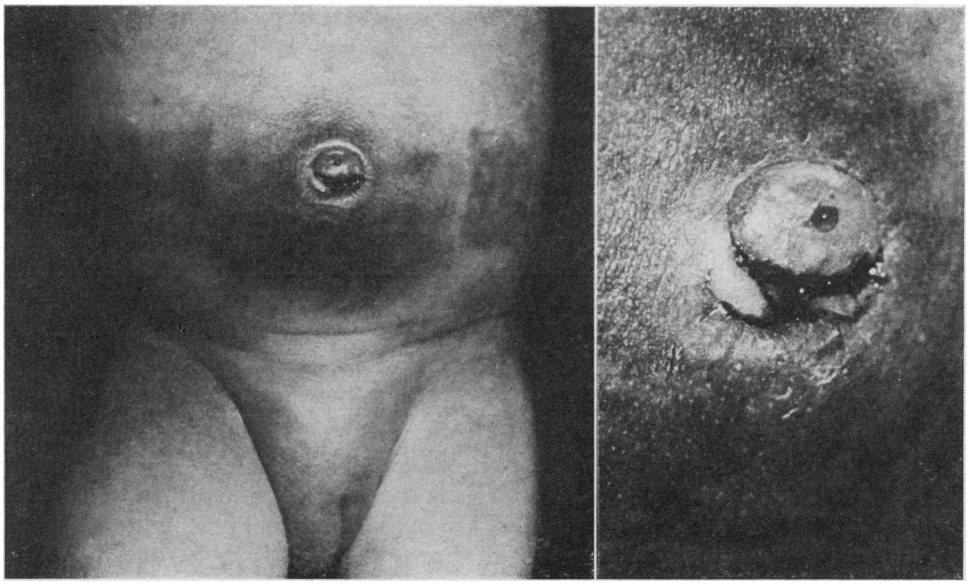
On the sixth day, when the infant weighed 3120 gms., she was examined by the family doctor who found a "click" in the right hip. At this time no other abnormality was noted though the cord had separated. The following day the infant's temperature was 38.5°C and the abdomen was noted to be tender, red and hard around the umbilical wound. This was then dusted with neomycin/bacitracin powder (cicatrin) and the doctor arranged transfer to the Neonatal Unit at the Belfast City Hospital.

On admission the infant weighed 3175 gms. and was pale and lethargic. There was some peripheral cyanosis and the temperature was 38.3°C. The anterior abdominal wall in the region of the umbilicus was red and indurated with serosanguinous fluid exuding from the umbilical wound (Figure). There was no crepitus in the tissues. Swabs from the umbilicus and blood cultures were taken before treatment was started with intravenous fluids, penicillin and cloxacillin. A Gregory Box was used to administer oxygen, as hyperbaric oxygen was not available.

Culture of the umbilical swabs grew Staph. aureus, coliforms, Cl. Welchii and Staph. albus but three blood cultures were negative. Radiology of chest and abdomen showed no abnormality and in particular gas was not present in the tissues. On admission the haemoglobin was 21.1 gm. per 100 ml. with a total white cell count of 30,700 per mm^3, 71 per cent of which were neutrophils and 25 per cent lymphocytes. The electrolyte block was normal.

Despite full supportive therapy and the addition of gentamicin to the antibiotic regime, the infant's general condition deteriorated with spread of the cellulitis to involve the vulva, upper thighs and lower chest wall. Death occurred on the eighth day.

Post mortem showed an area of reddish purple induration of the skin extending



The umbilical region showing the induration with a bead of serosanguinous fluid exuding from the remains of the cord.

4 cm. around the umbilicus and the underlying tissues and muscles were swollen and oedematous. There was no recognisable pus and only a slight fibrinous exudate on the related peritoneal surface and 20 ml. of clear fluid in the cavity.

Microscopically the peri-umbilical subcutaneous and muscle tissues were spread apart by an eosinophilic exudate and a heavy infiltration by polymorphs, but only traces of fibrin were present on the peritoneal surface. No gas bubbles were present. A heavy infiltration by polymorphs occupied the sheath around the umbilical arteries, but there was no reaction spreading along the umbilical vein.

A complete post mortem and histological study of all organs revealed no other lesion, congenital anomaly or evidence of dissemination of the infection, and the thymus showed only slight lymphocytic depletion.

Comment

Severe omphalitis amounting to spreading cellulitis of the abdominal wall was seen relatively commonly before the introduction of antiseptics last century.

Von Reuss (1921) quotes Runge "The term omphalitis is applied to that condition in which inflammation spreads to the cellular tissue of the neighbouring skin, sometimes in a large area of the abdomen. The condition is a dermatitis (allied to erysipelas) or a phlegmonous process. The disease generally occurs after detachment of the cord in the second or third week. The most severe local disease of the navel is gangrene. Before the antiseptic period the disease was frequent

like hospital gangrene generally; nowadays (1921) it is only exceptionally observed and must be unknown among medical men of the younger generation."

In this case the care of the cord followed the usual procedure in the general practitioner maternity unit. Antiseptics are not used routinely but only if the midwife suspects the presence of inflammation.

The source of the infection is not clear and no further cases of severe umbilical infection have been reported from the maternity hospital concerned. The infection may have been due to either a very virulent organism or organisms in combination, or to some susceptibility in the host. Externally the infant appeared normal, and showed a good leucocyte response to the infection. At post mortem the thymus gland was normal. Organisms that are known to cause a spreading cellulitis are haemolytic streptococcus and Cl. welchii. The former was not isolated in this case and the evidence of a clostridial infection is poor due to the absence of gas in the tissues and of muscle necrosis. The probability remains that the infection was due to a virulent staphylococcus and that the Cl. Welchii was incidental.

This case illustrates that severe umbilical infection can still occur to-day and extreme vigilance in the management of the umbilicus remains of utmost importance to all those concerned with neonatal care.

I wish to thank Professor J. E. Morison for his help and advice in the preparation of this report, and Dr. Muriel J. L. Frazer for permission to report on a case under her care.

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CONTINUING EDUCATION FOR GENERAL PRACTITIONERS IN NORTHERN IRELAND

by

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IN 1970 the Education Committee of the Council of the Royal College of General Practitioners commissioned a survey of the opinion of general practitioners regarding continuing education. The objectives of the survey were to ascertain the extent to which general practitioners were making use of the facilities available, their opinion of the teaching received and of the types of course commonly held, and also to seek suggestions for improvement in the organisation of continuing education.

The survey was conducted by a postal questionnaire distributed to all general practitioner principals in Northern Ireland and to a randomly selected sample of general practitioner principals in England and Wales. This paper presents an analysis of the replies received from Northern Ireland.

Method of Study

The questionnaire was distributed in the summer of 1970 to 759 general practitioners in Northern Ireland. Replies were received from 386 (51 per cent). No attempt was made to follow-up those practitioners who did not reply.

Results

Of the replies received 28.5 per cent were from single-handed practitioners, 38.6 per cent were in partnerships of two and 32.4 per cent were in partnerships of three or more doctors. The mean age of respondents was 48.08 years (standard deviation 9.69).

Postgraduate Medical Centres

A postgraduate Medical Centre (PGMC) was available to 78.5 per cent of whom 15.7 per cent could reach it within 10 minutes but 28.3 per cent required more than 30 minutes.

Locum requirements

In order to attend a course which entailed being absent from their practice, 44.2 per cent of the respondents had to obtain a locum, the majority of these were in single-handed practices. Many practitioners expressed difficulty in obtaining a locum, only 16.7 per cent said that they had no difficulty, and 57 per cent regarded the expense of a locum as a factor which tended to deter them from attendance at courses.

Types of course preferred

Practitioners were asked to indicate which of the commonly held types of continuing education course they would prefer to attend (Table 1). Long intensive courses proved to be the most popular and lunch-time meetings least popular. There was little difference in preference for extended courses, week-end courses, evening meetings or mid-week courses. When choosing a long intensive course 56 per cent preferred to attend one which was held outside their home area, and two-thirds liked accommodation to be provided rather than to find their own.

TABLE 1

The type of course preferred by Northern Ireland General Practitioners

Type of Course	*No.*	*Per cent*
Long intensive course lasting a week or more	143	35.0
Extended course	65	15.9
Short intensive week-end course	58	14.2
Evening meetings	58	14.2
Short mid-week course	50	12.3
Lunch-time meetings	34	8.3
	408*	100.00

*Some respondents gave equal preference to more than one type of course.

All practitioners were asked whether, regardless of their previously expressed preference, they could attend week-end and mid-week courses. As many as 85 per cent were able to attend week-end courses and 60 per cent could attend mid-week courses. However 41.6 per cent of those who could attend week-end courses said that they would prefer not to do so. Opinion was evenly divided concerning the most convenient time at which mid-week courses should be held: 50 per cent preferred the afternoon, 47 per cent favoured the evening and 3 per cent expressed no particular preference.

The content of courses and the standard of teaching

A change in the general content of courses was requested by 56 per cent of practitioners, 58 per cent of whom asked that clinical topics should be included more frequently. Other changes requested were for instruction in practice organisation (37 per cent), clinical case demonstrations (36 per cent), teaching in the behavioural sciences (25 per cent), basic science subjects (17 per cent) and instruction in research methods (14 per cent).

Most practitioners were satisfied with the level of instruction that they received and with the way in which courses were planned. Twelve per cent of all respondents said that there was insufficient use of modern teaching aids, 11.2 per cent complained of lack of variety and 10.7 per cent criticised the way in which material was presented.

There was an interesting difference between general practitioners' opinion regarding the amount of information they received about local and national courses. Only 2 per cent believed that they received inadequate information about courses held in their region, but 43 per cent said that they did not receive sufficient information about courses held on a national basis.

Facilities for continuing education

The facilities for continuing education in the region were regarded as satisfactory by 60 per cent of the practitioners who replied. A slightly smaller proportion (55 per cent) were satisfied with national facilities. However 34 per cent did not have access to a medical library and 27 per cent of those who did have access were unable to obtain books on loan. No medical book had been purchased during the twelve months prior to the survey by 37 per cent. In contrast, 41 per cent had bought two or more books including 10 per cent who had purchased more than four.

The nature and function of a journal club was known to 191 practitioners of whom 19 belonged to one and 113 (59 per cent) would like to join. Only 65 practitioners knew of a journal club in their locality.

Educational audiotapes were used by 30 per cent of practitioners, two-thirds of whom preferred to listen as a member of a group where discussion was included.

Other educational opportunities and intra-professional contacts

Questions were included about four other aspects of education, namely: reading, television, discussion with medical colleagues and the allocation of specific study periods. Only half of the respondents considered that they had sufficient time to keep up to date by reading and 33 per cent said that they regularly watched the BBC television programme "Medicine Today". Many practitioners (63 per cent) expressed a desire for the allocation of specific study periods (e.g. sabbatical leave).

Although most practitioners had an opportunity for medical discussion with general practitioner colleagues, only 54 per cent said that they had an opportunity for discussion with hospital colleagues, 29 per cent had an opportunity for discussion with local authority medical staff and 11 per cent with industrial medical officers.

Clinical attachments and clinical assistantships

In the questionnaire a clinical attachment was defined as a temporary unpaid attachment to a hospital consultant or department, purely for educational purposes. A clinical assistantship was defined as a salaried post in which a general practitioner worked as an active member of the hospital team. The survey found that 10.6 per cent of respondents had had a clinical attachment and 9.8 per cent had held a clinical assistantship.

Access to diagnostic services

Access to a radiography service was claimed by 68.9 per cent of respondents, but for only 28.2 per cent was access to contrast radiography included. As many as 75.6 per cent had access to a pathology service and 26.4 per cent reported the availability of other diagnostic services (e.g. ECG and EEG).

Discussion

It is important to emphasise that the results of this survey represent the opinion of general practitioners who replied. Although no doubt the opinions were based soundly on experience, they cannot necessarily be held to represent what actually occurred in practice.

Despite the relatively small response to the questionnaire some interesting points emerge, one of which is that nearly 80 per cent had access to a PGMC, despite the fact that there were only three in Northern Ireland at the time (McKnight, 1972). It is evident that Northern Ireland practitioners are prepared to travel quite long distances to educational meetings.

All general practitioners are familiar with the problem of finding a locum, and it was not surprising to find that 83 per cent of those who needed a locum expressed difficulty. It is interesting to observe that in a similar survey among general practitioners in north-west England, Byrne (1969) found that 46 per cent of practitioners needed a locum and 90 per cent of them had difficulty in finding one. Both proportions are larger than in Northern Ireland. The cost of employing a locum was also noted by Byrne. He found that the proportion of practitioners who regarded the cost as a significant deterrent was almost the same as in this survey.

The preference expressed in favour of the types of course commonly organised present interesting features. Week-end courses have not been held in Northern Ireland in recent years and many courses are held on week-days (McKnight, 1974), despite this 14.2 per cent expressed a preference for short week-end courses and only 12.3 per cent express a preference for short mid-week courses. Another interesting feature is the relatively high proportion who preferred long intensive courses compared with the very poor demand for long courses reported by Byrne (1969).

The finding that respondents would prefer to attend a long intensive course which was held outside their home area, raises the question whether the provision of such courses should be concentrated in specially designated centres where all the necessary resources, including residential accommodation, are available. Being a relatively small cohesive geographical area with a well established medical school, Northern Ireland would seem to be an area eminently suited to such an experiment.

Clinical attachments and clinical assistantships are frequently regarded as part of continuing education. Clinical attachments are designed to be educational but clinical assistantships are primarily service posts. Service needs vary from one locality to another and not every practitioner has an opportunity to obtain an assistantship but temporary attachments can usually be arranged more easily. The

Ministry of Health and Social Services (1972) found that 29.9 per cent of Northern Ireland practitioners who did not hold a hospital appointment wished to do so.

Table 2 illustrates some of the changes that have taken place since 1955 in general practitioners' opinion about continuing education, and includes some of the results obtained from the survey of general practitioners in England and Wales which have been more fully reported elsewhere (Acheson, 1974). Access to a

TABLE 2

A comparison of three surveys of continuing education for general practitioners

	1955[i]	1968[ii]	1970[iii]	
			Northern Ireland	*England & Wales*
	(*Per cent*)	(*Per cent*)	(*Per cent*)	(*Per cent*)
Use a medical library	36	50	66	83
Lack of time to keep up to date	75	49	52	52
Locum difficulties when attending courses	38	46	44	37
Have attended week-end courses	14	18	39	67
Have attended extended courses	20	47	40	41
Have attended long intensive courses	13	31	78	57
Courses too elementary	5	5	7	12
Courses too highbrow	5	14	18	7
Receive adequate information about regional courses	91	48	98	92
Receive adequate information about national courses	53	49	56	51
Topics desired: 1	∅	Clinical	Clinical	Clinical
2		Behavioural science	Practice organisation	Behavioural science
3		Practice organisation	Behavioural science	Practice organisation
4		Basic science	Basic science	Basic science

∅ Not available

REFERENCES: (i) College of General Practitioners (1958)
(ii) Byrne, P. S. (1969)
(iii) Present study

medical library has increased. Fewer now complain of lack of time to keep up to date, but almost the same proportion of practitioners still have locum problems. Opinion about the dissemination of information about courses is unaltered. Topics desired have not changed dramatically. The most important positive change is the increase in the proportion of general practitioners who now attend courses. The next step must be to give greater encouragement to home study by the provision of educational package programmes supplemented by postal tuition.

Summary

The results are presented of a survey of the opinion of general practitioners in Northern Ireland concerning some aspects of continuing education. Of 759 practitioners 51 per cent responded to a questionnaire and of these 78.5 per cent had access to a postgraduate medical centre. Of the types of course commonly available more practitioners preferred a long intensive course. Most practitioners were satisfied with the level of instruction received but changes in course content were requested by 58 per cent. Only half the respondents claimed to have sufficient time to keep up to date by reading and 63 per cent were in favour of the allocation of specific study periods. If they were to attend a course 44.2 per cent required a locum, and more than half had difficulty in obtaining one and regarded the cost of a locum as a deterrent to course attendance.

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MENINGOCOCCAL INFECTIONS IN BELFAST CHILDREN 1972-1973

by

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THE incidence of bacterial meningitis in Northern Ireland has been low in recent years but small local outbreaks still tend to occur and because of a high risk of morbidity and mortality it is a condition which must continue to command the respect of physicians and parents alike.

During the winter and spring of 1972–1973 it became noticeable that many more children with meningitis were being admitted to the Royal Belfast Hospital for Sick Children (RBHSC) than in previous years. Between August 1972 and August 1973 there were 83 such admissions as compared with only 20 in the same period of 1971–1972. Closer analysis of the aetiology revealed that the majority of bacterial cases were due to the meningococcus. Included in these figures are children who developed fulminant meningococcal septicaemia with or without meningitis.

Sixty per cent of the meningococcal organisms isolated during the period under review were noted to be resistant to sulphonamides. No preventive method of control of bacterial meningitis is at present available such as has been developed for other potentially life threatening infectious diseases. The effectiveness of sulphonamide administration to contacts is now doubtful in controlling spread of the infection. Reduction in mortality is therefore dependent entirely on the early recognition of the disease and rapid commencemnt of rigorous therapy. Indeed 5 of the 7 fatal cases in this series died within 12 hours of admission. It is clear that every case of childhood bacterial meningitis is an acute medical emergency.

Review of Material

Eighty-three cases of meningitis were diagnosed in the RBHSC between August 1972 and 1973. In thirteen no organism was cultured from the CSF, and because of marked lymphocytosis and no reduction in CSF sugar were diagnosed as aseptic meningitis probably of viral aetiology. One case proved to be due to the tubercle bacillus. Thirteen of the remaining cases, all of whom had typical CSF changes of bacterial meningitis, i.e. polymorph leucocytosis, low sugar level, and high protein concentration, were neonatal in origin and are excluded from the series.

A total of 56 bacterial cases remained, of these 29 were due to the meningococcus as seen on gram stain of CSF sediment or on culture of blood or CSF. The incidence of other organisms isolated was haemophilus 4, pneumococcus 3, and haemolytic streptococcus 1. A final group of 19 cases in which no organism was isolated then remains. Twelve of these were thought to be meningococcal in origin on the basis of, typical findings at post mortem, presence of a purpuric rash, or close contact with a proven case, e.g. the sister of another meningitis patient with

meningococcus isolated from CSF. Of the remaining seven cases in this final group only three had a polymorph CSF leucocytosis, the cells being polymorphs and lymphocytes in the other four. Four of these seven had antibiotic therapy prior to admission.

TABLE I

Basis of Meningococcal Diagnosis

	Number
CSF Culture	17
Blood Culture	3
Direct Microscopy	9
	29
Strong Clinical or P.M. evidence	12
Total	41

Table 1 summarises the 41 cases of meningococcal infection and the basis on which the organism was implicated. Eighty-five per cent of cases of bacterial meningitis admitted were meningococcal. All but two children were of pre-school age and 70 per cent of infections occurred in the first two years of life (Table II) with the youngest patient from whom the organism was isolated being only 2 months of age. Seven of the 41 children had an acute fulminant meningococcal septicaemia and died, i.e. 17 per cent of the patients. Age, sex and social class in fatal cases reflected the overall pattern. The youngest fatality was 3 months of age. All these fatal cases had evidence of a fulminating septicaemia and had widespread confluent purpuric rashes at death. Autopsy was carried out on five, four had bilateral adrenal haemorrhages and one a massive pulmonary haemorrhage. Geographical

TABLE II

Relationship of age to incidence and fatality – Meningococcal Infections

Age	*No. of Cases*	*Fatalities*
0–½ yr.	5	1
½–1 yr.	7	2
1–1½ yr.	12	2
1½–2 yr.	4	1
2–2½ yr.	5	1
2½–3 yr.	2	0
3–3½ yr.	3	0
3½–5½ yr.	3	0

distribution (Table III) may merely reflect the hinterland of the hospital but the possibility of a localised pocket of infection was discussed with the Medical Officer of Health. The geographical distribution was not reflected by admissions to the Northern Ireland Fever Hospital in the same period. Seasonal distribution is in keeping with reported epidemic patterns, i.e. late winter and early spring peak. The peak incidence built up from two cases admitted in December, five in January and again in February, six in March, to nine in April before falling off again to only 1 case in July. Early observations during the same period of 1973–1974 indicate a repetition of the pattern.

TABLE III

Geographical Distribution – Meningococcal Infections

Area	*No.*	*Area*	*No.*
Belfast 11	5	Armagh	1
Belfast 12	20	Down	2
Belfast 13	4	S. Antrim	2
Belfast 14	3	N. Antrim	1
Belfast 15	4	Other Areas	2

An important finding in examining the organisms isolated at the Royal Victoria Hospital Laboratory was that 60 per cent of these were sulphonamide resistant on standard testing. All these organisms were sensitive to ampicillin, penicillin and chloramphenicol. Of organisms isolated from fatal cases 50 per cent were resistant to sulphonamide. Three of the fatal cases were treated using a high dose intravenous ampicillin regime and four with traditional triple therapy. Considering all organisms isolated from the total 56 bacterial cases only one other organism showed resistance to any of the 4 mentioned antibiotics. This was a pneumococcus resistant to sulphonamide.

CLINICAL FEATURES

Case 1

A nine month old boy presented with a history of irritability and being "off his feeds". The parents were worried because he seemed very drowsy. Hospital referral was because of an absence of a cause for his pyrexia of 101°F. Shortly after admission he was observed to have a convulsion of short duration. Lumbar puncture was performed and CSF analysis revealed a low sugar, polymorph leucocytosis and high protein concentration. Meningococci were not observed on Gram stained smears but were subsequently cultured. Intravenous triple antibiotic therapy with penicillin, sulphonamide and chloramphenicol was commenced. Within 48 hours he was obviously improved and demanding food. Parenteral antibiotics were continued for 7 days until the CSF was normal. Recovery was full and uneventful.

Case 2

This eight month old boy was noticed by his parents to be a little out of sorts and irritable before going to bed on the evening prior to admission. He spent a restless night and woke his parents with grunting and groaning. He had a nasal discharge in

the morning and when bathing the child the mother noticed there was a rash like red pin points on his abdomen around 9 a.m. Shortly afterwards he became very drowsy and his mother now noticed the rash had spread to his legs and buttocks. She brought him straight to RBHSC Casualty and reported his eyes had been rolling on the journey. On examination he was found to be collapsed with a widespread ecchymotic rash. He was admitted to the Intensive Care Unit at 11 a.m. Intravenous fluids, triple antibiotic therapy and hydrocortisone were administered. LP produced clear CSF with no abnormal findings, but from which meningococci were subsequently grown. One hour after admission the child suffered a cardiac arrest but was resuscitated using intracardiac calcium chloride and adrenalin. He was intubated and ventilated but 7 hours after admission again had a cardiac arrest from which he could not be resuscitated. Autopsy revealed bilateral adrenal haemorrhages.

These two cases vividly illustrate the difference between the simple case of meningitis which progresses slowly and presents with classical signs and this rapidly fatal form of the infection.

Spectrum of Disease

There is a wide spectrum of meningococcal infection ranging from asymptomatic carrier states, which have been demonstrated in 37 per cent of populations in some series, to a fatal, acute fulminant meningococcal septicaemia. When invasion from the upper respiratory tract occurs resulting in a bacteraemia, dissemination to many organs may occur. The infection most commonly presents with involvement of the meninges and the skin causing signs of meningitis and a purpuric rash. Joints, myocardium, adrenal glands, ears, eyes and lungs may also become involved by the bacteraemia.

Presentations and Progress

All practitioners recognise the classical signs of meningitis but these only occur in children past the toddler stage. The diagnosis of meningitis in infants is usually based on the analysis of cerebrospinal fluid. Lumbar puncture in this age group is carried out most often because the other common causes of a pyrexia, e.g. otitis media, tonsillitis, etc. have been excluded on clinical examination. Not only may Kernig's sign be negative and neck stiffness be absent, but there may not even be a pyrexia and bulging of the fontanelle, usually the most reliable sign in infants, may not occur. Nevertheless, the experienced physician or parent readily recognises these children are ill because they are apathetic and listless until disturbed when they become irritable and fretful. They may have vomiting and on occasions diarrhoea which can be diagnostically misleading. Without exception they feed poorly if at all. Active parenteral antibiotic therapy at this early phase in the illness usually leads to full recovery.

In the acute fulminant meningococcal infection, included in this paper under the grouping of meningococcal meningitis for simplicity, there can be a similar poverty of signs, and in our experience even C.S.F. analysis in the early hours of the illness has normal indices and is not helpful. In this situation the first diagnostic sign is the appearance of a few fine petechial spots, usually on the abdomen, chest or anterior surface of the legs. Exanthems are said to occur in two thirds of all meningococcal infections and must always be sought for diligently. Its presence is

always a major cause for alarm and dictates immediate hospital admission, as in fulminant cases it heralds or coincides with rapid deterioration, onset of shock and convulsions which inevitably proceed to irreversable coma and death. Since treatment beyond the stage of shock usually fails, early parenteral antibiotics are imperative. Fulminating infection can occur rapidly in a healthy child within hours, or after some time in an untreated case of meningococcal meningitis.

Discussion

There was a definite increase in the number of admissions to RBHSC with meningococcal infection during the period under review. The geographical survey gives some support to a theory that a pocket of infection existed in the Belfast 12 area but this is not proven. To strengthen this theory it would be necessary to demonstrate an increased carrier rate. Variable peaks of incidence occur under normal conditions when the carrier rate is 25–35 per cent of the population but in epidemics the carrier rate has been shown to rise to 70 per cent or more. It is possible that the overcrowded living conditions which predispose to meningococcal outbreaks (Ducker, 1968; Martin, 1972) exist in some areas of Belfast at present. It is worth noting that the number of cases of acute meningitis reported to the Registrar-General has risen sharply each year since 1967. Eleven were reported in 1967 and 51 in 1972. Certainly it will be important to watch the incidence of meningitis over the next few years.

The case histories have demonstrated the difference in clinical presentation between meningococcal meningitis and the acute fulminant septicaemia, emphasising the extreme importance of early diagnosis. In our series, morbidity in survivors has been low. The commonest finding has been behaviour disturbances noted in 15 per cent at review. Most of these disturbances may occur in any group of children in the pre-school age group after a hospital admission for acute illness. Examples are: extreme shyness amounting almost to fear of strangers, reticence to mix or play with other children, nightmares, bed wetting, refusal to leave mother's company, aggressive behaviour and temper tantrums.

Treatment

No clear advantage of the traditional triple antibiotic therapy over the more modern regime of a high dose of ampicillin (400 mg/Kg. body wt. in 4 divided doses 6 hourly) was demonstrated. The finding that 60 per cent of organisms were sulphonamide resistant would suggest that the latter treatment should now be preferred, especially when one bears in mind the perhaps overstated danger of blood dyscrasia with chloramphenicol. Several studies have demonstrated the efficacy of high dose ampicillin regimes in all types of bacterial meningitis including that caused by Haemophilus organisms (Jenson, 1968; Werle, 1969; Mathies, 1972). Ampicillin however has not been shown to be effective in eradicating throat organisms in carriers and sulphonamides are obviously no longer useful in this field. The two best drugs for prophylaxis in the families of patients are phenoxymethicillin and erythromycin. These will often not eradicate organisms but should abort bacteraemia. Antibiotic therapy of patients sensitive to penicillin is difficult

and fortunately we did not have this problem. Chloramphenicol and tetracycline are recommended and for sensitive organisms sulphonamides.

The major problem which remains to be overcome is the successful treatment of fulminant septicaemia which so often results in death from the Waterhouse-Fredrichson syndrome. Current thinking is that the pathogenesis of the condition is a Schwartzman type reaction. This was first described as a reaction in animals to endotoxin in which there is clotting disorder blocking small blood vessels, vessel wall necrosis and haemorrhage. The phenomenon is thought to be unrelated to hypersensitivity and antigen – antibody reactions. The hallmark of this reaction is fibrin thrombi in small blood vessels. This has been demonstrated in meningococcal sepsis probably due to meningococcal endotoxin (Margaretten, 1958; Levin, 1965).

The condition is also associated with acute coagulation abnormalities resulting in hypofibrinogenaemia, thrombocytopenia, consumption of clotting factors, and a haemorrhagic diathesis (Evans, 1968; Manios, 1971). This was seen clinically in one of our patients. The role of this mechanism in the precipitation of adrenal haemorrhage is not proven, and when the disseminated intravascular coagulation (DIC) is controlled, as was our experience, death can still result from irreversible shock. It is important nevertheless to search for DIC and initiate early treatment with advice from an experienced haematologist, because although early intravenous heparin will arrest the process, if given at a late stage it may potentiate bleeding and fresh blood is more useful. Danger signs are (i) oozing at venepuncture sites. (ii) Sudden appearance or worsening of purpura. (iii) Shock or unexplained hypotension.

Hydrocortisone has not been demonstrated as effective prophylaxis of adrenal haemorrhages but pharmacological doses should not be withheld when shock is evident.

Death in the fulminant disease may be due to cardiac dysrhythmia and early warning can be obtained by monitoring serum potassium (Mauger, 1971). Although this is often normal at time of admission the patients often become hypokalaemic within 4–6 hours. If this situation is revealed, intravenous correction will be required with continuous ECG monitoring. In the presence of tachycardia with gallop rhythm rapid digitalisation is indicated to prevent fatal pulmonary oedema and cardiac impairment. We recorded two instances of hypokalaemia and one patient actually developed cardiac failure.

Conclusion

Meningitis must be considered in all children who have a pyrexia without an immediately obvious cause. In view of the increased incidence we have demonstrated, the possibility of meningococcal aetiology must be borne in mind especially where the patient is of pre-school age. A normal C.S.F. excludes this infection in most instances but continued observation is essential for 12 hours as the exception is the potentially fatal fulminant meningococcal septicaemia. Where there is any positive sign of meningitis, or in the infant group when such signs are often absent,

further investigations are important even when the C.S.F. is clear. Blood culture may grow organisms even when the C.S.F. proves sterile. A platelet count may give warning of impending disseminated intravascular clotting. Electrolyte estimation may reveal dehydration or hypokalaemia the correction of which may avoid cardiac complications. These latter tests are especially important in the fulminating disease where they probably offer the only hope of saving life. Treatment with intravenous ampicillin in high dose is recommended commencing as early as possible in the infection and is of equal efficacy for all the common organisms. This means that on occasions treatment should be started on the basis of clinical diagnosis alone where signs are unequivocal. The increased incidence of sulphonamide resistance of the meningococcus demonstrated raises problems in prophylactic treatment of contacts.

Summary

An increase in the incidence of admissions to the Royal Belfast Hospital for Sick Children (RBHSC) due to systemic meningococcal infection during the period August 1972 to August 1973 is demonstrated. A high mortality rate due to fulminant meningococcal septicaemia occurred. Reasons for the increase are discussed on the basis of age, sex, seasonal and geographical distribution, and the possibility of a pocket of infection in one area of Belfast, at that time, is raised. Presentation, pathogenesis and complications of the fulminant infection are described and treatment suggested, including the use of a high dose ampicillin regime as opposed to the traditional triple therapy. A high incidence of sulphonamide resistance in isolated organisms is noted. High index of suspicion, early diagnosis, hospital admission and initiation of treatment are emphasised as the most important methods of reducing fatality in what remains a serious childhood disease despite all recent advances in treatment.

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FIVE YEAR RETROSPECTIVE STUDY OF FEMORAL NECK FRACTURES

by

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INTRODUCTION

THIS retrospective study was carried out on patients admitted to the Fracture Unit of the Belfast City Hospital during the period 1965–1969 inclusive. It may be taken as a sequential study to that of Macafee 1969 who reported his findings on patients from the same unit over the preceding period. As in most centres the standard treatment for this type of fracture was by internal fixation using a tri-fin nail, blade-plate or by femoral head replacement. Pre-operative medical assessment and early mobilisation reduced mortality and decreased the duration of in-patient care.

METHODS

The case notes of all patients admitted with fractures of the femoral neck during the five year period, from 1st January 1965–31st December 1969 inclusive, were studied. The information was then transferred to data sheets for comparison. The nature of the fracture was confirmed radiologically in all cases.

RESULTS

During the period of study a total of 416 femoral neck fractures were recorded. Of these 72 were in male patients and 344 were in females. The distribution of patients by age and sex is shown in Table I. From this it can be seen that the number of fractures in males is fairly constant in each year, but that the incidence of fractures in females rose slowly from 1965 to 1968 and then more rapidly in the last year of the study.

TABLE I

Yearly distribution of patients by sex

Year	*1965*	*1966*	*1967*	*1968*	*1969*	*1965–1969*
Male	8	18	15	16	20	77
Female	58	56	65	63	97	339
Total	66	74	80	79	117	416

The distribution of cases in each year is displayed in Table II, and they are subdivided by the type of treatment received. Thus in this series it may be seen that

TABLE II

Distribution of cases per year and treatment

Year	*Conservative*	*Tri-fin nail*	*Blade plate*	*Austin Moore*	*Total*
1965	0	13	14	39	66
1966	7	13	28	26	74
1967	4	11	23	42	80
1968	15	10	29	25	79
1969	12	17	36	52	117
Total	38	64	130	184	416

only a small proportion of these fractures were treated by conservative means, and that the most frequent treatment was by Austin Moore prosthetic replacement of the femoral head. Extra-capsular fractures were treated by the insertion of a blade plate and this was the second most common operation performed.

As expected there was no difference between the incidence of right and left sided fractures as has been reported in an earlier series by Mr. Macafee. The patients were divided into five year age groups, and the number of fractures in each group noted. The age-sex distribution is shown in Table III. Here it can be seen that there were fewer males admitted with hip fractures in any one age group. The maximum incidence for both sexes was seen to lie between 75 and 79 years of age. Below the age of 60 years the total incidence for each group was almost constant. There was a steep rise towards the maximum and then an equally steep decline after the age of 79 years.

TABLE III

Age/Sex Distribution

Age in years	*Male*	*Female*	*Total*
–50	5	8	13
50–54	3	8	11
55–59	3	11	14
60–64	6	18	24
65–69	8	33	41
70–74	8	58	66
75–79	13	82	95
80–84	15	62	77
85–89	11	39	50
90+	5	20	25
Total	77	339	416

There were 248 intra-capsular fractures, which were treated by either tri-fin nail or by Austin Moore prosthetic replacement. Below the age of 55 years all were treated by the tri-fin nail, and between the ages of 55 and 65 years of age, almost 80 per cent were so treated. Over 70 years of age, almost 80 per cent were treated by femoral head replacement. Extra-capsular fractures, which were treated by nail plate fixation formed 30 per cent of all fractures at any age, with the exception of those over 90 and under 50 years of age, where the incidence was 48 per cent and 38 per cent respectively.

The number of patients in the survey was redistributed by type of treatment and by the age group, and pattern displayed in Table IV. It was the policy of the Unit that in the elderly operation was carried out whenever possible to allow for ease in nursing care. Intra-capsular fractures were treated in general by tri-fin nail fixation below the age of 70 and by Austin Moore replacement after that age. This pattern is clearly evident in the distribution of the cases as shown in Table IV. It should also be noted that the distribution throughout all age groups of extra-capsular fractures is relatively constant. Of those patients treated conservatively

TABLE IV

Total patient distribution by age and type of treatment received

Age in years	*Conservative*	*Tri-fin nail*	*Blade plate*	*Austin Moore*	*Total*
–50	3 (*23.2*)	5 (*38.4*)	5 (*38.4*)	0 (*0.0*)	13
50–54	2 (*18.1*)	6 (*54.5*)	3 (*27.4*)	0 (*0.0*)	11
55–59	0 (*0.0*)	8 (*57.1*)	4 (*28.5*)	2 (*14.4*)	14
60–64	3 (*12.5*)	10 (*41.7*)	8 (*33.3*)	3 (*12.5*)	24
65-69	2 (*4.9*)	10 (*24.4*)	13 (*31.7*)	16 (*39.0*)	41
70–74	4 (*6.2*)	10 (*15.1*)	16 (*24.2*)	36 (*54.5*)	66
75–79	9 (*9.4*)	7 (*7.5*)	25 (*26.3*)	54 (*56.8*)	95
80–84	6 (*7.8*)	2 (*2.8*)	27 (*35.0*)	42 (*54.5*)	77
85–89	7 (*14.0*)	4 (*8.0*)	17 (*34.0*)	22 (*44.0*)	50
90+	2 (*8.0*)	2 (*8.0*)	12 (*48.0*)	9 (*36.0*)	25
Total	38 (*9.3*)	64 (*15.3*)	130 (*31.2*)	184 (*44.2*)	416

Number in brackets and italics = percentage.

the greatest incidence of this form of treatment lay below the age of 50 years, and there was a second smaller peak in the 85 to 89 year old age group. These latter cases were the result of patients who were considered unfit for operation for medical reasons, and were, therefore, treated conservatively.

As there has been in the past some controversy regarding the urgency of treatment in femoral neck fractures, it was noted in this series that only 7.3 per cent of cases were operated on on the day of admission. However, 75 per cent of

cases underwent operation within the first four days, and the remaining 17.7 per cent suffered a delay of two weeks or longer while attempts were made to fully assess their medical state, and to render them fit for surgery.

The number of deaths during the studied period was noted and excluded from the calculation of duration of inpatient stay, which was then plotted with respect to the type of treatment received. This information together with the nature of patient rehabilitation is shown in Table V.

TABLE V

Outcome in relation to the type of treatment received

	Conservative	*Tri-fin nail*	*Blade plate*	*Austin Moore*	*Total*
Home	11 (*35.5*)	40 (*69.0*)	49 (*40.2*)	61 (*42.1*)	161 (*45.2*)
Convalescence	6 (*19.4*)	16 (*27.6*)	50 (*41.0*)	63 (*43.4*)	135 (*37.9*)
Dead	14 (*45.2*)	2 (*3.4*)	23 (*18.8*)	21 (*14.5*)	60 (*16.9*)
Total	31	58	122	145	356

Number in brackets and italics = percentage.

The mean length of stay in the Fracture Unit of patients treated by Austin Moore replacement was 5.19 weeks compared to 6.93 and 7.38 weeks in the case of those treated by tri-fin nail and by blade plate. Conservatively treated cases had a mean duration of inpatient stay of 13.1 weeks. The mortality was 45.2 per cent in the latter group due to the poor general medical state. The insertion of a tri-fin nail carried the least risk with the mortality of 3.4 per cent compared to 18.8 per cent and 14.5 per cent in a case of the insertion of a blade plate or the Austin Moore prosthesis respectively.

The restoration of the patient to his normal environment after his treatment is a problem, especially when the patients are elderly. On leaving the Unit the patients were discharged directly home, transferred to another hospital or sent for convalescence, usually lasting two weeks. Those requiring long stay care were included in the convalescent group, as shown in Table V. Several cases were lost in the survey as a result of lack of data in their records. Sixty-nine per cent of those treated by tri-fin nail were discharged directly home, as compared to 40.2 per cent of those treated by blade plate insertion, and 42.1 per cent treated by Austin Moore prosthetic replacement. Of those patients treated surgically convalescence was least needed in those receiving the tri-fin nail.

DISCUSSION

This retrospective study was carried out over a five year period in one fracture unit, and during this period a total of 416 cases was treated. This is a marked increase when compared to the previous study in the same unit by Macafee (1969), which was over an eleven year period, and in this time he found 496 cases. His

survey covered the period from 1957, when the unit was first opened, to 1967. This gave a total of 341 cases in the eight years prior to the beginning of the current survey. This shows that there was an increase in the work load of the Unit of 95.3 per cent in comparison with the mean annual admissions in each survey.

As can be clearly seen from these results there was a marked increase in the number of female patients admitted each year, whereas the number of male patients has remained fairly constant. Female patients have formed the largest proportion of admissions in any year, and were the most frequent admission in any one age group. This may be due to the fact that there is an increase in the population of elderly patients due to better medical care, and also to an improved standard of living. There is a greater incidence of osteoporosis in the female after the menopause, and there is also a diminished male population over 60 years of age due to death from myocardial disease and other causes.

In this unit the policy is to treat patients surgically in order to reduce the length of inpatient care and ease the nursing problem. In addition this also results in an improved survival rate. Below the age of 70 years the tri-fin nail is the treatment of choice for intracapsular fractures, while in the over 70 year old group it is the Austin Moore prosthesis that is most frequently used. The latter usually allows the patient to sit out of bed the day following operation, and partial weight bearing can be commenced after the removal of sutures on the tenth post-operative day. This greatly increases the ease of nursing and encourages the patient by tangible evidence of early ambulation and the prospect of returning home to normal surroundings. The overall hospital mortality for all ages and types of treatment was 14.42 per cent as compared to 14.57 per cent as noted by Macafee in his survey. As in the previous study there was a degree of pre-selection in that the moribund patient was treated conservatively. However, all others were treated surgically when their medical condition allowed. The delay was usually three to four days as in 75 per cent of the cases studied. In previous surveys (Schenk, Smith and Stephens, 1956; Manpel, Marzulli and Boley, 1961; Neimann and Mankin, 1968) it has been recommended that a femoral neck fracture should be classed as an emergency and all patients treated as an urgent admission on the day of arrival. These authors, however, have a higher mortality following this treatment whereas in this series the hospital mortality was 3.4 per cent in the case of those treated by tri-fin nail and 14.5 per cent in those treated by femoral head replacement. The mortality in those treated by blade plate insertion was highest with a mortality of 18.8 per cent. One must also take into consideration the fact that those treated by the tri-fin nail were both younger and generally fitter than those treated by other means, and in the last group, 75 per cent of the patients were over 70 years of age, and the operation of insertion of a blade plate is of the longest duration of the three described. Only a few charts gave an index of operating time, but those which did, gave an average of 20 minutes to insert an Austin Moore prosthesis, 30 minutes for a tri-fin nail, and one hour for a blade plate. Neimann and Mankin (1968) stated that in their series of unselected hip fractures the mortality was 51.72 per cent. They also noted in a large series of surveys that for patients below the age of 70, the mean mortality was 9.6 per cent as compared to 5 per cent in

this survey. In the over 70 age group the mortality was 37 per cent compared to 26.29 per cent in this series. In considering all age groups and types of treatment, the mean was 20.03 per cent as compared to 14.4 per cent in this current series.

The earlier the patient can be mobilised and discharged the easier the nursing problem. There are many patients and their numbers are growing each year, while at the same time there is a decreasing availability of nursing staff. In some cases the patients were transferred to other hospitals, but were otherwise only discharged or sent for convalescence after they were able to walk safely with assistance. Rehabilitation was, therefore, carried out within the unit, and included in the period of inpatient care. The duration of inpatient care was found by Macafee (1969) to be on average of 8.1 weeks duration, and was confirmed in this study. This compares favourably with other series where the mean length of stay was 11.4 weeks. Rehabilitation to the patient's normal environment is notoriously a difficult problem as can be seen from this series, and 41 per cent of those treated by blade plate fixation required some degree of convalescence or long-term care. Forty-three per cent of the patients treated by Austin Moore prosthesis required convalescence or long-term care. Unfortunately, this type of operation has to be carried out in the over 70 years age group. They are quite frequently living alone or in poor home circumstances, and they require much post-operative care and re-education in walking. Many are unfit to be returned home or their relatives refuse to take them back. It has been calculated that at present 8 out of 10 patients in the female ward of the fracture unit are there for reasons totally unconcerned with their fracture or the treatment of same. A few have been waiting for six months or more for a long-stay bed elsewhere in one of the Geriatric Units.

This limited survey confirms the findings of Macafee (1969) and supports the view that surgical treatment of the elderly patient reduces the burden of nursing care, and that the replacement of the femoral head in the over 70 year old patient is advantageous with regard to low mortality and early discharge from the unit.

Summary

A retrospective survey of 416 patients admitted to the Belfast City Hospital with upper femoral fractures was carried out. This covered a five year period prior to 1970. In this series there was a four day pre-operative delay to allow for medical assessment and treatment. Femoral head replacement in the over 70 year old patient and tri-fin nail insertion in the under 70 age group was the policy of the unit as the treatment for intracapsular fractures. The hospital mortality was 26.29 per cent and 5 per cent above and below the age of 70 years respectively. The overall mortality was 14.4 per cent. The mean duration of inpatient care and rehabilitation was 8.4 weeks. The problems of increasing workload, decreasing availability of nursing staff and of patient discharge and return to their normal environment have been discussed.

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I wish to thank Mr. N. S. Martin, Mr. J. B. Pyper and Mr. N. McLeod, Consultant Orthopaedic Surgeons in the Fracture Unit of the Belfast City Hospital, for their help and permission to use their clinical material. I am also grateful to the staff of the Records Department, Belfast City Hospital, for their valuable assistance.

BOOK REVIEW

CLINICAL TESTS OF GASTRIC FUNCTION. By Alastair M. Connell. (Pp. 117. Illustrated. £1.50). London: Pitman Medical. 1973.

In recent years the well known gruel test meal has given place to more precise tests of gastric secretion, measurements of the rate of emptying have been introduced into clinical practice and it has become possible to measure the stimulating hormone, gastrin. The whole subject has been admirably reviewed in a small paper-back by Professor Alastair Connell, now of Cincinnati, Ohio. In this book he refers extensively to his experience of 1,800 tests in the gastric function service which he ran here in Belfast. Many of these patients were followed up over a period of years, so that the results of acid studies can be linked to the clinical findings, giving authority to Dr. Connell's findings.

There is a particularly useful chapter describing postoperative tests, in which the controversial Hollander's insulin test is carefully analyzed and its usefulness is put into perspective. In another chapter the gastric emptying test, devised in Belfast by George, is well described. An excellent feature of this work is a series of nine short appendices, each describing precisely how each test should be performed.

This low priced little book is a must for the gastroenterologist and should be available to all physicians and to any surgeon who is prepared to perform a vagotomy or gastrectomy. It is a great pleasure to recommend a book which is essentially a product of the Belfast Medical School, and which is eminently readable.

T.K.

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T.K.

SICKLE CELL TRAIT: A RARE CAUSE OF POST-OPERATIVE DEATH IN NORTHERN IRELAND

by

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OWING to the increase in the immigrant population in Northern Ireland, the medical profession, and especially anaesthetists, should be alerted to the necessity of investigating certain patients for sickle cell trait before anaesthesia. Although usually harmless, it may cause sudden death after even minor surgery.

Case Report

The patient who was a six-year-old negro child of mixed parentage with no recorded previous medical history was admitted for a minor plastic operation. At the time of admission his haemoglobin was 11.5 g. per 100 ml. Neither of the parents, both of whom were medically qualified, were aware of any haematological abnormality. Premedication was administered in the hour before being taken to theatre and consisted of seconal 50 mg per rectum, and morphine 5 mg and atropine 0.6 mg intramuscularly. The anaesthetic which was uneventful was induced with Althesin and maintained with nitrous oxide and oxygen (50/50) and methoxyfluorane (1%–0.2%). Post-operatively, the child was awake and restless and was sedated with 5 mg of Physeptone. Approximately four hours after completion of the operation the patient suddenly collapsed and resuscitation was unsuccessful.

At post-mortem examination, the body was that of a 4-feet tall negro child weighing 21 kg. On the posterior surface of each pinna there was a 4-cm long sutured surgical incision. There were no other significant findings on external examination.

On gross examination of the organs a small amount of blood-stained mucus was found in the trachea. Anterior to the hilum of the left lung there were two openings approximately 0.4 cm in diameter which were produced by needles during the attempt at resuscitation. The right lung showed a 1-cm long segment of collapse on the anterior border. On section, both lungs were congested and oedematous. The brain was cyanosed and soft. It weighed 1350g, an increase above the normal weight, due to cerebral oedema. The spleen weighed 60g which was within normal limits for the age of the patient. It showed no scarring or any other abnormality.

On microscopic examination, the most striking feature was in the spleen where there was distortion and congestion of the sinusoids around the lymphoid follicles. The lymphoid follicles were prominent, some containing active germinal centres. The bone marrow was active and showed no abnormality. The brain showed engorgement of the small vessels. The glomerular and peritubular capillaries of the kidneys also showed engorgement. The lungs were congested and showed focal collapse and oedema of some alveoli with compensatory expansion of others. Other organs showed no histological abnormalities. The sickle shape of the red blood cells seen microscopically may have been due to the patient's disease but can also be produced artefactually by fixation of tissue in formalin.

Examination of a blood specimen by electrophoresis showed the presence of haemoglobin A and haemoglobin S, confirming that the patient suffered from sickle cell trait and subsequent examination of the father's blood showed that he also carried the trait.

Pathology

The red blood cells in a patient with this condition, when deprived of oxygen, assume a sickle shape and sludging of blood with blockage of vessels may occur (Edington and Gilles, 1969). This is due to an abnormal haemoglobin, haemoglobin S, crystalling out in the deoxygenated state when it is less soluble than normal haemoglobin A. The abnormality in haemoglobin S is replacement of glutamic acid by valine at the sixth position of the beta chain. In the deoxygenated state the valine residues in each molecule form apolar bonds with adjacent haemoglobin molecules; several of these polymers twist upon each other and these long crystals of haemoglobin S distort the cell giving it the characteristic shape. Red cells so affected are also prone to haemolysis.

The essential pathology of the disease arises mainly from capillary thrombosis which can cause micro-infarcts and ischaemic atrophy, and the clinical effects depend on the organ or organs affected. The usual complications encountered (Rapaport, 1971) are splenic infarction after exposure to a high altitude, gross haematuria secondary to renal papillary necrosis and ulceration, cerebral thrombosis and sudden death.

At post-mortem, if death has resulted quickly the findings may not be specific. The spleen is the most likely organ to be affected and it is often enlarged and dark purple in colour with areas of congestion and haemorrhage around the central arterioles. The kidneys may appear grossly normal although occasionally papillary haemorrhages are present. On microscopic examination the diffuse intravascular sickling and agglutination of distorted erythrocytes may be well demonstrated in peritubular capillaries and in large glomeruli, particularly near the corticomedullary junction (Kissane and Smith, 1967). If the patient survives 24-hours or so focal ischaemic necrosis of glomeruli may be seen. In the brain diffuse cerebral hyperaemia and oedema are common. Engorgement of small vessels is always present. True thrombi may form in microscopic vessels, and occasionally in dural sinuses, resulting in cerebral infarcts.

Evidence of previous sickling episodes may be present. The spleen may be distorted due to scarring and weigh only a gramme in young adults. The kidneys may be coarsely scarred and the papillae may be shrunken and fibrotic and microscopically show dilated vessels and disruption of collecting ducts.

It may be difficult or impossible to determine the exact initiating cause of a sickling episode. This is because of a variable time lag between the period of relative hypoxia and death. In the reported case, with which the authors were concerned, the patient died within six hours of the operation. In another case, that of a 12-year-old negro boy who had a tonsillectomy, 33 days elapsed before he succumbed to a superior longitudinal sinus thrombosis.

The sickle cell trait is found in people who are heterozygous for the S gene. This is a Mendelian dominant and is an allele of the gene responsible for the

production of normal haemoglobin. Unlike the homozygous condition which usually presents as a severe congenital anaemia, the trait is usually asymptomatic (Browne, 1965). It is widely distributed but its highest incidence is usually found in tropical Africa. There, the heterozygote carrying the trait enjoys an advantage against the lethal effects of infection by the malarial parasite, *Plasmodium falciparum*. In a malarial-ridden country, this confers a selective advantage greater than any disadvantage. It is present in the descendants of West Africans in the United States where it reaches an incidence of 9 per cent and in the West Indies and South America. Isolated pockets of relatively high incidence are found in Sicily, Greece, South Turkey, South Arabia and the Indian peninsula.

Discussion

Until the present time death due to sickle cell trait has been virtually unknown in Northern Ireland. However, doctors in the province may expect to meet the condition more often if the immigrant population rises as it has done in England. At the last census in 1971, 936 people were recorded as having been born in Africa and 1284 in India; many of these were presumably closely associated with hospitals, as many posts are now filled by foreign graduates from regions where the condition is found. One of the great dangers of the trait is that it may go completely unnoticed and may pass as an unexplained cause of death unless specifically looked for at post-mortem. A case has been recorded of a negress dying after an uneventful anaesthetic for a 15-minute procedure although she had given birth to a child 5-months previously without complications. This stresses the point that a careful history should be taken, as an "operation" to a patient may not involve general anaesthesia. Furthermore, as in the case reported, a parent may be carrying the trait without realising it. Because of these facts one must be aware of the condition in certain ethnic groups.

During operation sickling may be caused by clinically undetectable hypoxia (Gilbertson, 1965). The level of oxygen desaturation required to produce sickling is variable both in different regions of the body in any one patient and in different patients. It has further been shown (Nunn and Payne, 1964) that a considerable degree of hypoxia may occur during and after an uneventful anaesthetic for a minor operation. These authors state that the average degree of hypoxia discovered post-operatively corresponds to that which occurs in an unpressurised air-craft flying at an altitude of 10,000 feet above sea-level and the lowest oxygen tension they found would be reproduced in a person in such an aircraft at 17,000 feet. In aircraft at these altitudes, however, passengers with sickle cell trait have suffered from splenic infarction (Smith and Conley, 1955) and so the same accident or consequences of sickling could be expected to occur post-operatively.

During operation a lowering of oxygen tension may cause an increase in viscosity without sickling. Due to the slowing of blood flow a local acidosis may then occur which initiates or enhances sickling. Thus a vicious circle may be set up, the initiating general hypoxia being exaggerated locally by factors resulting from it. Tissue hypoxia will be increased if there is accompanying dehydration or blood loss which cause circulatory stasis. It is logical to assume that any sedative drugs

which depress respiration could further increase tissue hypoxia. It has been stated (Searle, 1973) that there is little evidence to support the statement that anaesthesia may precipitate a sickle cell crisis in sickle cell trait. However the usual techniques to ensure adequate tissue oxygenation should be exercised with particular care.

Apart from the predisposing factors mentioned earlier, the position of the operating table should be carefully adjusted to prevent local stasis and tourniquets should not be used unless absolutely necessary. If they are, such as in orthopaedic operations, the limb must be carefully exsanquinated using an Esmarch bandage. Also, cooling and sepsis should be prevented because cooling increases blood viscosity and sepsis may be associated with an acute sickling crisis. However, it would seem that the ancillary methods suggested to prevent sickling in the homozygous condition are unnecessary. These include giving alkalies orally, low molecular weight dextran to reduce blood viscosity, urea to break down the hydrophobic bonds between the molecules of deoxygenated haemoglobin S and oxygen administration continuously for 24 hours after operation.

Sideroom and Laboratory Tests

A sickling test can now be carried out with a commercial preparation, Sickledex, and only takes a few minutes to perform (Loh, 1968). The test works on the principle that haemoglobin S is relatively insoluble when combined with a buffer and a reducing agent. When Sickledex Reagent Powder is mixed with Sickledex Test Solution and a blood sample is added, blood containing haemoglobin S will form a cloudy turbid suspension. Other haemoglobins are more soluble and will form a transparent solution when tested. This test has been found to be more sensitive and more reliable than the standard metabisulphite test.

The electrophoresis test is carried out in a specialised haematology department and works on the principle that haemoglobin S migrates in an electrical field at a different speed from normal haemoglobin A.

Summary

The authors wish to draw attention to the condition of sickle cell trait and to emphasise the increasing probability that serious manifestations may be seen in countries where previously it was unknown. It is particularly dangerous because there may be no prior clinical manifestations. It is suggested that screening for this condition should be performed in all negro, Indian and Mediterranean patients before any operative procedure requiring general anaesthesia. Blood for a simple sickling test or for electrophoresis should be sent routinely with specimens for blood grouping. Pre-medication and post-operative sedative drugs should be kept to a minimum and during anaesthesia particular attention should be paid to the prevention of hypoxia and the factors which may add to it such as circulatory stasis, blood loss, cooling and sepsis.

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THE FAILURE OF INVAGINATION HERNIOTOMY FOR INDIRECT INGUINAL HERNIA

by

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THE SEARCH for a simple secure method for the repair of indirect hernia continues. In 1899 Kocher (Kocher, 1903) introduced displacement of the invaginated neck of the sac lateral to the inferior epigastric vessels. This method never achieved the popularity of that suggested by Bassini but has been practised by various surgeons; C. J. A. Woodside of Belfast used it throughout his surgical career and claimed, but never published, excellent results.

In 1964 Celestin published a modification of the Kocher method which had been used by Grant-Batchelor for at least 10 years. This consists of isolation of the sac up to, but not including, the internal ring, not disturbing the natural adhesions between the fascia transversalis and peritoneum (Fig. 1). The sac is

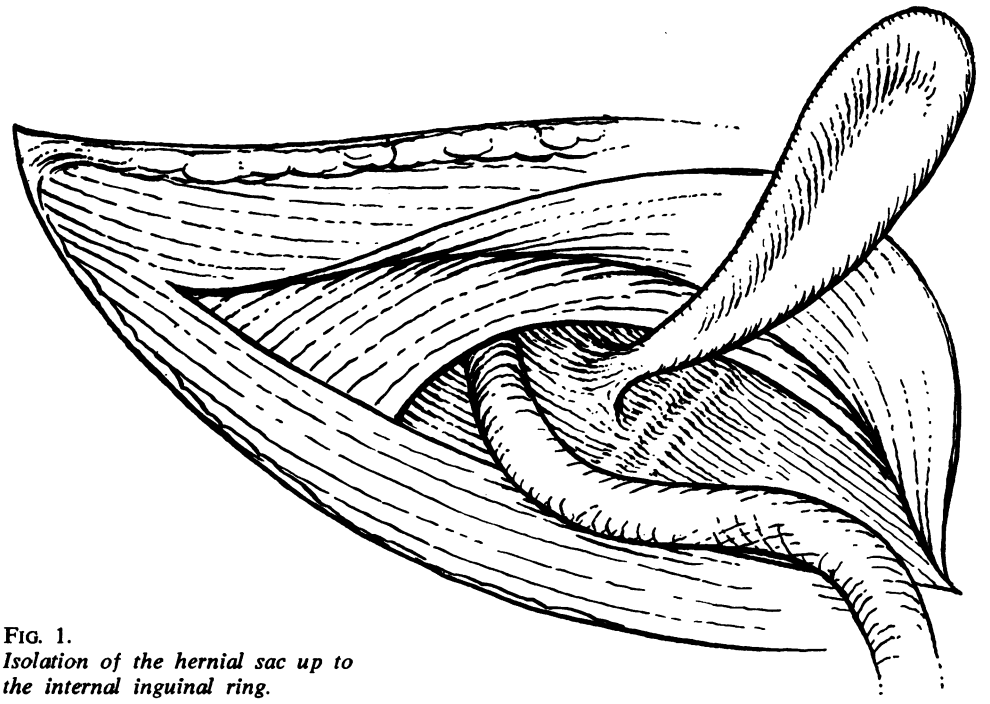

FIG. 1.
Isolation of the hernial sac up to the internal inguinal ring.

invaginated and brought out through the parietes in the vicinity of the anterior iliac spine. It is twisted, thereby tightening the posterior wall of the canal, and after closure of the small opening in the peritoneum around the twisted sac, the latter is anchored to the oblique muscles (Fig. 2). The reported results were excellent: 5.4 per cent recurrence rate in 212 patients with 88.5 per cent recall at 5 to 9 years after operation; if those over 70 years of age were excluded the failure rate dropped to 4 per cent. The method was recommended for routine use in all adult cases below the age of 70 years.

In 1964 the senior of the present authors, after satisfying himself that the method appeared to give a secure repair, started using it routinely in patients under the age of 70 years. In 1967, after 37 operations, the trial was discontinued because it was obvious that the recurrence rate was unacceptable. At review 3½ years after operation, 35 patients were examined (2 could not be traced). There were 6 recurrences – 17 per cent (Table). In 2 cases there had been sudden complete recurrence as if the anchoring sutures of the invaginated sac had given way.

TABLE
Invagination Herniotomy

No. of cases	*Reviewed at 3½ years*	*Recurrences*	*Percentage Recurrence*
37	35	6	17

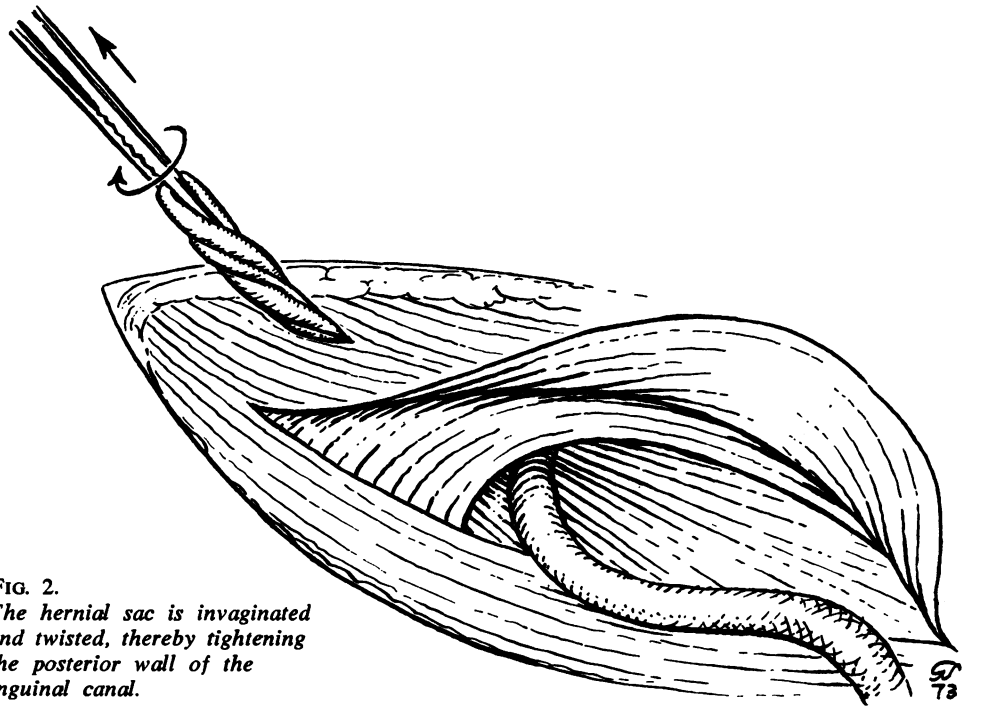

FIG. 2.
The hernial sac is invaginated and twisted, thereby tightening the posterior wall of the inguinal canal.

Obviously either the method is bad or the surgical technique was at fault. The choice between the two possibilities can be helped by comparison with another personal series using a different method. This is provided by 44 consecutive adult cases of inguinal hernia of all types – direct, indirect and 7 recurrent and including 5 patients over the age of 70 years – operated upon by the senior author or with his direct assistance in the 12 month period commencing February, 1970. The method of repair was the "triple repair" recommended by Gibbon and Choudhury (1969).

These patients were reviewed by one of us (R.A.B.M.) between 2 and 3 years post-operatively. The recall rate was satisfactory in that 39 (89 per cent) were examined, 2 who had emigrated replied by letter, and the case-notes of 3 who had died between 1 and 2 years post-operatively were available. There had been only one recurrence in the group.

Discussion

The good results in the second series would justify the assertion that poor surgical technique was not the cause for the unacceptably high recurrence rate in the first series. Therefore invagination herniotomy cannot be recommended as a simple secure herniotomy.

However, during the 3 years of the trial, invagination of the sac was used as an incident during prostatectomy in 2 patients over the age of 70 years and during more extensive herniorrhaphy in 9 patients. The eldest of the 11 died 18 months after operation and there had been no recurrence during the period of review in the other 10. The method may therefore have a place as a supplementary method of repair during herniorrhaphy or during prostatectomy when a more radical opening-up tissue planes may not be indicated.

Summary

Comparison of the results in two personal series of repair of inguinal hernia shows that a recurrence rate of 17 per cent in invagination herniotomy is more likely to be due to a bad method rather than to bad surgical technique. The method cannot be recommended as the sole method of repair in indirect inguinal hernia.

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ALTHESIN: A GROUP TRIAL AS AN INTRAVENOUS ANAESTHETIC

by

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THE initial clinical trials of a drug usually only provide information pertaining to its use in strictly defined circumstances, often with a small number of highly trained observers. For this reason, when the circumstances permit, this should be followed by a 'group trial' prior to its general release. The purpose of this is to provide information, often not obtained from the controlled clinical trials and, in the case of drugs used during anaesthesia, to ascertain how the new agent will fit into routine clinical practice. It also tests the acceptability of the new drug to a large number of practising anaesthetists in a wide variety of clinical situations. This paper reports a group trial of Althesin involving 2,800 administrations by 70 anaesthetists.

Althesin is a combination of two steroids, alphaxalone and alphadolone acetate, with Cremophor EL acting as solvent (Child et al, 1971). Initial clinical studies in several centres suggested that it could prove to be an acceptable intravenous anaesthetic (Campbell et al, 1971; Clarke et al, 1971; Savege et al, 1971).

Organisation of the Trial

This group trial was modelled on a previous study of propanidid reported by Clarke and Dundee in 1966. One full-time organiser was responsible for its co-ordination. An initial letter introducing the drug and outlining the purpose of the trial was sent to every anaesthetist in Northern Ireland. Those who expressed willingness to participate were visited personally and given forty 5 ml ampoules of Althesin, a brief factual summary of its pharmacology and appropriate record sheets for their observations. They were requested to use the drug for 40 cases in their routine clinical practice with an induction dose of 50 μl/kg. Premedication was left entirely to the personal choice of the anaesthetist concerned.

The anaesthetist was asked to keep an appropriate record of each administration and particularly to record the occurrence of side effects during induction of anaesthesia such as excitatory phenomena—tremor, muscle movement, hypertonus; respiratory upset—cough, hiccough, laryngospasm and respiratory depression, with or without apnoea; fluctuation in pulse rate and blood pressure etc. Each induction of anaesthesia was to be graded as follows according to the scheme described by Dundee, Moore and Nicholl (1962):

Grade (1) – Smooth uncomplicated induction;

Grade (2a) – Induction with minor side effects not interfering with anaesthesia or surgery;

Grade (2b) – Side effects which interfered with anaesthesia or surgery but did not endanger the patient's life;

Grade (3) – Major side effects which could endanger the patient's life or make surgery impossible.

Each anaesthetist was asked to complete a five page questionnaire consisting of two main sections, the first of which he was asked to answer after his first twenty cases and the second after a further twenty cases. Pharmacological and physical properties of Althesin were compared with other induction agents with which he was familiar. In addition anaesthetists were asked to express an opinion as to the likely future of Althesin in clinical anaesthesia. It was stressed that this reply was to be based on their own personal impressions and not on the published work of others. Finally, they were asked about any particular difficulties encountered during the use of Althesin and also to record any other individual comments about the drug.

Completed questionnaires often with detailed reports, were obtained from 70 anaesthetists of varying seniority and experience. Half of the participants were consultants and the remainder junior anaesthetist staff. Twenty-five clinicians had previous experience with a group trial, either with methohexitone or propanidid.

Althesin was administered to 2,800 patients undergoing a wide variety of surgical procedures including cardiothoracic, dental and neurosurgery. On 396 occasions Althesin was employed for out-patient anaesthesia and also used to induce anaesthesia in 269 paediatric patients, i.e. children aged 10 years and younger. In approximately 12 per cent of patients Althesin was employed as a sole agent either as a single dose or used intermittently with incremental doses. In the remainder of patients the new steroid agent was used purely for induction of anaesthesia and a wide variety of inhalation agents and muscle relaxants were subsequently added for maintenance of anaesthesia (Table I).

TABLE I

Inhalation agents and muscle relaxants employed following induction of anaesthesia with Althesin

Inhalation agents		*No. of patients*	*Muscle relaxants*	*No. of patients*
Nitrous oxide/oxygen		706	Suxamethonium	823
,,	/halothane	1493	Pancuronium	205
,,	/methoxyflurane	104	Tubocurarine	85
,,	/trichloroethylene	61	Gallamine	75
,,	/intravenous analgesia	80	Alcuronium	3

RESULTS

Induction of Anaesthesia

Table II lists the individual induction complications. Involuntary muscle movement occurred in approximately 18 per cent of patients and was the commonest

induction side effect. In spite of this relatively high incidence, few people considered muscle movement as being troublesome or potentially dangerous. The relatively low incidence of respiratory tract irritation, i.e. cough, laryngospasm and hiccough is noteworthy.

TABLE II

Incidence of side effects during induction of anaesthesia with Althesin

Complication	*No. of patients*	*Percentage*
Involuntary muscle movement	501	17.9
Cardiovascular depression*	172	6.1
Respiratory depression	121	4.3
Inadequate depth of anaesthesia	111	4.0
Hypertonus	90	3.2
Cough	79	2.8
Hiccough	69	2.5
Flushing of skin	63	2.3
Slow onset	26	0.9
Laryngospasm	23	0.8
Others – e.g. excessive salivation	23	0.8

*Cardiovascular depression is taken as a fall in systolic blood pressure in excess of 20 mm mercury.

Approximately two-thirds of the 2,800 inductions were completely trouble-free. In a further 769 cases there was some minor upset which did not interfere with the conduct of anaesthesia or surgery. The remaining 5 per cent of inductions were considered to be unsatisfactory. Of these, some incident occurred in 134 patients which interfered with the course of anaesthesia and/or delayed the onset of surgery. However, in only 12 instances was this of sufficient severity (grade 3) as to make surgery impossible or place the patient's life at risk. The factors responsible for these serious upsets included failure of induction of sleep, severe hypotension or laryngospasm.

Comparison with other agents (Table III)

Excitatory phenomena: Eighty-two per cent of participants thought that Althesin caused less excitatory phenomena than methohexitone, and only one anaesthetist considered it to be worse. However, 41 anaesthetists thought that the new drug was slightly worse, and two thought it to be much worse than thiopentone in this respect. Only 10 per cent thought that excitatory effects were less with Althesin than with thiopentone. Opinion was evenly divided as to whether the new steroid was either no different or an improvement on propanidid.

TABLE III

Opinion of 70 anaesthetists on the relative merits of Althesin as compared with thiopentone, methohexitone and propanidid

Criterion for comparison	*compared with: Althesin*	*Althesin considered to be:*			
		Better	*Not different*	*Slightly worse*	*Much worse*
		Number of Anaesthetists			
Smoothness of induction	Thiopentone	12	41	17	0
	Methohexitone	51	17	2	0
	Propanidid	56	13	1	0
Excitatory phenomena	Thiopentone	7	20	41	2
	Methohexitone	57	12	1	0
	Propanidid	27	31	11	1
Cardiovascular depression	Thiopentone	39	27	4	0
	Methohexitone	14	47	9	0
	Propanidid	42	23	5	0
Respiratory depression	Thiopentone	55	14	1	0
	Methohexitone	36	32	2	0
	Propanidid	27	31	11	1
Duration of recovery	Thiopentone	61	9	0	0
	Methohexitone	24	37	9	0
	Propanidid	2	16	33	19
Character of recovery	Thiopentone	51	17	2	0
	Methohexitone	32	34	4	0
	Propanidid	13	42	12	3
Ease of administration	Thiopentone	42	21	6	1
	Methohexitone	34	29	6	1
	Propanidid	56	14	0	0

Three-quarters of the anaesthetists were of the opinion that Althesin provided a smoother induction of anaesthesia than methohexitone and propanidid. Only 12 anaesthetists thought Althesin better than thiopentone and in fact 24 per cent considered the steroid to be slightly less smooth than thiopentone.

Cardiovascular depression: There was no clear cut opinion as to the relative cardiovascular effects of Althesin compared to other agents. Fifty-six and 60 per cent of anaesthetists considered it to be less depressant than thiopentone and propanidid respectively, while two-thirds thought it was not significantly different than methohexitone in this respect.

Respiratory depression: In the opinion of the anaesthetists in this group trial, Althesin produced much less depression of respiration than equivalent doses of thiopentone. However, approximately half of them considered Althesin to be not different from methohexitone. A few anaesthetists thought that propanidid caused less respiratory depression than Althesin.

Recovery: A large majority of participants considered recovery with Althesin to be more rapid than with thiopentone; nobody thought it to be slower than the barbiturate. Approximately half found no difference between the speed of recovery with Althesin and methohexitone. However, 74 per cent of anaesthetists considered Althesin to be slower in the recovery phase than propanidid.

A favourable impression was created with respect to the clarity of recovery following Althesin. When compared with thiopentone, 51 thought the steroid to be an improvement; with methohexitone opinion was almost equally divided as to whether Althesin was better or not different. Eighty-one per cent of anaesthetists did not consider Althesin to be an improvement on propandid with regard to the character of recovery.

Ease of administration: When considering the small volume of the anaesthetic agent required, also the fact that the drug comes ready in solution and does not require mixing, 60 per cent of anaesthetists thought that the steroid anaesthetic was more convenient to use in the clinical situation than thiopentone, and this view was held in spite of its increased viscosity compared to the water soluble barbiturates. Fewer anaesthetists considered Althesin better than methohexitone, largely as a result of the smaller volume of 2 per cent methohexitone necessary when compared to 2.5 per cent thiopentone and the fact that most methohexitone is dispensed from multi-dose bottles. Many anaesthetists thought Althesin was an improvement on propanidid on the basis of decreased viscosity and a smaller volume of solution required. Nobody considered it to be more difficult to administer than propanidid.

The overall opinion of the participants with regard to the viscosity was that 52 did not consider it a practical problem. With regard to the volume of solution 46 anaesthetists approved of working with 5 ml syringes.

Others: In the study anaesthetists were also asked to note any suspected drug interactions; however, 57 found no evidence of any interaction. The remaining 13 anaesthetists found some information suggesting a drug interaction most frequently involving suxamethonium (Table IV). Other suspected interactions were tachycardia with methoxyflurane, increased excitatory phenomena with hyoscine premedication and resistance in alcoholic patients.

Overall opinion

Twenty-one anaesthetists thought that Althesin was a 'safe' anaesthetic, and many used it as their drug of choice in the 'poor risk' patient; 10 felt that it was suitable for use as sole agent either as a single dose for short procedures or used intermittently for longer operations. It was surprising to find that 16 observers thought that the onset of sleep was slower by a few seconds than with other conventional induction agents, although this feature was not considered a hindrance in practice. Ten anaesthetists who found 50 μl/kg to be inadequate felt that if the dose was increased to 60 μl/kg or 75 μl/kg better results would have been obtained.

The concensus of opinion shown in Table V was that Althesin was likely to have a place in clinical anaesthesia. It was felt that the steroid was less likely to replace thiopentone than methohexitone. Of the 15 anaesthetists who thought

Althesin would just become an additional drug, four were doubtful that the drug had any clinical usefulness. The majority of anaesthetists thought that Althesin was most suitable for minor surgical and out-patient procedures. However, 30 considered the steroid to be a suitable drug for routine induction of anaesthesia for major as well as minor surgery.

TABLE IV

Frequency of reports of suspected interactions by 13 *anaesthetists*

Suspected drug interaction	*Number of Reports*
Shorter action of suxamethonium	5
Increased duration of suxamethonium	2
Increased suxamethonium fasiculations	2
Hypertension with suxamethonium	2
Increased excitatory phenomena with hyoscine premedication	3
Tachycardia with methoxyflurane	1
Tachycardia with gallamine	1
Prolonged action of pancuronium	1
Resistance in alcoholics	1

TABLE V

The overall opinion of 70 *anaesthetists regarding the clinical usefulness of Althesin*

Number who regarded Althesin as:	
A replacement for Thiopentone	– 10
,, ,, ,, Methohexitone	– 23
,, ,, ,, Propanidid	– 22
An alternative drug of little proven advantage	– 15
	70
Number who thought its place was for:	
Minor surgery and outpatient anaesthesia	– 40
Routine induction of anaesthesia	– 30
	70

Discussion

The optimal induction dose of Althesin is 50–60 μl/kg (Clarke et al, 1971). During this trial the percentage incidence of acceptable inductions at this dose resembles closely that found by other workers (Clarke et al, 1971). The commonest reported complication during induction of anaesthesia was involuntary muscle movement which occurred in 18 per cent of patients, this again being similar to previous reports (Swerdlow, Chakravorty and Zahangir, 1971). Three anaesthetists reported an increased incidence of excitatory phenomena with hyoscine premedication and this also confirms previous reports (Clarke et al, 1972).

The most frequent reports of suspected drug interactions involved suxamethonium. Some thought that it intensified and others that it antagonised the action of this relaxant. This is an erroneous view as there is both experimental and clinical evidence to show that Althesin behaves in an identical fashion to the barbiturates with respect to its duration of action of suxamethonium (Healy, Birmingham and Chatterjee, 1972; Carson, Clarke and Dundee, 1973; Foley et al, 1972). The absence of interaction with other anaesthetic drugs has thus far been a feature of Althesin (Campbell, Miller and Bradford, 1972).

Only nine out of 70 anaesthetists considered the recovery following Althesin to be longer than after methohexitone which is surprising since most experimental evidence would support this view (Foley et al, 1972; Hannington-Kiff, 1972). Work in progress in this department shows that recovery times with 50–60 μl/kg of the steroid are much closer to those of equipotent doses of thiopentone, than previously suspected, but when larger doses of each are used, then recovery is quicker after Althesin.

Summary

Seventy anaesthetists took part in a 'group trial' of Althesin as an intravenous anaesthetic agent. The induction characteristics and the side effects of this drug were studied and compared with thiopentone, methohexitone and propanidid.

The opinions expressed on a questionnaire suggest that Althesin will be a widely used drug for induction of anaesthesia in both in-patients and out-patients. Twenty-one per cent of anaesthetists thought that the new steroid agent, although safe and pleasant to use, was of little proven clinical advantage over other more conventional intravenous anaesthetics.

Acknowledgements

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The author is indebted to each and every anaesthetist who gave of their time to participate in this 'group trial'.

It is a pleasure to thank Professor J. W. Dundee and Dr. R. S. J. Clarke for help in the preparation of this paper.

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ANALGESIC REQUIREMENTS FOLLOWING SURGERY

by

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THE requirements for postoperative analgesia are very variable and are thought to depend on a multitude of factors which include age, sex, social class, the site and extent of surgery and the immobility or otherwise of the patient (Keats, 1956).

The writer had the opportunity to observe and record the frequency of use of postoperative analgesia in the general surgical recovery ward in a main hospital. During two separate periods (totalling 9 months) a record was maintained of the requirements of 1,611 consecutive surgical patients. This paper presents an analysis of the findings and relates drug needs to the site of operation and the sex of the patient. During the second period of observation the analgesic requirements following endoscopy were also noted.

TABLE

Percentage incidence of patients requiring analgesics in the first four to six hours after operation related to site of surgery and sex of patients

Period	*Treatment*	*No. of patients*	*TYPE OF SURGERY*						
			Abdominal		*Thoracic*	*Cutaneous*	*Anal*	*Limb*	*Diagnostic*
			Upper	*Lower*					
FIRST 3 MONTHS									
Male	Analgesic	114	71	43	85	32	—	18	
	No Analgesic	120							
Female	Analgesic	81	53	50	40	12	—	21	
	No Analgesic	114							
SECOND 6 MONTHS									
Male and Female	Analgesic	517	68	50	74	21	46	—	11
	No Analgesic	665							
Total		1,611							

The incidence of patients requiring postoperative analgesia can be seen in the Table in which the results for the two separate periods of observation have been analysed independently. In both groups the overall percentage of patients requiring analgesics was between 43 and 44 per cent. This was significantly more frequent

in the upper abdominal series than in those patients having lower abdominal surgery ($\chi^2=16.02$; $P<0.0005$). Thoracic surgery was followed by the highest incidence of the need of analgesics, 74 per cent in the present study. On the whole women had a lower requirement for analgesics than men except after lower abdominal and limb surgery. The difference between male and female analgesic requirements for combined upper and lower abdominal surgery groups just failed to reach significant levels ($\chi^2=3.28$; $0.1>P>0.05$). When this comparison was possible, female patients showed an almost identical analgesic need following upper and lower abdominal surgery. During the period of study male patients had a significantly greater requirement for analgesia following upper abdominal ($\chi^2=10.89$; $P<0.001$) and thoracic surgery ($\chi^2=8.32$; $P<0.005$) than females.

Analgesic requirements were similar after upper abdominal and thoracic operations but in both incidences they were greater than after lower abdominal surgery ($\chi^2=16.91$; $P<0.0005$). Similarly patients who had undergone either abdominal or thoracic surgery had a significantly greater requirement for analgesia than patients who had undergone only superficial operations to the limb or body wall.

Discussion

The findings of the present study are very similar to those of Loan & Dundee (1969) which were carried out five years previously in the same recovery ward. They also confirm those of Swerdlow, Starmer and Daw (1964) who found a greater requirement for postoperative analgesia after upper as compared with lower abdominal operations. Many women maintain that they can suffer pain better than their men folk. In the light of the present study there may well be justification for their view, at least when the pain is very severe.

Two final features of this study were that anal surgery required much less pain relief from opiates than the writer would have believed. He later found out that some of his surgical colleagues were infiltrating the operation site with local anaesthetic solutions! Normally one does not consider that cystoscopy, gastroscopy, sigmoidoscopy and other diagnostic procedures are painful. It is of interest to learn that over 11 per cent of these patients asked for an opiate to relieve postoperative discomfort.

Summary

In a large series of patients the writer confirmed that upper abdominal and thoracic procedures were more painful than lower abdominal and cutaneous surgery. Male patients were less tolerant of severe pain than were females.

The author wishes to express appreciation to Professor John W. Dundee for advice in the preparation of this manuscript and to acknowledge receipt of a Royal Victoria Hospital Fellowship during the period in which he collected the data for this report.

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CHANGING PATTERNS IN THE PREVALENCE OF MENTAL SUBNORMALITY IN NORTHERN IRELAND

by

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INTRODUCTION

DESPITE a strong recommendation by a World Health Organisation (1954) report that "research into, and surveys of, prevalence rates (of mental subnormality) should be a continuing feature of the mental health programmes of individual countries" (p 10), comparatively few reports have been published. Examples of European surveys are those by Akesson (1961) in a Southern Swedish population and by Amnell, Palo and Varilo (1964) in Finland. Examples of surveys in the United Kingdom are those by Scally and MacKay (1964a) in Northern Ireland, Kushlick (1965) in Wessex and Innes, Kidd and Ross (1968) in North-East Scotland. The present report is concerned with a re-assessment of the prevalence of mental subnormality in Northern Ireland. It is perhaps the first of its kind to be reported which allows for prevalence comparisons to be made over a period of time within the same region.

Other investigations have made inferences about changes in prevalence by studying sections of the general population. For example, Rayner (1964) concluded that the prevalence of mental deficiency in Sweden was declining since the number of military conscripts who underwent routine examination and were found to be mentally subnormal had shown a marked decline over the years. In another investigation he found (Rayner, 1962) that the incidence of juvenile amaurotic idiocy had also declined. In both cases he tentatively attributed the changes to the disruption of population isolates.

But the investigation reported here was organised on different lines. The background can be described briefly. Ascertained subnormals in Northern Ireland are referred to as "persons requiring special care" or "special care patients". Until recently they were informally graded as high (IQ 50+), medium (IQ 20–49) or low (IQ 0–19). The criteria in the Mental Health Acts (Northern Ireland, 1948, 1961) are essentially subnormality of intelligence from birth or from an early age and social inefficiency. For more detailed information see Scally and MacKay (1964b).

An overall index of the prevalence of subnormality for a given region can be very useful. It can also be misleading. It can be helpful to the body or bodies responsible for the care of the subnormal in their planning of future services and provisions. When used, however, for comparisons across regions or countries it can be misleading since the criteria of subnormality may, and usually do, vary from place to place. Rayner (1964) reported that the criterion in his survey was

an IQ of approximately 75 to 80. Social inefficiency was not specified. In Northern Ireland a number of high grade referrals are rejected as candidates for special care on the grounds that they are socially competent. Thus Rayner's survey would have certain kinds of subnormals who would not be included on the special care registers and comparisons based on overall prevalence rates would not only be futile but misleading.

There are, nevertheless, certain circumstances when the differences in criteria would not necessarily invalidate inter-regional comparisons. If, for example, one region takes IQ as the sole criterion and another (as in Northern Ireland) had a dual criterion, comparisons would be possible between medium and low grade cases since, at these levels, social inefficiency by ascertainment standards appears to be an invariable concomitant of low IQ. The high grade category is the problematic group. In their regional comparisons, Scally and MacKay (1964a) omitted patients in this category.

One of the main advantages of the present investigation is that comparisons of prevalence rates can be made for all three grades within the same region over a period of years since the criteria of subnormality have remained exactly the same. A second main advantage is that the observed rates are based on ascertained cases of all ages and grades. Inferences about population trends are not made on the basis of incidental samples.

Method

All the files of individual special care patients were examined. The files are kept at the headquarters of the Eastern area (Belfast and Muckamore Abbey Hospital), the Northern area (Londonderry) and the South Western area (Armagh). The information, comprising the sex, age, grade, place of care and the presence or absence of a diagnosis of mongolism, was put on punch cards for analysis.

Results

General

The general findings of the present survey are given in Table I together with the corresponding figures obtained in the earlier survey (Scally and MacKay, 1964a).

Table I

Total Special Care Populations, Rates per 1,000 *Population and Male/Female Ratios in the* 1964 *and* 1970 *Surveys, Northern Ireland*

Year	*General population*	*Total special care population*	*Rate per* 1,000 *population*	*Male/Female ratio*
1964	1,435,400	4,631	3.2	1.11: 1
1970	1,502,000	6,117	4.1	1.14: 1

Although the nett increase in the general population over the six years was 4.6 per cent, the number of special care patients increased by almost one third. The rate per 1,000 of the general population increased from 3.2 to 4.1. These results should *not* be taken to indicate a real increase in the prevalence of subnormality. The Special Care Service came into being in 1948. Harbison, MacKay and Weir (1967) have shown that low grade patients tend to be notified when very young because, in addition to being subnormal, they usually have very noticeable physical stigmata. Medium grade patients tend to be notified while of school age and high grade cases are notified relatively late in life. The apparent increase is, therefore, probably due to the fact that a comparatively new service is still trying to catch up with all extant cases. Most, if not all, low grade patients will have been ascertained but some medium grade and many high grade patients might not have been ascertained in 1964 when the service was only sixteen years old.

Although medium grade cases tend to be referred while of school age, there are some whom parents or guardians prefer not to have ascertained until they themselves are unable to cope. The same may apply to high grade cases. It may be a few years, therefore, before the notification and ascertainment rates settle to a level commensurate with that of a region where services for the subnormal have existed for a long time.

As might be expected from other surveys, males outnumbered females; the ratios for 1964 and 1970 are somewhat similar.

Grade

Table II shows the percentages of patients in the three grades for the two surveys. The very slight increase in actual numbers in the low grade category and their decrease as a percentage of the subnormal population lends indirect support to the view that their ascertainment was complete in 1964. If the argument, outlined

TABLE II

Percentages of Special Care Patients in the Three Grades in 1964 *and* 1970
(*Actual numbers are given in brackets*)

Year	*Percentages of patients*		
	High	*Medium*	*Low*
1964	29.2 (1,354)	59.5 (2,755)	11.3 (522)
1970	31.5 (1,928)	59.6 (3,647)	8.9 (542)

above, that differences in ages at notification between grades would affect observed trends in population analysis is tenable, then one might, in the present survey, expect a greater increase among high than among medium grade patients. In fact, high grade cases increased by 30 per cent and medium grade cases by 24.4 per cent.

The percentage of medium grade subnormals to the subnormal population as a whole remains almost the same in 1970 as it did in 1964. The percentage of high grade cases has increased slightly.

Type of care

Approximately one in three of the patients was under residential care. Table III shows the numbers under community and hospital care, by grade. Twenty-three per cent were in subnormality hospitals and thirteen per cent in mental hospitals

TABLE III

Distribution of patients by type of care and grade

The numbers are given followed by the percentage in italics and in brackets

Type of care	*All patients*	*Grade*		
		High	*Medium*	*Low*
Hospitals:				
Subnormality	1,429 (*23.4*)	359 (*18.6*)	842 (*23.1*)	228 (*42.1*)
Mental and Others	774 (*12.6*)	256 (*13.3*)	444 (*12.2*)	74 (*13.6*)
Community	3,914 (*64.0*)	1,313 (*68.1*)	2,361 (*64.7*)	240 (*44.3*)
	6,117	1,928	3,647	542

and other residential units. Those in mental hospitals are, on the whole elderly patients who needed residential care before 1948 and for whom special units were not available. The probability of their release from these institutions is very low.

Not surprisingly, over half the low grade cases are in hospitals. Most of them require much nursing care and often pose insuperable problems to their parents who, sooner or later, request their admission to hospital. By contrast, only 32 per cent of the high grade patients are under residential care.

Grade and Age

The prevalence of high grade patients increased from 0.9 in 1964 to 1.3 per 1,000 of the general population in 1970. Table IV shows the numbers and rates, by age, for the two surveys. Very young high grade patients (0–9 years) are few and constitute only about 2 per cent of all cases in this category. The highest rate in 1964 was in the 15–19 age groups (2.2); in 1970 it was in the 20–29 age groups. In the age groups of 20 years and over, the rates per 1,000 of the population for 1970 consistently exceed those of 1964. The largest discrepancy was in the 20–29 age group. Many of these patients are notified for the first time at about this age and it is usually some sort of anti-social conduct on their part that draws attention

TABLE IV

Prevalence of High Grade Special Care Patients per 1,000 in each age group population in Northern Ireland in the 1964 and 1970 surveys, by age groups

High grade age groups	1964 *survey (Scally and MacKay)*		1970 *survey (MacKay)*	
	Number	*Rate per 1,000 population*	*Number*	*Rate per 1,000 population*
0–4	4	0.0	6	0.0
5–9	18	0.1	38	0.3
10–14	91	0.7	63	0.5
15–19	281	2.2	280	2.2
20–29	383	2.1	658	3.3
30–39	219	1.3	309	1.8
40–49	157	0.9	250	1.4
50–59	132	0.8	159	1.0
60+	69	0.3	165	0.7
Total	1,354	0.9	1,928	1.3

to them. Many more manage to exist quite well in the community without attracting attention.

Table V shows the corresponding numbers and rates for medium grade patients. Children (i.e. 14 years and under) comprised 31.6 per cent of all medium grade cases in 1964 and 28.8 per cent in 1970. The highest rate in the present survey occurred in the 15–19 age group. The most interesting point in this table is that, for every single age group without exception, the 1970 rates exceed those of 1964. A few of the discrepancies are very small, particularly in the 0–4 and 60+ groups. The largest increase occurred in the 30–39 age group. The overall prevalence has increased from 1.9 in 1964 to 2.4 per 1,000 of the population in 1970. Table VI gives the details. At no age level does the rate equal or exceed 1 per 1,000. Differences between rates for the two surveys are very small at all ages. Surprisingly, some patients in this category survive into middle age and older. Between the ages of 5 and 29 the rates are consistent for both surveys. In the present investigations, they are identical between the ages of 5 and 19; in the next decade the rate varies by only 0.1 per 1,000.

TABLE V

Prevalence of Medium Grade Special Care Patients per 1,000 in each age group population in Northern Ireland in the 1964 and 1970 surveys, by age groups

Medium grade age groups	1964 *survey (Scally and MacKay)*		1970 *survey (MacKay)*	
	Number	*Rate per 1,000 population*	*Number*	*Rate per 1,000 population*
0–4	109	0.7	123	0.8
5–9	367	2.7	459	3.0
10–14	394	3.0	470	3.5
15–19	414	3.3	519	4.1
20–29	589	3.3	787	4.0
30–39	306	1.8	501	3.0
40–49	259	1.5	343	2.0
50–59	190	1.2	230	1.5
60+	127	0.6	215	0.9
Total	2,755	1.9	3,647	2.4

TABLE VI

Prevalence of Low Grade Special Care Patients per 1,000 in each age group population in Northern Ireland in the 1964 and 1970 surveys, by age groups

Low grade age groups	1964 *survey (Scally and MacKay)*		1970 *survey (MacKay)*	
	Number	*Rate per 1,000 population*	*Number*	*Rate per 1,000 population*
0–4	57	0.4	39	0.2
5–9	97	0.7	85	0.6
10–14	82	0.6	87	0.6
15–19	92	0.7	75	0.6
20–29	96	0.5	142	0.7
30–39	40	0.2	48	0.3
40–49	32	0.2	36	0.2
50–59	19	0.1	20	0.1
60+	7	0.0	10	0.0
Total	522	0.4	542	0.4

Discussion

The present investigation of the prevalence of subnormality in Northern Ireland allowed for comparisons to be made for all three grades of severity of retardation, by age groups, with the findings of an earlier survey (Scally and MacKay, 1964a) in the same region. The main findings were that

(i) the overall rate increased from 3.2 in 1964 to 4.1 per 1,000 in 1970;
(ii) the greatest increase was amongst high grade patients but the rate for low grade cases remained the same;
(iii) there were more males than females;
(iv) both surveys showed that about one third of all the patients were hospitalised.

This discussion will take as its starting point the apparent increase in the overall rate of subnormality. As was stated earlier, the apparent increase should not be interpreted as indicating a real increase in the prevalence. It ought to be interpreted as showing that, because of its relatively recent introduction, the Special Care Service has not yet achieved full ascertainment of all subnormals except, perhaps, in the case of low grade patients. A Report on the Development of the Special Care Service in Northern Ireland (1966) predicted that complete ascertainment would be achieved in 1973. Despite the caution that should be exercised in interpreting the present figures, they may give rise to some alarm.

Scally and MacKay (1964a) compared the prevalence of medium and low grade patients with the rates estimated by Lewis (1929) for England and Wales and with the rates obtained by Goodman and Tizard (1962) of imbecility and idiocy among children in London and Middlesex. With one exception (10–14 age range), the prevalence rates for Northern Ireland were higher than those found by Lewis in England and the rates of medium and low grade children were higher in all age groups than those estimated by Goodman and Tizard in their survey. If full ascertainment is not, in 1974, yet complete in Northern Ireland for medium grade patients, then one must conclude that the 1964 rates were conservative. It would appear, therefore, that the real prevalence of subnormality in this region may be higher than in other parts of the United Kingdom. The comparisons made in the earlier survey between regions might be criticised for two reasons. First, Lewis (1929) carried out his survey over 40 years ago and there might be grounds for believing it to be out of date. Nevertheless it is still quoted as being one of the best and one of the most reliable of its kind. Second, Scally and MacKay did not attempt to determine whether the regions involved were comparable on factors such as demographic characteristics and these should be taken into account. They omitted to do this simply because of the paucity of prevalence data. Comparisons had to be made where possible.

Fortunately, a recent survey on subnormality in North-East Scotland (Kidd, Innes and Ross, 1967) provides a much better basis for making inter-regional comparisons and these form the subject matter of a further report.

The second feature meriting discussion is the distribution of patients in the grades. It was suggested by Lewis (1929) that, in every hundred defectives, there are 75 feeble-minded cases, 20 imbeciles and 5 idiots. These terms correspond

broadly to high, medium and low grade categories respectively. In the present survey the ratio of low to medium grade cases is approximately 1 to 6. But the ratio of medium to high is about 2: 1, a widely discrepant estimate. These figures would indicate, very roughly, that only about 24 per cent of high grade subnormals in the general population are on the special care registers. The others are presumably managing to exist in the community without too much trouble.

The third interesting aspect of the present survey is the distribution of patients by age, within grades. It has been found, in common with other surveys, that the life expectancies of patients in Northern Ireland differ with respect to grade (McCurley, MacKay and Scally, 1971). Not surprisingly, the distributions in the present survey are skewed. The percentage of high, medium and low grade patients under the age of 14 are 5.5, 28.8 and 38.9 respectively. These differences, using the actual numbers in the analysis, are highly significant ($p<0.001$). The increasing life expectancy of all grades of subnormals is going to be an important factor in prevalence surveys and, at a very practical level, it will have an important bearing on the planning of services.

Finally, there is the recurrent observation that, in surveys like these, males outnumber females. Different explanations of this sex difference have been advanced and have been discussed by Harbison et al (1967) and other investigators. Beginning with Ellis (1904), a number of writers have suggested that, although the average ability of men and women may be equal, the range of intelligence is wider among men. According to this argument more geniuses and more mental defectives would be found among men than among women. Survey data on institutional populations were presented as evidence of the greater number of male defectives and statistics on eminence were cited as proof of the greater frequency of superior men. Roberts, Norman and Griffiths (1938) found that boys were 13 per cent more variable than girls in intelligence test. This notion of greater male variability was regarded by some as a fundamental bilogical law.

Another explanation put forward was that the uncompetitive nature of many occupations open to women meant that the detection of feeble-mindedness, as well as the necessity for admission to hospital or some other kind of care, would be less likely among women than among men. Harbison (1966) found that female patients admitted to a psychiatric unit had significantly lower IQ's than males and propounded a rather similar explanation for this difference: the males, being the wage earners, are under greater external stress than women. If the males show any sign of a breakdown, or decreased mental efficiency, immediate steps are usually taken by themselves, their relatives or their employers. With females, on the other hand, any lessening of efficiency might tend to go unnoticed or, if noticed, be tolerated much longer so that those who are eventually admitted to a psychiatric unit are relatively worse than males and this is manifested in their poorer performance on a wide range of psychological tests.

A third possible explanation has been put forward by Heber (1962). He suggested that social and cultural differences exist in classifying patients as needing institutionalization or ascertainment. There are, he suggests, three aspects which assume differing importance as qualifying conditions of mental subnormality for

different age groups. Delay in maturation is the most frequent cause of referral to clinics for pre-school children; defects in learning ability constitute the most frequent cause of referral during the school period and social inefficiency or social maladjustment the most frequent reason for referral in subsequent years. One might be able to predict sex differences in terms of numbers at referral at these three stages. When the social aspect of classification is considered, society may be *less* tolerant of females than of males, depending on factors such as type of abnormal behaviour, age, etc. The community tolerance thresholds of misdemeanours by adult women may be lower than it is for men, perhaps because most misdemeanours committed by adult mildly retarded females involve sexual activities. These arguments would suggest that as far as high grade subnormality is concerned, a "double standard" may exist in the criterion for referral of boys and girls, men and women and that "society's tolerance levels for undesirable acts may vary differently with age for males and females" (Windle, 1962). Clearly, this common survey finding of the excess numbers of males needs further investigation.

An identical survey is planned for Northern Ireland in 1974 and a further investigation for 1975. If ascertainment is complete for the region by that time, it will be possible to state with greater certainty what the differences between regional prevalence rates are. At present, it would appear that the rates are higher than might be expected from other surveys.

Summary

A re-assessment of the prevalence of mental subnormality in Northern Ireland showed that, in a general population of 1,502,000, the known case load of ascertained subnormals (6,117) represented a prevalence rate of 4.1 per 1,000. In 1964 the rate was estimated to be 3.2. The apparent increase is probably due to the fact that, because of the relatively recent introduction of a service to cope with the subnormal, ascertainment of subnormals is, with the exception of low grade cases, not yet complete. Although there appear to be no grounds for concluding that the difference over time reflects a real increase in the prevalence of mental subnormality, the present necessarily conservative figures indicate relatively high rates amongst medium and low grade cases. Other findings were that males exceeded females and the fact that approximately one third of the ascertained subnormals were hospitalized. Further studies are planned.

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CANCER EDUCATION IN NORTHERN IRELAND

A Progress Report 1971–1974

J. F. O'SULLIVAN, M.B., F.R.C.S., F.R.C.O.G.,

Chairman, Education & Social Research Committee of The Ulster Cancer Foundation

CANCER EDUCATION is the responsibility of the Ministry of Health and Social Services. This task has been performed by the medical officers of health, health visitors and health education officers. The Ulster Cancer Foundation was established in 1970. Amongst its aims was cancer education, and in order to develop this objective an Education Committee was appointed in 1971. At this time, cancer education for lay-people carried out by voluntary organisations, was confined to the Manchester, Merseyside and the South Wales areas of the United Kingdom. The programme to be undertaken by the Foundation was to supplement that already undertaken in the province. To avoid overconcentration of efforts in some areas and to supplement the programme already in use, several meetings were held with Dr. Elder, Deputy Chief Medical Officer of the Ministry of Health and Members of the Association of Medical Officers of Health.

Details of the Manchester Cancer Society's Education Programme—established in 1951 and that of the Irish and South Wales (Tenovus) Societies were studied. It was agreed that the material used by these organisations was unsuitable for use in our community. The American films used by the Welsh and Irish Societies were not in accord with current medical practice in Northern Ireland, e.g. annual medical check-up etc. In the Republic of Ireland the speaker was always a doctor—usually a member of the College of General Practitioners. Because of the problem of private practice there was a rule that the doctor had to live at least thirty miles from the town in which he was speaking! Therefore, there was no communication between the speaker and the Society's officers in Dublin. In the Manchester region, the speakers were both medical and non-medical, but all were Members of the Staff of the Christie Hospital. Thus very close liaison was maintained between the speakers and the education officers whose headquarters are in the grounds of the hospital.

It was decided that all our speakers should be doctors. Having rejected the material used by the other societies it was necessary to prepare a tape/slide presentation. In doing so, the committee were satisfied that the material presented was in keeping with current medical practice. The commentary was recorded by a well known actor. The presentation was shown to an audience by a projectionist. The doctor gave a short talk to elaborate on any points. This was then followed by a question and answer session. All the audiences were adult—requests for talks being made by women's organisations, church groups and eventually our own local 'Combat Cancer Groups'.

Another aim of the foundation is fund raising. By agreement with the medical officers of health, no fund raising or promotional activity took part at an education meeting. The local medical officer was always informed of the date and place of a meeting.

Requests for such meetings are usually received from September until May. In the 1971/72 session, twenty-three lectures were given to a total audience of 800. There were only five doctors and two projectionists in the team.

From the questions asked at meetings, it was realised that many members of the audiences would like to read about cancer. A leaflet entitled 'Cancer—The Facts' was prepared. This leaflet is based on the slide/tape presentation, and is now available free of charge at all our education meetings.

During the 1972/73 session, requests for lectures increased, and the panel of medical speakers was gradually enlarged. An interesting development was that requests were now received from Parent/Teacher Associations. The logical step from this was the many requests from teachers for speakers to talk to their pupils about the dangers of smoking to health. It was impossible to meet these requests as doctors were not free to undertake lectures during the daytime. The Education Committee members felt that this opportunity must not be lost, so the Foundation was approached to allocate funds for the appointment of a full-time Schools Information Officer. This was approved, and the post was filled in May 1973. It was the intention of the Committee to limit the visits to schools in the Belfast area. Approval had been obtained from Dr. Taggart, City Medical Officer of Health and Mr. Eakins, Director of Education in Belfast.

The British Cancer Council was established in 1968. The majority of cancer societies and medical bodies interested in cancer are amongst its members. Its purpose was to eliminate competition amongst the various societies, to co-ordinate research and commence a comprehensive education programme. By 1973 little progress had been made in the last objective. At this stage the Cancer Research Campaign (formerly known as the British Empire Cancer Campaign) which hitherto had only been interested in financing research donated £100,000 to the British Cancer Council Education Committee. They in turn decided that the money could best be spent by establishing four bursaries in Cancer Education at Manchester University. The course was to last for two years and would end with the award of an M.Sc. degree. It was hoped that the successful candidates would be employed in the four oncological centres which are to be established in England. These cancer education officers would direct research into the education programme in their areas.

Dr. G. Lynch, M.B., F.F.R., F.F.R.R.C.S.I., D.M.R.T., who represented the Northern Ireland Hospitals Authority in the British Cancer Council, was Chairman of the Education Committee which established the four bursaries. Through his good offices, Professor Smith of Manchester University, agreed to take another student. The Foundation agreed to finance a bursary from Ulster, and to guarantee the graduate employment with the Foundation on completion of the Course. Mr. Peter McAuley, B.Sc., the son of a local doctor, was successful in obtaining our bursary. It is hoped that he will establish a programme of research into cancer education—the needs, techniques and results. In this he will work closely with the community physicians, the Department of Social Medicine at the Queen's University Belfast and with the new Professor of Cancer Studies.

During the 1972/73 session, two more slide/tape presentations were made. One dealt with self-examination of the breast and the other with the cervical smear test. Several English-made films were purchased, in order to give variety to our Programme. A pamphlet entitled 'What To Tell Your Parents About Smoking', was prepared for the Schools Project.

During the 1973/74 session, the Adult Evening Education Programme expanded. As our new 'Combat Cancer Groups' were established, requests from the various organisations in these areas were received. Our panel of doctors had now increased to eighty. The schools programme developed rapidly. One hundred and eighteen sessions were conducted in schools—many of these outside Belfast. A survey was carried out in nurse training schools. This showed that many sister tutors would welcome lecturers from the Foundation to speak to their pupils on cancer in general, and especially on the dangers of smoking to health. Several talks were given to student nurses in their hospitals, and to trained nurses who were attending refresher courses organised by the Royal College of Nursing. Our efforts have also been welcomed by officers of the Northern Ireland Council for Nurses and Midwives and by those of the Royal College of Nursing.

An obvious deficiency in our programme is that at present speakers only go by invitation to audiences, which to some extent must already be interested in cancer. Employee education in factories and training centres plays a large part in the programme in the Manchester area. Many such people would not be influenced by programmes on television, radio or by articles in papers and journals. Personal contact with small groups of employees is of paramount importance in imparting information about cancer.

To meet these needs—for nurses and employees—the Foundation has now appointed a nurse tutor to visit hospitals and factories in the province. A second schools information officer has also been appointed to endeavour to meet the many requests from the schools.

Another field in which progress has been made is with the profession itself. At the end of each year the Foundation has had a distinguished speaker to address its panel of doctors, education liaison officers and other interested workers. The speaker in 1972 was Mr. Ronald Raven, O.B.E., T.D., F.R.C.S., Chairman, The Marie Curie Foundation, London. In 1973, Dr. John Dunwoody, Hon. Director of ASH (Action On Smoking and Health) London, spoke at our final meeting. Following his visit the Foundation was appointed as agent for ASH in Northern Ireland. In 1974, we had a lecture from Mr. Rennie Davison, Executive Officer, Manchester Regional Committee On Cancer. Also during the year, the first Ulster Cancer Foundation Annual Lecture was delivered to members of the Ulster Medical Society, by Professor L. G. Lajtha, Director of The Paterson Laboratories, Christie Hospital, Manchester.

We have been less successful with medical students! Therefore, a sum of money, to be used as prize money in an essay competition, has been given by the Foundation to the Dean of the Faculty of Medicine. In addition to helping finance the Chair of Cancer Studies and the Senior Lecturer in the Department at The Queen's University, we will indirectly be influencing cancer education among the students.

Is Cancer Education Worth While?

Members of the Foundation are convinced of this, and have allocated a large sum of money for this purpose. In our first three years, 282 evening meetings were held before an estimated audience of 12,173 people. We are further convinced that breast self-examination and use of the cytology service will reduce the number of deaths from cancer of the breast and cervix. Reduction in smoking will prevent cancer of the lung and allied diseases.

In 1924—fifty years ago—the then Ministry of Health, London, issued a circular suggesting that the local health authorities form local cancer committees. One important function of these committees was to 'propagandize' the public about cancer, because, even at that time, delay by patients in seeking treatment was causing serious concern to doctors.

The Manchester Committee on Cancer was founded in response to the Ministry's circular. But it was not until 1951 that it began a controlled experiment in public education about cancer. This area has now the most advanced cancer education programme in the United Kingdom. One notes, with regret, that the first cancer education programme started twenty-seven years after Ministry advice!

All cancer societies in the English speaking world, devote a large amount of their funds to cancer education. More recently, as already noted, the Cancer Research Campaign has entered this useful field. Lord Zuckermann, in his Report on Cancer Research (1972), congratulated the efforts of the British Cancer Council in the education of lay-people, but also emphasised that cancer education to doctors must be improved, as too often there appeared to be a wide gap in knowledge between the clinician and the research worker.

I trust that the efforts of the Education and Social Research Commitee will be worth while.

I wish to thank the medical speakers, education liaison officers and all the employees of the Ulster Cancer Foundation for their help during the past three years. My thanks is also due to the many people who donated the money being used for this programme, and to my friends in the Foundation who allocated the funds to the Education and Social Research Committee.

THE NORTHERN IRELAND COUNCIL FOR POSTGRADUATE MEDICAL EDUCATION

THE re-constituted General Practice Committee of Council has now met on three occasions. The Committee which has representatives from Local Medical Committes, Area Boards, The Royal College of General Practitioners, the Dept. of Health & Social Services (N.I.), etc. is composed of the following:

Dr. W. M. D. Clements
Dr. D. R. DeLargy
Dr. A. W. Dickie
Dr. J. J. Doherty
Dr. G. A. Donaldson
Dr. W. A. Eakins
Dr. W. A. Gilmore
Dr. J. Henneman
Dr. T. Horner
Dr. R. P. Maybin
Dr. S. Moore
Dr. R. A. Moorehead
Dr. H. B. Murtagh
Dr. A. H. Simpson
Dr. J. McA. Taggart
Dr. D. White
Dr. J. White
Dr. I. T. D. Williams
Dr. O. Woods

Professor W. G. Irwin (Chairman)
Dr. J. E. McKnight (Secretary of Council)
Dr. N. D. Wright (Postgraduate Adviser in General Practice)
Dr. H. Baird (Associate Adviser in General Practice)
Dr. A. G. McKnight (Associate Adviser in General Practice)

Dr. H. Baird and Dr. A. G. McKnight have been appointed Associate Advisers in General Practice and Council has recently invited applications from trainers for appointment as course organisers for sessions in Belfast, Craigavon and Londonderry.

NORTHERN IRELAND VOCATIONAL TRAINING SCHEME FOR GENERAL PRACTICE AS AT 1st AUGUST 1974

13 completed training at 31st July 1974.

1 will complete training at 1st February 1975.

There will be 9 in 3rd year, 16 in 2nd year and 21 in first year at 1st August 1974.

Recruitment is below expectation although expansion continues to take place. The number who have completed training in the last year was the highest yet attained. Recruitment is being encouraged from those who have already held S.H.O. posts in the hospital service and three were recruited into second year and one into third year.

The appointment of course organisers will allow the establishment of a full second year half day release course and this course will be held in Craigavon Hospital as well as in Belfast with a limited number of joint sessions. This will help to surmount the difficulties of day release.

HANDBOOK FOR THE TRAINER AND TRAINEE

A Handbook for Trainers has been written by the Associate Advisers. The Handbook was distributed widely in Northern Ireland and Great Britain and many helpful comments have been received. A second edition is now in the course of preparation.

CONTINUING EDUCATION

Attendance at courses in 1973/74 showed an increase over the previous two years. Part of this increased attendance can be explained by the requirements of some general practitioners for sessions to count towards their qualification for seniority payments but the main increase is due to the increased number of courses and meetings being held in local centres. A one week general course was held in May 1974 and 11 doctors from Great Britain attended even though this course coincided with the 'strike' in Northern Ireland. It was quite successful and favourable comments have been received from our visitors.

In future courses the content of small group discussion of cases encountered in general practice will be increased. Cases will be presented either as modified essay questions or as exercises in clinical diagnosis.

A paper on the progress of the N.I. Vocational Training Scheme for General Practice and including recommendations about future staffing of the general practice services in Northern Ireland has been approved by the General Practice Committee and by Council and is at present being considered by other professional bodies. This paper highlights the inadequacies of the training of some recent entrants to general practice and makes suggestions as to how this may be remedied in future.

Trainees who have obtained the D.R.C.O.G.

Dr. A. L. T. Blair
Dr. Brian Dean
Dr. Arlene E. Geddis
Dr. H. Ginn
Dr. Celia Hadden
Dr. John S. Henry
Dr. A. M. B. Minford
Dr. I. Ali
Dr. A. T. Brown
Dr. N. A. Napier

Trainees who have obtained the M.R.C.G.P.

Dr. N. S. S. Adair
Dr. W. J. S. Baird
Dr. D. Barker
Dr. J. W. Bassett
Dr. R. Cromey
Dr. Agnes McKnight
Dr. P. I. Munro
Dr. J. R. Stewart
Dr. Ann Thompson
Dr. J. B. White

BOOK REVIEWS

CURIOSA. A MISCELLANY OF CLINICAL AND PATHOLOGICAL EXPERIENCES. By William St. Clair Symmers, Senior. (Pp. xv+208. Figs. 67. £3.75). London: Bailliere Tindall, 1974.

THIS book by a graduate of this medical school and a Fellow of this Society, who is now Professor of Histopathology at Charing Cross Hospital Medical School, is a fascinating record of interesting clinical and pathological experiences. The conditions described are rare or presented in some unusual way, but the author has been able to indicate something of general value and interest in nearly all. While many of the conditions will rarely be encountered by the practitioner they are all described in a fascinating manner and read like short essays in detection. Some of the commoner conditions are described because of associated unusual and interesting features and there are cautionary tales of short-comings and deficiencies by both pathologists and clinicians. The experienced pathologist will be aware of the rarer conditions, but will not have encountered them all and may wonder if he has failed on occasions to recognise some of them.

Professor Symmers is to be congratulated on the care with which he has collected and recorded interesting clinical and pathological cases over a professional lifetime. Some of the cases described go back to his student days in Belfast. All experienced practitioners, physicians and surgeons as well as the trained pathologist will appreciate these accounts of experiences beyond the usual, but perhaps only those who really accept that "common conditions occur most often" should read the book lest their judgement in differential diagnosis be beguided by these fascinating records.

J.E.M.

SURGERY IN INFANCY AND CHILDHOOD. By Wallace M. Dennison and Teaching Colleagues in the Glasgow Medical School. Third Edition. (Pp. 618, Illustrated. £5.00). Edinburgh and London: Churchill Livingstone. 1974.

THIS book is written primarily for family doctors, senior medical students and junior hospital staff. The third edition has been largely rewritten and expanded without losing the clarity of style which made previous editions popular. Mr. Dennison is now joined by 19 colleagues in the Glasgow Medical School so that all aspects of paediatric surgery receive careful attention. The reader will find a lucid presentation of basic information without burdensome details. As the book is not intended for paediatric surgeons there are only brief descriptions of treatment. There are particularly helpful sections dealing with surgery of the newborn, elective surgery and cancer and radiotherapy in childhood. Illustrations are plentiful and clear and are particularly good in the sections dealing with the developmental anomalies and orthopaedic conditions. Each chapter concludes with a short selected bibliography which will be useful for those seeking more detailed information.

It is a little disappointing that it has not been possible to include the more recently accepted views on the treatment of spina bifida, particularly in regard to the need for selection of patients for treatment. It is no longer generally accepted that immediate closure of the back has any significant effect in preventing deterioration of function in the lower limbs.

This volume presents the reader with a clear, easy text in paediatric surgery and can be recommended.

B.T.S.

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PROFESSOR WOODBURNE'S textbook was first published in 1957, and it is now in its 5th edition; it has met with the approval of teachers and students in many parts of the world. The book gives a sensible, accurate, clear account of the structure of the human body, with functional and clinical relevance constantly in mind. It is designed, by a teacher of long experience, to be used as a companion to dissecting room studies: it therefore examines the body regionally, from superficial to deep; and by frequent cross-references, synoptic illustrations and stress on continuity of structures, it avoids the danger of 'dissociated learning' which too exclusive a regional approach is liable to engender.

There are many good things in the book, e.g. an excellent general introduction to the systems, 'details' in small print; interesting, rather old-fashioned coloured plates reminding one of early 19th century atlases; a good series of radiographs; tables of movements and muscle actions; a glossary of eponyms; some 200 key references; and a good index. On the other hand, I was not impressed with the black and white illustrations: many were too small, over-detailed and difficult to interpret. But perhaps my over-riding impression is that the book is rather unexciting: one longs to see an anatomy text which will fire the imagination of the young student, and induce him not only to see the relevance of the information but to love the subject for its own sake.

J.P.

THE ESSENTIALS OF FORENSIC MEDICINE. By C. J. Polson and D. J. Gee. Third Edition. (Pp. xvii+729; 160 figures. £12.00). Oxford: Pergamon Press. 1973.

TO have to review a textbook written by one's former chief and mentor could be difficult if it were dull and failed to blow a stimulating breath of fresh air on the subject. It could be equally difficult if it were a new edition not much different from the first. Happily this third edition of The Essentials of Forensic Medicine spared me from any such problems. It looks good and was a delight to read.

It is interesting to look back and see how this textbook has grown. The first edition published in 1955 without illustrations was intended principally for law and medical students and was an amplification of Polson's lecture course in forensic medicine at Leeds University, although I like to regard as the real first edition the bound volume of the lectures in typescript which Polson had long before made available to students in the library of the Leeds Medical School. The second edition of 1965 enabled Polson to build on a firm foundation and establish his book as a standard text; the material was enlarged and revised, illustrations were added, some of them in colour, and the bibliography was expanded. This third edition might well have been just a revision but it has taken on a completely new look. With the collaboration of David Gee who succeeded Polson to the Chair of Forensic Medicine at Leeds, there has been a re-arrangement of the text, considerable revision and enlargement of the chapters, the introduction of numerous illustrations and an extensive bibliography to each chapter. It contains the chapters usually found in textbooks of forensic medicine but they have now sensibly omitted discussion of the finer points of blood testing and grouping, an increasingly difficult subject properly in the field of forensic science, and they have added chapters on the scene of crime, anaesthetic deaths, the battered child and sudden natural death.

The book has grown in area, thickness, weight and price, the original £1.10s. having risen to £12. This cost now puts it beyond the personal ownership of most undergraduates but this was not by accident; the authors acceded to the request of the publishers to turn the book into one for pathologists and postgraduate students. They succeeded admirably; every pathologist coming face to face with medico-legal work must have a copy available for easy reference. It is an essential standard text for every medical and law library. What of the

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This symposium is a good attempt to bridge the gap between paediatrics and adult medicine, into which the adolescent child falls, and will be of interest to those physicians whose clinical interest falls on either side of that gap.

D.R.H.

CONTROVERSY IN INTERNAL MEDICINE. Volume II. Edited by F. J. Ingelfinger, R. V. Ebert, M. Finland and A. S. Relman. (Pp. 829. Illustrated. £7.90). London: Saunders. 1974.

ONE of the major dangers in the path of the mature physician is that of adopting an increasingly philosophical approach to his practice of medicine. This book caters for that need. It probably represents the point of view of your reviewer that he found it very interesting. A reviewer of the first volume stated "the frontpiece should contain in bold red type a warning to all residents who propose to sit for the Boards that they should avoid this book. If he were not confused before reading it he would have a written guarantee for confusion before he finished it." I think this criticism, at least of the second volume, is unjustified. The book is written for the post-mature physician who has some knowledge of the controversies which are raised but who need not necessarily be deeply versed in any one of these specialised subjects. There are two points of view in most controversies and the editors have tried to choose a distinguished proponent from each side. I think the discussions are more interesting in the subjects in which one is not personally involved and this is the aim of the book. Those of us who have research or clinical interests close to any particular controversy will find ourselves aligning with one or other side and the discussion of the controversy itself is probably less helpful.

The authors are chiefly from the U.S.A. and their points of view represent the approach in that country. However, there are many topics of interest to all physicians. For example—is internal medicine obsolete, exercise for the coronary patient, is aspirin a major cause of acute gastrointestinal bleeding, the management of gallstones particularly the silent variety, the management of cerebral ischaemia and others. Two topics in which this reviewer has

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personal interest include a debate that all antidiabetic agents have a limited place in management and may be harmful opposed to a view that all hypoglycaemic agents are worthwhile, and the controversy as to whether the solitary thyroid nodule should or should not be removed. It is always interesting to see the evidence for and against one's own particular viewpoint being presented. The papers tend to be discursive rather than brief and the evidence quoted is certainly personal rather than necessarily inclusive. A brief comment by a third party is included in each discussion which is written in the knowledge of what both of the previous discussants have written. As these are controversies there is no final answer in many cases but the presentation of a subject is brief enough to allow the two sides and the comment to be read at one sitting.

Provided one is aware of the danger of self-indulgence in philosophical concepts and can try and identify the real issues from the non-issues this is a useful and stimulating book. The good final year student would appreciate it. The candidate for Membership would best keep clear of it but from then on we are all really part of several of these controversies throughout our professional lives.

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OBSTETRIC THERAPEUTICS; CLINICAL PHARMACOLOGY AND THERAPEUTICS IN OBSTETRIC PRACTICE. Edited by D. F. Hawkins. (Pp. 594; 55 figures and 2 plates. £8.50). London: Bailliere Tindall. 1974.

IN recent years there have been considerable changes in the whole concept of Obstetric practice, and since the introduction of the Part I examination for the Membership of the Royal College of Obstetricians and Gynaecologists there has been a real need for textbooks on Applied Physiology and Pharmacology. This publication goes a long way towards fulfilling this role. The book is written in a clear and simple style that makes reaching it a pleasure. Most of the figures and tables are self explanatory. An attempt is made to cover a very wide field while still keeping the book of reasonable size but one feels that some of the details recorded are mainly of historical value and could very well be omitted. The section on anaesthesia is very well written and possibly the best in any obstetric textbook to date. That on induction of labour could be revised and emphasis put on more modern trends rather than outdated methods. The way references are presented will be of great help to both postgraduate students and practicing physicians. There is no doubt that this textbook will play a leading role in obstetric practice. The considerably high price and the few errors to be found in it detract little from its value and it should be read by all obstetricians.

H.L.

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D.R.H.

OBSTETRIC THERAPEUTICS; CLINICAL PHARMACOLOGY AND THERAPEUTICS IN OBSTETRIC PRACTICE. Edited by D. F. Hawkins. (Pp. 594; 55 figures and 2 plates. £8.50). London: Bailliere Tindall. 1974.

IN recent years there have been considerable changes in the whole concept of Obstetric practice, and since the introduction of the Part I examination for the Membership of the Royal College of Obstetricians and Gynaecologists there has been a real need for textbooks on Applied Physiology and Pharmacology. This publication goes a long way towards fulfilling this role. The book is written in a clear and simple style that makes reaching it a pleasure. Most of the figures and tables are self explanatory. An attempt is made to cover a very wide field while still keeping the book of reasonable size but one feels that some of the details recorded are mainly of historical value and could very well be omitted. The section on anaesthesia is very well written and possibly the best in any obstetric textbook to date. That on induction of labour could be revised and emphasis put on more modern trends rather than outdated methods. The way references are presented will be of great help to both postgraduate students and practicing physicians. There is no doubt that this textbook will play a leading role in obstetric practice. The considerably high price and the few errors to be found in it detract little from its value and it should be read by all obstetricians.

H.L.

SYMPOSIUM: ADVANCES IN LABORATORY MEDICINE. Edited by A. T. Proudfoot, B.Sc., M.B., M.R.C.P.(Ed.). (Pp. 107. £1.50). Edinburgh: Royal College of Physicians. 1973.

THIS symposium held in the College on 2nd February 1973 consists of six papers, four relate to biochemistry and two to immunology. The biochemical subjects are inherited metabolic disorders discussed by Barbara Clayton, radioimmunoassay described by W. M. Hunter, measurement of drug concentrations in plasma reviewed by L. F. Prescott and computers in clinical chemistry considered by L. G. Whitby. Human immunoglobulins are discussed by J. R. Hobbs and cellular immunology by W. L. Ford. A large amount of information, and sometimes disconnected information, is supplied in condensed form and little previous knowledge is assumed. This leaves little space for discussion of any selected aspects of fundamental theory or clinical application. Often the readers appetite is whetted but left unsatisfied. The symposium is competent and efficient, but rarely inspiring, and some aspects, such as the availability of radioimmunoassay are dating rapidly. Perhaps the claim to discuss advances in laboratory medicine and the omission of microbiology, haematology, histopathology and cytopathology should be qualified.

J.E.M.