received led the commercial laboratories to request the Minister of Health to review the claims as to the cost-effectiveness of the Hamilton District Laboratory Programme. This study, carried out by the Woods, Gordon, and Company accounting firm, took two years to complete and is one of the most comprehensive and complex cost analyses of laboratory services provided by a group of hospitals. The study included the analysis of all laboratory requests received, both on inpatients and outpatients, by five hospital laboratories in a week in May 1975 and related this to all the tests performed. The three sequential reports recently released by the Ministry of Health of Ontario concluded that, had it operated as a private laboratory, the Hamilton District Laboratory Programme would indeed have made a profit, albeit a small one.

The release of this report coincided with newspaper publicity of alleged corrupt practices by certain commercial laboratories. The allegations included gifts and commissions to doctors referring patients and billing for tests that had not been performed. Although commercial laboratories are licensed by the province, the only requirement laid down for their supervision is that of a registered medical practitioner. There has been considerable publicity of the Provincial Laboratory Proficiency Testing Programme finding that about 10% of the laboratories fell below acceptable standards.

These disclosures on the quality and cost-effectiveness of laboratories have coincided with the announcement by the Minister of Health of the closure of 1000 hospital beds, meaning that 5000 health-related professionals will be losing their jobs. A public inquiry into public and commercial laboratories has been called for but at the time of writing no action has been taken.

Financial circumstances, a minority Conservative government, and a highly articulate and courageous Minister of Health, Mr Frank Miller, who has recently had a heart attack, have led to decisions which will undoubtedly affect the future patterns of health care delivery in Ontario. The need to reduce the costs of health and the difficulties in implementing these decisions make it appear that the opposition parties are unwilling to defeat the Government. An appropriate analogy might be the national sport of ice hockey—a fast, rough game in which it is impossible not to become partisan whether watching one's son or daughter play or the professionals. The first period is over, the tempers are running high, and now that the provincial legislature has reassembled one expects at any moment the gloves and sticks to be dropped and the fights to start. Whether the benches will empty and so enable the public to give their verdict at the polls is yet to be seen. Meanwhile, the political scene in Ontario as it relates to health, like the hockey match, has one on the edge of one's seat.

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Contemporary Themes

Cost of management of patients with haemophilia

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British Medical Journal, 1976, 2, 465-467

Summary

The cost of managing 114 adult haemophiliacs in the west of Scotland was assessed for the period 1 March 1971 to 28 February 1974. Altogether 23 of them (20%) accounted for 80% of the resources used. The cost of hospital treatment of these patients during the period was compared with the predicted cost of home treatment, given the availability of freeze-dried factor VIII concentrate in sufficient amounts. We calculate that adequate on-demand home treatment would cost only 16% more than the present treatment, which is substantially less efficient.

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Introduction

In the past few years the availability of potent concentrates of plasma clotting factors has produced important changes in the management of patients with bleeding disorders. This, in turn, has led to a decline in mortality with a resultant increase in numbers of patients and a demand for facilities for self-administration of plasma concentrates at home.

Although the number of patients with haemophilia A is small, their consumption of medical resources is high. In the west of Scotland the mean prevalence of such patients is 1·12 per 10 000 of the male population. The prevalence of patients by age is shown in fig 1. There are apparently fewer haemophiliacs in the younger age groups because mild haemophilia is not always diagnosed until the teenage years or later, while the declining prevalence with age is probably due to the shorter life expectancy of haemophiliacs before effective treatment with factor VIII concentrates became widely available. If the prevalence in the group aged 19 to 23 years in 1974 (2·03/10 000 male population)

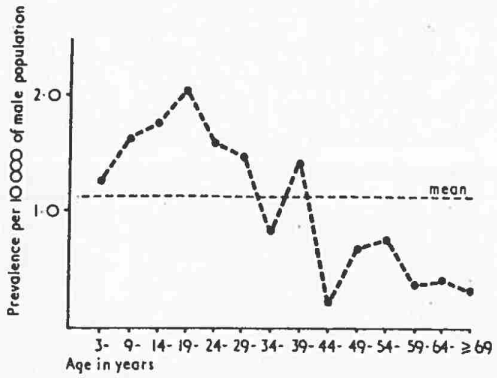

FIG 1—Prevalence of haemophilia in west of Scotland according to age in 1974.

represents a more accurate estimate of the prevalence of haemophilia in the community, given modern treatment, then the number of haemophiliacs can be expected to increase by 81% from greater life expectancy alone. Such an increase in the next few decades would have major financial implications in the provision of satisfactory medical care. We have attempted to assess the cost of treating haemophilic patients and to predict changes in cost that might result from setting up home treatment programmes.

Patients and methods

Nearly all the treatment required by adult haemophiliacs in the west of Scotland is given at the Haemophilia Centre, Glasgow Royal Infirmary. A complete record of all treatment given to each of 114 adult haemophiliacs was compiled for the period 1 March 1971 to 28 February 1974. All haemophiliacs aged 12 or over on 1 March 1971 were included in the study with the exception of one who moved into the area during the study period. Altogether 42 of the haemophiliacs (37%) received no treatment at Glasgow Royal Infirmary during the period. The remaining 72 had spent an average of eight days a year as inpatients (range 0-83 days), had attended for outpatient treatment five or six times a year (range 0-59 attendances), and had received an average of 157 packs of cryoprecipitate a year (range 0-1482 packs).

COSTS

Estimates included costs for inpatient and outpatient treatment and for the blood products administered. All costs refer to mid-1974 price levels.

Inpatient treatment—As detailed costs for specific groups of patients were not available, the average cost per inpatient day for Glasgow Royal Infirmary for 1974-5—£29·99—was used.[1]

Outpatient treatment—Most outpatients needed some form of treatment, usually cryoprecipitate. The cost to the hospital of an outpatient attendance was therefore calculated from the cost of giving a transfusion of cryoprecipitate. The total figure was composed of the cost of the materials needed to thaw out and administer the cryoprecipitate and the cost of staff time—namely, that of a laboratory technician, a porter, a staff nurse, and a senior house officer—which were £1·64 and £1·89 respectively. For the few outpatients who did not require treatment the average cost to the hospital of an outpatient attendance—£2·07—was used.[1] The cost of transporting the patient to hospital was also included in the total. The average distance from home to hospital was 10 miles (16 km). An estimated cost of 5p a mile (based on current ambulance and public and private transport costs) gave a travelling cost of £1 for each outpatient attendance.

Blood products—Cryoprecipitate was the main blood product administered during the study period, a total of 33 903 packs being used. Other treatment included whole blood (182 donations), fresh-frozen plasma (from 41 donations of blood), washed packed cells (from 12 donations), antihaemophilic factor (Cohn fraction I, from 140 donations), and three commercial freeze-dried concentrates (Kryobulin 12 185 units of factor VIII activity, Hemofil 4152 units, and Edinburgh factor VIII 988 units). A previous estimate of the cost of preparing cryoprecipitate was £1·69 a pack.[2] Costs for the remaining blood products were estimated as follows: whole blood £6·65 per donation, fresh-frozen plasma and washed packed cells £3·50 per donation, antihaemophilic factor (Cohn fraction I) £13·30 per donation, and commercial freeze-dried concentrate 10p per AHF unit.

Results

Using the above figures we calculate that the total cost of treating haemophilia in the west of Scotland during the three-year period was £118 973—almost £40 000 a year. The distribution of cost among the patients is shown in fig 2. Altogether 23 of them (20%) accounted for 80% of the cost. Any attempt to evaluate the cost of a change in the method of treating haemophilia should therefore concentrate on this group of "frequent attenders." Five of these patients were diagnosed as having moderate haemophilia, and the remaining 18 were severely affected. The yearly cost for individual patients varied from £417 to £4624 (12% of the total cost). Table I shows how the cost of treating the 23 patients was distributed among the different components. Cryoprecipitate accounted for 47% of the cost (the largest proportion) and hospital inpatient treatment for 44%.

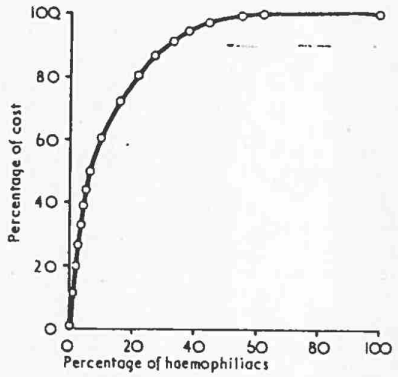

FIG 2—Cumulative cost curve showing that 80% of resources were consumed by only 20% (23) of registered haemophilic population.

TABLE I—*Present yearly cost of treatment and travelling for the 23 frequent attenders*

	£	%
Hospital inpatient treatment	14 125	44·4
Hospital outpatient treatment	1 103	3·5
Cryoprecipitate	14 785	46·5
Other blood products	1 498	4·7
Travelling	315	1·0
Total	31 826	100·1

PREDICTED COST OF TREATING FREQUENT ATTENDERS AT HOME

Home treatment of haemophiliacs has been proposed and implemented in various centres.[3-5] Although cryoprecipitate has been used in home treatment, freeze-dried concentrate is generally preferred.[6] This is expensive, however, and the cost of running such a programme has been questioned. In an attempt to predict the cost of treating the 23 frequent attenders at home with freeze-dried concentrate we made the following four assumptions.

(1) We assumed that all patients who were frequent attenders would be suitable for home treatment.

(2) We assumed that each patient would treat himself at home for all episodes now treated on an outpatient basis. A dose of up to 15 packs of cryoprecipitate given at an outpatient attendance would be replaced by an injection of 500 units of factor VIII in freeze-dried form given at home. An injection of 750 units of factor VIII would replace a transfusion of 20 packs or more of cryoprecipitate. As will be appreciated these are not exact

nversions of unitage from cryoprecipitate to concentrate. It is apparent at in the past, because of variability of different batches of cryoprecipitate, has been necessary to overtreat patients to ensure adequate haemostasis. his should not happen when the unitage is accurately known.

(3) The records of each patient were examined to see if hospital admissions er the period under examination would have been necessary had adequate me treatment been available and given immediately to stop further eeding. Conditions for which admission to hospital would have been ecessary" included haematemesis, melaena, prolonged haematuria, dental ctractions, and surgical operations. Inpatient admissions were regarded as voidable" if it was felt that the patients could have treated themselves ccessfully. This category included haemarthroses and haematomas. We en assumed that necessary treatment would be carried out as at present, hile each avoidable episode would be replaced by three days of intensive me treatment of 1000 units of factor VIII a day. This is a generous verestimate.

(4) We assumed that each patient would attend the hospital for four heck-up visits a year, seeing a staff nurse and a senior house officer and btaining further stocks of concentrate.

Costs calculated for home treatment based on these assumptions re shown in table II. The total yearly cost is £36 982, or £1 608 for ach of the 23 patients. Comparison of tables I and II shows that the verall yearly cost of home treatment would be £5156 (16%) more han that of the present method of treatment.

TABLE II—*Predicted yearly cost of home treatment for the 23 frequent attenders*

	£	%
Hospital treatment	8 292	22·4
Freeze-dried concentrate	24 800	67·1
Other blood products	3 792	10·3
Travelling	98	0·3
Total	36 982	100·1

Discussion

These results show that, with certain assumptions, the predicted cost of home treatment of a group of patients with severe and moderate haemophilia using adequate amounts of freeze-dried concentrate would be 16% higher than the cost of the present, suboptimal treatment. Certain factors may help to reduce the cost of home treatment. Firstly, most of the freeze-dried concentrate used in the United Kingdom is imported, and it is forecast that supplies produced in this country will be cheaper. Secondly, those patients who are already on home treatment have reported a much improved quality of life.[3,7] During the study period nine of the 23 frequent attenders were unemployed, and the remainder lost time from work because of recurrent illness. This suggests that the total cost of haemophilia to the community is higher than the cost of treatment. If home treatment can reduce morbidity and enable some of those unemployed to return to work the total cost to the community would be reduced. Prompt home treatment may also prevent long-term crippling and so reduce the amount of long-term care required in the future.

Recently there has been a plea for more money to be set aside to provide adequate treatment for haemophilia.[8-11] If home treatment could provide substantial benefits—and the cost to the health service would be only fractionally higher—then there should be no further delay in instituting such programmes.

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A girl aged 7 is due to have a booster dose of antitetanus vaccine. As a three-month-old baby she collapsed after a full DTP injection, but since then has had immunisation injections without ill effect? Is it safe to proceed with further immunisations?

Both local and generalised reactions to tetanus toxoid may occur, but they are never fatal, nor do they leave sequelae. Moreover, they are extremely rare in childhood, and the 1% of adults who are adversely affected have usually already received many doses.[1] It is therefore completely safe to give this girl further doses of tetanus toxoid, whatever the nature of her "collapse" at the age of 3 months.

[1] *British Medical Journal*, 1974, **1**, 48.

A patient with psychotic depression and Parkinson's syndrome is taking tricyclic antidepressants and trifluoperazine hydrochloride. Attempts to reduce the doses have resulted in a relapse of her depression. The Parkinsonian symptoms are made worse by this treatment and orphenadrine hydrochloride makes little difference. Is there any problem in adding levodopa to her treatment?

There would appear to be no specific contraindication to using levodopa in treating this most difficult case. Nevertheless, theoretically, it is unlikely to be of much help because trifluoperazine hydrochloride and other neuroleptics are believed to act by blockade of central dopaminergic receptors. Levodopa, from which dopamine is produced in the brain, cannot be effective if the receptors are blocked. But one can never be sure and there is no harm in trying.

Brodgen, R N, *et al*, *Drugs*, 1971, **2**, 262.
Parkes, J D, and Marsden, C D, *British Journal of Hospital Medicine*, 1973, **10**, 284.

Is there a serological test for determining a person's immune state in relation to tetanus?

A serum tetanus antitoxin level of 0·01 unit/ml is generally accepted as indicating immunity to tetanus.[1] It would be interesting, however, to know the motive behind the question, since it is difficult to imagine any clinical application for a serological test of immunity to tetanus. If active immunisation is being considered, the procedure is so safe and tetanus toxin potentially so lethal, that tetanus toxoid should be given wherever there is clinical doubt about the immune state. In the case of antitoxin administration, the risks of horse serum are unacceptable whatever the immune state, and if human antitoxin is available it must be given on clinical grounds without delay.

[1] *Topley and Wilson's Principles of Bacteriology, Virology, and Immunity*, ed G S Wilson and A A Miles, 6th edn, vol 2, p 2246. Baltimore, Williams and Wilkins, 1975.

Can vitamin C overdosage cause venous thrombosis?

There was considerable correspondence in the columns of the *Lancet* a few years ago over the therapeutic benefits or otherwise of large doses of vitamin C. One author[1] claimed that 1-2 g daily provided protection against venous thrombosis and pulmonary embolus in a controlled trial. Another[2] wrote to say, however, that as a result of taking a single dose of 3 g for an upper respiratory infection, he had developed what appeared to be a femoral vein thrombosis the next day. I have been unable to find any corroborative reports.

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[2] Horrobin, D F, *Lancet*, 1973, **2**, 317.