THE NOVA SCOTIA MEDICAL BULLETIN

Anaesthesia: An Unappreciated Profession

"The price of freedom is eternal vigilance."

There is no profession with more individual responsibility than anaesthesia. As with a pilot or an air traffic controller, an unchecked error or a mistake in judgement can have fatal consequences. For each practitioner with these skills, a whole organisation and a modern technology lie behind these manipulations, but the burden of responsibility is ultimately on the anaesthetists shoulders, sharing with the surgeon, nurses and hospital, the safety of the patient who blandly submits to his infusions.

Modern anaesthetics have become so remarkably safe that they are taken for granted and often the patient is unaware who administered them. In emergencies patients in the extreme stages of shock are calmly resuscitated, intubated and kept alive by mechanical devices whilst the surgeon endeavours to correct the anatomical defects.

Infants with tracheo-oesophagical fistulae, children with cardiac anomalies, adults with intestinal obstruction, people with ruptured aneurysms, senile ladies with fractured hips: all are accepted almost without demure. New fields like micro-surgery require the patient to be analagesic for over 12 hours at a stretch. Behind the patients' safe survival and healthy recovery lie the pre-operative care, the induction and maintenance of anaesthesia and satisfactory post-operative recovery.

All this, and yet the profession is often regarded as the most unglamourous and unexciting for any student to contemplate. Like an airline pilot "Hours of boredom punctuated by brief moments of panic" — This it is not! Behind each case lies a series of complicated manoeuvres based on expert judgement and good training. It has taken well over 100 years to establish anaesthesia as a specialty in its own right — one which requires as much study as any other branch of the medical profession.

Most students know the story of Dr. Morton giving the first ether anaesthetic in Boston, Massachusetts in 1846. He tried to patent the anaesthetic as "Letheon" withou success. Ether at first competed with chloroform as the most popular anaesthetic agent. Introduced by Simpson in Edinburgh, chloroform became widely used on this continent as a result of his paper published on November 10, 1847: "Discovery of a new anaesthetic agent more efficent than sulphuric ether." Chloroform was more popular than ether probably because of its ready portability and lesser volatilty.

Both anaesthetics were used extensively in the American Civil War, but with doubtful benefit. Conditions were appalling, and here is a description of conditions at Gettysburg. "Most of the tables were placed in the open where light was best. The surgeons stood with their sleeves rolled up to their elbows, their bare arms as well as their aprons lined with blood, their knives held between their teeth, while they helped a patient on and off a table. . . as a wounded man was lifted on to the table often shrieking with pain, the attendants handled him, the surgeon examined the wound, quickly resolved upon cutting off the limb. Some ether was administered and the body put in position for a moment. The surgeon snatched the knife from between his teeth, wiped it rapidly once or twice across the blood-stained apron and the cutting began. The operation complete, the surgeon would look up and 'on to the next'."

Deaths attributable to surgery were incredibly common. Surgeons hands and instruments were not disinfected and the Listerian principles of asepsis were not established. In 2335 cases where ligatures were used the mortality rate was 61%. The mortality of all gunshot wounds was 13%. Pyaemia, erysipelas and gangrene occurred in 28% of injuries. It was thought that wounds were lined with dead tissue which had to be thrown out of the body as pus. If they healed by first intention it was considered a freak. Surgeons would often probe wounds with their uncleaned fingers. Anaesthesia, whilst allaying suffering, was responsible for encouraging a pre-Listerian horror story where unskilled surgeons wreaked their septic havoc.

It was twenty years before the historic combination of Pasteur's discovery of organisms and Lord Lister's application of aspetic principles to surgery, allowed a marriage of anaesthesia and safe surgery. The wide application of these principles has since produced an amazing variety of ablative and reconstructive procedures to relieve man's suffering. By the turn of the century anaesthesia was widely accepted for major and minor operations as well as childbirth, and today only the most stoic individual would refuse its administration for an operation.

Remarkably enough anaesthetics have been used in Canada since 1847. In Nova Scotia, both ether and chloroform were used very soon after their initiation, by practitioners who learnt their trade from the masters. Dr. Lennox Van Burkitt of Halifax familiarised himself with the use of ether by visiting Boston, and he administered it for Dr. Palmer for an amputation in 1847. The same Dr. Palmer who had been a clinical clerk to Dr. Simpson in Edinburgh in 1845, was present when chloroform was used for the first time in Canada. It was given successfully on February 8, 1848 by Dr. Almon, for amputation of a finger.

Chloroform first used in Halifax in 1848.

Ether and chloroform continued to be used for many years in Nova Scotia. Chloroform was particularly favoured by the rural practitioner, particularly for childbirth, as it was in England. Holding a mask and pouring on an anaesthetic was not a very refined procedure, but it became highly respected after John Snow gave chloroform to Queen Victoria in 1853, and was knighted for the deed.

In Britain and Canada, anaesthesia remained the prerequisite of doctors and whilst no formal training was given, certain practitioners became adept at the art. By 1863 some two thousand anaesthetics had been given at the Toronto General Hospital, and the first two deaths from chloroform recorded for Toronto and Montreal. The stages of anaesthesia were fully understood and dangers realised. Manitoba led the way in the scientic and experimental aspects of the process and established the first honorary appointment. Dr Webster was first lecturer in anaesthesia in Manitoba Medical School in 1900. His undergraduate course included lectures, demonstrations on animals, and teaching in the operating room. Dr. Samuel Johnson in Toronto also became widely known for his contributions and was appointed President of the Section of Anaesthetics (British Medical Association).

Hospital anaesthetic departments were just begining before World War I and continued to develop thereafter, but it took the demands of the Second World War to really establish anaesthesia as a specialty in its own right.

Anaesthesia has matured as a rewarding career that has branched out to include intensive care, the relief of pain, and resuscitation. As physiology extends, so will anaesthesia become ever more complex, more demanding.

Canada's contribution has been considerable. The first three subjects to receive cylopropane included Dr. Banting, of insulin fame. The first curare ever for relaxation was given in Montreal in 1942. Professional standards have gradually risen. At one time any practitioner could label himself as anaesthetist. Since 1942, the Royal College has recognised Certification as part of the medical division and training programmes have been monitored.

The contribution by Dr. Moffitt in this issue recognises the difficulty in providing certified anaesthetists throughout Nova Scotia, but it represents a carefully calculated assessment of the province's future needs. Thanks to the pioneering efforts of a century and a half of anaesthetists in Nova Scotia, and continuing efforts to keep up to date by practitioners, we have one of the standards in our teaching hospitals that compare favourably with anywhere in the world. It is hoped that future plans will provide a wider distribution of specialists and a satisfactory solution can be reached for the training and regulation of the part time anaesthetist in the more remote areas.

The future of anaesthetics depends of imagination, enthusiam and organisation of small group of physicans. It is hoped that the profession will attract the high calibre of new physicians it deserves. □

B.J.S.G.

References

1. **Gordon, R.A:** A Capsule history of Anaesthesia in Canada. *Can. Anaesth. Soc.J.* **25:**75, 1978.

2. **Adam, G.W:** "Doctors in Blue: The Medical History of the Union Army in the Civil War." Collier Books, New York. 1952.

Anaesthetic History Notes*

1844 — Horace Wells, a dentist, first used nitrous oxide as a dental anaesthetic, but was unsuccessful in subsequent demonstration at Massachusetts General, and was hissed out of the room. (later abandoned dentistry, became a chloroform addict, toured the States with a troupe of performing canaries, was jailed after throwing sulphuric acid at a New York prostitute, and committed suicide).

1846 — William Morton gave first successful demonstration of ether anaesthesia at Massachusetts General on October 16. Tried to patent ether as "Letheon"; was not recognised as discoverer of anaesthesia in his lifetime; died of a cerebral haemorrhage. Charles Jackson claimed to have suggested ether to Morton, and to have been the true discoverer. Became paranoid and died insane. Oliver Wendell Holmes of Boston suggested the name "anaesthesia". December 21, 1846 — Robert Liston performed first operation under general anaesthesia in England at U.C.H.

1847 — Dr. Parker in Halifax performed amputation under ether given by Lawrence van Buskirk — date uncertain, but one of first in Canada.
November 4 — chloroform first used by James Simpson of Edinburgh.

1848 — February 5 — chloroform used in Halifax for amputation of finger by Dr. Almon in presence of Dr. Parker, who had been a clinical clerk to James Simpson in Edinburgh — claimed to be first use of chloroform in Canada.
January 28, 1848 — Hannah Greer, age 15, first to die under chloroform, in Co. Durham, England.

1853 — John Snow (first professional anaesthetist) gave "Chloroform-à-La-Reine" to Queen Victoria.

1887 — Sir Frederick Hewitt invented first practical gas-and-oxygen machine.

1893 — London Society of Anaesthetists' formed (first professional association in the world)

1899 — Dr. Hutton appointed honorary anaesthetist to Winnipeg General Hospital (first professional in Canada)

1904 — Dept. of Anaesthesia formed at Toronto General Hospital (first in Canada)

1905 — Long Island Society of Anaesthetists (first professional association in North America)

1907 — Dr. S. Johnston, first Lecturer in Anaesthesia in Canada (Toronto)

1920 — Canadian Society of Anaesthetists formed. Endotracheal anaesthesia pioneered by Magill and Rowbotham (East Grinstead). (Sir Ivan Magill honoured by Royal Society of Medicine last year on his 90th birthday). Early endotracheal anaesthesia in Montreal using specially-made wide-bore urethral catheters imported from France (manager of firm alleged to have said that his factory girls, unaware of intended use of catheters, were expressing interest in those magnificently-equipped Canadians!)

1929 — World's first clinical use of cyclopropane in Montreal. One of first three humans to receive it was Frederick Banting.

1942 — World's first use clinically of curare in Montreal (Griffith)

1945 — First Canadian independent Department of Anaesthesia at McGill University (Wesley Bourne)

1955 — Griffith of Montreal initiated and became first president of World Federation of Societies of Anaesthetists. □

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Gordon R.A.: A Capsule History of Anaesthesia in Canada. *Can. Anaesth. Soc. J.* **25**:75, 1978.

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Anaesthesia Needs Manpower in the Maritime Provinces

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Considerable attention recently has been focused on the manpower needs for physicians at both federal[1 3] and provincial levels[4]. How many of what kinds of doctor are currently practising and how many will be needed in 10 to 30 years? Are the various kinds of physician appropriately distributed with relation to where the people are?

For that specialty designated as Anaesthesia, who are currently providing services? Are there enough anesthetists in the Maritimes and what is their level of formal training? How many anesthetists does Dalhousie need to be training over the next three decades?

To obtain answers to those questions, we completed a survey of manpower and anesthetic services for Nova Scotia, New Brunswick and Prince Edward Island, early in 1978. This report summarizes that survey and forcasts the future needs in Anaesthesia for the Maritimes.

METHOD

Data Gathering

Two kinds of information were obtained:

1. number of anesthetic services by hospital, as paid by each provincial medical insurance plan. This included all types given by all doctors, except local anesthesia, regardless of length. For New Brunswick, these data are for 1974, 1975 and 1976; for Prince Edward Island, 1976, and for Nova Scotia, the year ending March 31, 1976.
2. identification of all known, full-time and part-time anesthetists in every hospital, their age and level of formal training. This was obtained by inquiry and from personal knowledge. It was essential to ascertain when and where replacements will be required and to assess the relative adequacy of numbers, relative to need, in each hospital.

Data Analysis

These criteria were followed in assessing the present and future needs for anesthetists, hospital by hospital:

1. the volume of services provided, in the years examined, had to be used to project future needs. In fact, most hospitals have gradually increased their surgical load since 1976. (See Table II, N.B.)
2. the national manpower study of 1971-72[1] recommended an annual workload of 1260 anesthetics per full-time staff in community hospitals. We accepted 1300 per year as the average caseload in deciding how many full-time anesthetists each hospital could support.
3. in hospitals having sufficient volume of anesthesia to support full-time anesthetists, we advocated that full-time staff provide the services instead of part-time practitioners, as replacements are made.
4. every hospital with surgical and obstetrical services, regardless of annual volume, must have a minimum of two anesthetists to provide continuous on-call service.

RESULTS

Table I (column 2) shows the annual number of anesthetic services in 25 hospitals in Nova Scotia, divided into six geographical areas. Column 3 gives the present ratios of cases/anesthetist/year. In that year, 75,941 anesthetics were given, with 39,462 of them in Area V (Halifax).

Columns 4 and 5 are the current number of specialists and nonspecialists in each hospital. A specialist is defined as a full-time anesthetist, with or without the Royal College certificate. A non-specialist is a part-time anesthetist regardless of amount of training. At present, 44 specialists and 29 non-specialists provide the anesthetic services for Nova Scotia.

Using the aforesaid criteria, the same volume of services could be provided ideally by 55 specialists and 21 non-specialists (columns 6 and 7). Columns 8 and 9 are the ratios resulting from that coverage.

Table II provides similar information for 30 hospitals in New Brunswick, in 6 geographical areas, with three years of annual caseloads. In New Brunswick, all specialists are on the Specialists' Register of the Provincial Medical Board.

In 1976, 71,902 anesthetics were given by 27 specialists and 51 non-specialists. Using the criteria for ideal coverage, there would be 17 more specialists and 25 fewer non-specialists, for the same volume of work.

Table III reveals the situation in Prince Edward Island. Approximately 9,500 cases were done by 5 specialists and two non-specialists. Their specialists are full-time anesthetists, either Royal College Certificated or eligible. This volume would ideally be covered by 5 specialists and 2 non-specialists.

Table IV shows the year in which the anesthetists in Nova Scotia will reach 65 years of age, when it should be assumed that they will retire or at least reduce their practices. The total of 78 is five more than in Table I, by 5 specialists in Region V who, on any particular day, are out of operating rooms on academic pursuits.

In this table are three categories: (1) those on the Specialists' Register of the Provincial Medical Board (i.e. have Royal College certificate, (2) specialists with Royal College eligibility (i.e. 4 years training, and (3) non-specialists (less than 4 years of training).

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TABLE I

Distribution and Workload of Anesthetists in Nova Scotia

HOSPITAL	ANNUAL NO. SERVICES	RATIO: CASES PER ANAESTHETIST	CURRENT NO. ANESTHETISTS		IDEAL NO. ANESTHETISTS		IDEAL RATIO: ANES/CASES	
			SPECIALIST	NONSPEC.	SPECIALIST	NONSPEC.	SPECIALIST	NONSPEC.
Area I								
I	837	1/279	0	3	0	2	—	1/418
2	913	1/304	0	3	0	2	—	1/456
3	795	1/397	0	2	0	2	—	1/397
4	3276	1/1092	0	3	3	0	1/1092	—
5	150	1/150	0	1	0	1	—	1/150
6	1051	1/525	0	2	0	2	—	1/525
	7022		0	14	3	9		
Area II								
1	3316	1/1105	3	0	3	0	1/1105	—
2	626	1/626	0	1	0	2	—	1/313
3	800	1/800	1	0	0	1	—	1/800
4	1100	1/1100	1	0	1	0		1/1100
5	973	1/973	1	0	1	0		1/973
	6815		6	1	5	3		
Area III								
1	1667	1/1667	1	0	1	1	1/1300	1/367
2	3732	1/746	0	5	2	1	1/1300	1/1132
3	3865	1/1932	2	0	3	0	1/1288	—
4	2050	1/2050	1	0	1	1	1/1300	1/750
	11314		4	5	7	3		
Area IV								
1	853	1/853	0	1	0	2	—	1/426
2	5370	1/1342	4	0	4	0	1/1342	—
3	2950	1/737	0	4	2	1	1/1300	1/350
4	1355	1/452	1	2	1	1	1/1200	1/155
5	800	1/400	0	2	0	2	—	1/400
	11328		5	9	7	6		
Area V								
1	18855	1/1347	14	0	16	0	1/1178	0
2	8038	1/1340	6	0	6	0	1/1340	0
3	2271	1/2271	1	0	2	0	1/1135	0
4	9301	1/1329	7	0	8	0	1/1162	0
5	997	1/997	1	0	1	0	1/997	0
	39462		29	0	33	0		
Total	75941		44	29	55	21		

Total Anesthetists: Now — 73 Ideal — 76

On a criterion of age alone, 8 specialists and 7 non-specialists will need replacement in 10 years. In the subsequent two decades, to 1998 and to 2008, 17 and 19 specialists will need replacement. In this twenty years, 22 currently practising non-specialists will reach 65 years, some of whom should not be replaced.

Table V documents the year of reaching 65 years of age for anesthetists practicing in New Brunswick. All the specialists are in the Specialists' Register. All others are classed as non-specialists, regardless of training.

New Brunswick has 2 non-specialists who are over 65 years old. In the next decade, 6 specialists and 10 non-specialists will need replacement. In the succeeding two decades, 10 and 11 specialists become 65 years old. During that 20 years, (1988-2008) a total of 34 non-specialists are expected to retire, but as seen from Table II, many of them should not be replaced by non-specialists. Also noteworthy is that in New Brunswick there are 7 non-specialists who are now 30 or less years of age.

Table VI provides information as to when anesthetists in Prince Edward Island reach 65 years of age. From age alone, no replacements are required before 1988. From 1988 to 2008 the five specialists and one non-specialist become 65 years old.

DISCUSSION

Number of Anesthetists Relative to Caseload

According to our information, there are 78 doctors practising anesthesia regularly in each of Nova Scotia and New Brunswick and 7 in Prince Edward Island: a total of 163. Of these, 76 are full-time anesthetists, most of whom are on Specialty Registers with Royal College certification or have four years formal training.

By far the largest proportion of anesthetics (78%) are done in Nova Scotia by full-time anesthetists: about 58,500 of 76,000.

TABLE II

Distribution and Workload of Anesthetists in New Brunswick

HOSPITAL	ANNUAL NO. SERVICES			1976 RATIO CASES	CURRENT NO. ANESTHETISTS		IDEAL NO. ANESTHETISTS		IDEAL RATIO ANESTHETIST/CASES	
	1974	1975	1976	PER ANESTHETIST	SPECIALIST	NONSPEC.	SPECIALIST	NONSPEC.	SPECIALIST	NONSPEC.
Area I										
1	1766	1652	1882	1/941	0	2	1	1	1/1300	1/641
2	3912	4125	4346	1/621	6	1	3	0	1/1449	—
3	9241	9252	9352	1/1559	2	4	7	0	1/1336	—
4	1937	1728	1506	1/1506	0	1	1	0	1/1300	1/200
5	898	1079	1112	1/1112	0	1	0	2	—	1/556
	17754	17836	18198		8	9	12	3		
Area II										
1	886	707	563							
2	5816	6098	6082	1/1201	6	0	6	0	1/1201	—
3	4978	6772	6539	1/1308	4	1	5	0	1/1308	—
4	1081	896	901	1/901	0	1	0	1	—	1/901
5	847	797	740	1/183	0	4	0	2	—	1/370
6	943	931	991	1/991	1	2	0	2	—	1/495
	14551	16201	15816		11	8	11	5		
Area III										
1	433	426	367	1/367	0	1	0	1	—	1/367
2	6374	5945	6194	1/1548	4	0	5	0	1/1239	—
3	87	74	66	1/22	0	3	0	0	—	—
4	1244	1272	1381	1/1383	1	0	1	0	1/1383	—
5	5304	4691	5999	1/2999	0	2	4	0	1/1500	—
6	258	201	216	1/108	0	2	0	1	—	1/216
7	1259	1149	1209	1/402	0	3	0	2	—	1/604
	14959	13758	15434		5	11	10	4		
Area IV										
1	3989	4825	4755	1/1586	3	0	3	0	1/1585	—
2	952	916	853	1/863	0	1	0	2	—	1/426
3	610	720	784	1/367	0	2	0	2	—	1/367
	5551	6461	6342		3	3	3	4		
Area V										
1	2972	2786	3231	1/1077	0	3	2	1	1/1300	1/631
2	1871	2009	2036	1/1013	0	2	1	1	1/1300	1/726
3	2285	2414	2319	1/580	0	4	1	1	1/1300	1/1019
4	316	628	485	1/485	0	1	0	1	—	1/485
	7444	7837	8061		0	10	4	4		
Area VI										
1	(3300)	(3300)	3777	1/1259	0	3	3	0	1/1259	—
2	859	802	873	1/873	0	1	0	2	—	1/436
3	1278	1175	956	1/919	0	3	0	2	—	1/478
4	2470	2822	2445	1/845	0	3	1	1	1/1300	1/1145
	7907	8299	8051		0	10	4	5		
Total Cases	68166	70392	71902		27	51	44	26		

Total Anesthetists: Now — 78 Ideal — 70

In New Brunswick where there is no centre of large volume comparable to Halifax, about 40,000 of 72,000 (56%) were done by full-time anesthetists in 1976.

However, in Nova Scotia in 1976, there were 12 of the 25 hospitals with yearly caseloads less than the 1300 needed to occupy one full-time anesthetist. In New Brunswick, 11 regional hospitals of 30, had significantly below 1300 anesthetics per year, so it is apparent that part-time anesthetists are and will continue to be needed, in those smaller hospitals that nevertheless have surgical and obstetrical services.

Length of Formal Training Related to Caseload in Hospitals

In all three provinces there are hospitals with caseloads large enough to occupy full-time anesthetists, in which the current anesthetists are part-time. Certainly these anesthetists are providing satisfactory, essential, and in many instances, high quality services. But as this generation retires and needs replacement, hospitals that can support full-time anesthetists should do their utmost to attract them. It is encouraging that in several larger hospitals in Nova Scotia without certified anesthetists, it is now stipulated that future additional anesthetists be fully qualified. The growing numbers of surgical specialists and sub-specialists in regional hospitals need, and they should work to get, equally well-qualified anesthetists.

TABLE III

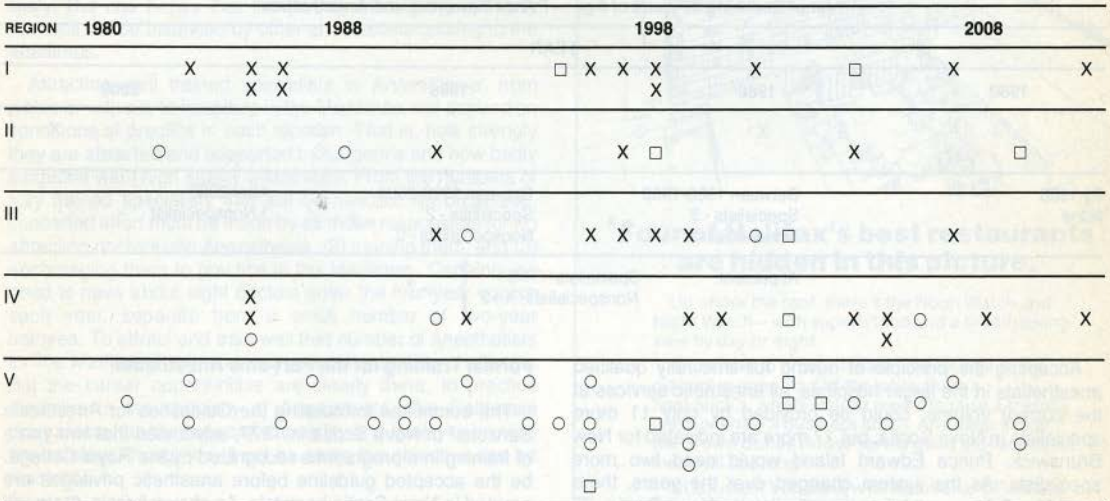
Distribution and Workload of Anesthetists in Prince Edward Island

HOSPITAL	ANNUAL NO. SERVICES	RATIO: CASES PER ANAESTHETIST	CURRENT NO. ANESTHETISTS		IDEAL NO. ANESTHETISTS		IDEAL RATIO: ANES/CASES	
			SPECIALIST	NONSPEC.	SPECIALIST	NONSPEC.	SPECIALIST	NONSPEC.
I	6600	1/1650	3	1	5	0	1/1320	-
II	2700	1/1350	2	0	2	0	1/1350	-
III	240	1/240	0	1	0	2	-	1/120
Total Cases	9540		5	2	7	2		

Total Anesthetists: Now — 7 Ideal — 7

TABLE IV

Year of Reaching 65 years of Age — Nova Scotia Anesthetists



By 1988
Specialists — 8
Nonspecialists — 7
= 15

Between 1988-1998
Specialists — 17
Nonspecialists — 11
= 28

Between 1998-2008
Specialists — 19
Nonspecialists — 11
= 30

After 2008
Specialists — 3
Nonspecialists — 2

At present:
On Specialists Register: ○ = 36
Specialists, Royal College eligible: □ = 11
Nonspecialists: X = 31
} = 78

TABLE V

Year of Reaching 65 years of age — New Brunswick Anesthetists

REGION	1980	1988	1998	2008
I	○ ○ X X	○ X	○ ○ ○ ○ X	○ ○ X X X X
II	○ ○ X	○ X X	○ ○ X	○ ○ ○ ○ X X X X
III	X X	○ X	○ ○ ○ X X X	○ X X X
IV	X	X	○ ○ ○	X
V	X	X X	X X X	X X X
VI	X	X X X	X X X	X X

By 1988	Between 1988-1998	Between 1998-2000	After 2008 —
Specialists — 6 = 16	Specialists — 10 = 22	Specialists — 11 = 33	7 Nonspecialists
Nonspecialists — 10	Nonspecialists — 12	Nonspecialists — 22	

At present: On Specialists Register; ○ = 27
Nonspecialists: X = 51 } = 78

TABLE VI

Year of Reaching 65 years of Age — Prince Edward Island Anesthetists

YEAR			
1980	1988	1998	2008
	X ○ ○	○ ○ ○	X

By 1988	Between 1988-1998	Between 1998-2008	After 2008
None	Specialists - 3 = 4	Specialists - 2 = 2	1 Nonspecialist
	Nonspecialists - 1	Nonspecialists - 0	

At present: Specialists: ○ = 5
Nonspecialists: X = 2 } = 7

Accepting the principle of having full-time fully qualified anesthetists in the larger hospitals, all anesthetic services at the current volume, could be provided by only 11 more specialists in Nova Scotia, but 17 more are indicated for New Brunswick. Prince Edward Island would need two more specialists. As the system changed over the years, there would be 8 fewer part-time anesthetists in Nova Scotia, 25 fewer in New Brunswick and the same number as at present in Prince Edward Island.

The attitudes in fact, are changing in Nova Scotia and more fully trained people are being requested. In late 1978, there are four known immediate needs for specialists outside of Halifax.

Formal Training for the Part-time Anesthetist

The committee formulating the Guidelines for Anesthesia Services[5] in Nova Scotia in 1977, advocated that two years of training in a programme recognized by the Royal College, be the accepted guideline before anesthetic privileges are granted in Nova Scotia hospitals. As shown herein, there will be a continuing need for part-time anesthetists in the smaller hospitals as long as one can foresee.

Though those persons are only giving anesthetics part-time, they will likely do so for the rest of their professional careers. They have an obligation to practice anesthesia safely, for the levels of surgery and obstetrics done in their

hospitals. Because of these conclusions, two years of training is a reasonable level of competence and a reasonable investment by that physician in his lifetime career. The Dalhousie Department of Anaesthesia supports that philosophy and will custom-make programmes to train two-year practitioners for the needs of specific hospitals.

Present and Future Needs for Anesthetists in the Maritimes

About 30 more fully trained anesthetists will be needed, to supply full-time anesthetists to all hospitals in which the volume of work can support them. (Table I, II, III) This should happen as practitioners retire and should not threaten capable, current anesthetists. Approximately 10 fully trained anesthetists are needed to fill present vacancies in Maritime hospitals. It is unpredictable if and where continued increases in the need for anesthetic services will occur in the next 30 years. Hence no predictions of need for that reason will be made.

In the next 3 decades 76 current specialists will reach 65 years of age and require replacement on an age basis. In addition, a 3% attrition rate per year due to other causes, is reasonable. This is 76 × .03 × 30 years = 68 anesthetists. This means that 30 + 10 + 76 + 68 = 184 anesthetists should be trained for the Maritimes in the next 30 years: 6.1 trainees *finishing* each year for the 30 years.

Thirty years is a long time to predict, so let us look at 10 years. Say that we will need a third of the 30 new fully trained people, the 10 present vacancies filled and the 14 replacements for age by 1988 = 34 people. Add 3% attrition on the 76 × 10 years = 22 more, or 5.6 anesthetists finishing each year from now through 1988. Note that the rate of retirement doubles for the next two decades after 1988. These calculations presume that graduates in Anaesthesia from Dalhousie will all stay in the Maritimes, which is not likely. But one hopes that the loss to other parts of North America will be balanced by other anesthetists coming to the Maritimes.

Attracting well trained specialists in Anaesthesia, from within or without, to hospitals in the Maritimes, will depend on conditions of practice in each location. That is, how strongly they are attracted and supported by surgeons and how badly surgeons want high quality anesthesia. From the numbers of fully trained specialists that will be needed, an organized, concerted effort must be made by all those responsible for (1) attracting doctors into Anaesthesia; (2) training them; and (3) encouraging them to practice in the Maritimes. Certainly we need to have about eight doctors *enter* the four-year course each year, separate from a small number of two-year trainees. To attract and train well that number of anesthetists for the Maritime Provinces seems a considerable challenge. But the career opportunities are clearly there, to practice medicine in the specialty of Anaesthesia. Our Dalhousie programme has the capacity, capability and quality to provide the training. Though it will not be easy, the objective can be reached.

Summary

A survey of the number, ages and level of training of all anesthetists practicing in Nova Scotia, New Brunswick and Prince Edward Island was done to assess the present and future manpower requirements for anesthetic services. Of 163 practising anesthetists, 76 are full-time, most of whom are fully trained. As replacements of part-time practitioners are needed, due to age or other attrition, 31 more fully trained anesthetists should enter the system, in hospitals where the case load is sufficient. But for provision of anesthetic services, about 50 part-time anesthetists will be needed for smaller hospitals, who should have two years of training. To attain the proper number of fully-trained anesthetists and replace the present specialists, approximately eight anesthetists must enter residency training each year for the next 30 years. □

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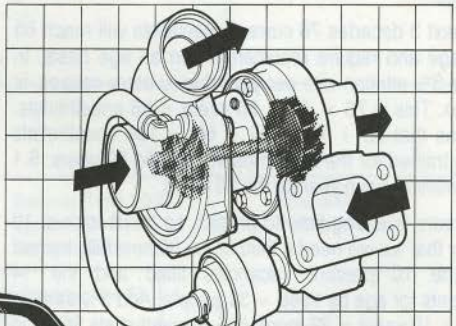

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Dr. Bernard J. Steele
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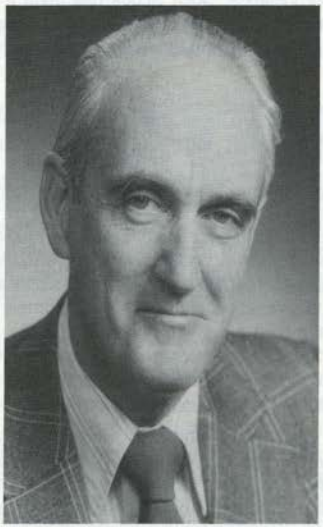

Dr. "Bernie" J. Steele was born in Dominion, Cape Breton, "quite a few years ago," as he puts it.

He attended St. Francis Xavier University in Antigonish and then obtained his medical degree from the University of Ottawa in 1952. Following five years of general practice in Cape Breton, during which he became active in the branch society, he opted for a surgical residency at Halifax's Victoria General Hospital. On completing his residency in 1961, he decided to stay in Halifax and has practised there ever since.

Dr. Steele is a Professor of Surgery at the Dalhousie Medical School and maintains an office in the Victoria General. Although the demands on his time have been heavy, he has made a considerable contribution to Society business.

Dr. Steele is a former treasurer and president of the Halifax Medical Society. He has also served the provincial body as a member of the Executive, as Honorary Secretary and as Chairman of the Executive. He has also held the office of President of the Victoria General Hospital Medical Staff.

His interests have also extended into the community as a member of the Halifax Rotary and as the Chairman for the 1978 Easter Seals campaign.

Dr. Steele and his wife, Theresa, have one daughter, Leone, a Grade XI student at St. Patrick's High School.

The Society's new president enjoys golf, swimming and skiing but admits that, like it or not, "work seems to be my biggest hobby right now." □

Dr. Steele — Talks to the Bulletin

THE BULLETIN: Dr. Steele, the Society now has to deal with a relatively new government. Do you have any reason to believe relations are going to be better . . . or, for that matter, more difficult than they were with the last administration?

DR. STEELE: First of all, I think that the role of government has to be understood before a question like that is asked. Government's job is to manage, among others, the overall health budget. That includes a lot more than the money paid for physicisians' services under MSI. An administration — any administration — has to consider all the economic ramifications when it makes a move in any given sector of the economy. When we have had what some would consider problems in discussing the tariff in the past, it's simply because government has been exercising its right and duty to consider all the angles.

THE BULLETIN: Perhaps the question was poorly put. The reference was really to what might be termed the new administration's relative inexperience.

DR. STEELE: Well, it's the Medical Society's responsibility and, in fact, the responsibility of all those in the health care field to help the Minister (Dr. Gerald Sheehy) to understand what the specific problems really are, how the system works and in what areas real service headway can be made. I think, too, that we have a duty to pursue those avenues where the best value for the taxpayer's dollar can be obtained. This is an on-going process, you know. It's not something you do overnight and then forget. I'm sure that Dr. Sheehy understands this because he has intimated so on a number of times.

THE BULLETIN: Well, there are political considerations to consider. For instance, it's not unknown for the profession to be used as a sort of whipping boy when medical costs increase . . . .

DR. STEELE: Just let me refer you back to a statement Dr. Sheehy made to the media at our Annual Meeting last fall. He pointed out quite forcibly that the doctors can't be blamed for increases in health care costs. In fact, I believe he made special note of the cost of heating hospitals and other physical expenses which make a far greater impact on health care costs than do MSI payments to physicians.

THE BULLETIN: But there is a certain trend at the public level . . . . .

DR. STEELE: Before we go on, I'd just like to underline something with respect to those MSI payments.

THE BULLETIN: By all means.

DR. STEELE: This may seem like old hat to many of our readers, but it remains a fact all the same. The Medical Society and the profession as a whole have absolutely nothing to do with the amount of insurance coverage provided under the province's Medical Services Insurance Act. Sure, we can make recommendations, but the final

decision is up to government. However, we do have our own schedule of fees which outlines recommended per-procedure costs. That schedule is something *we* set and try to adhere to. The government has no say in that. Obviously, however, there has to be some form of meeting place somewhere. That's where we sit down with government and point to imbalances in our fee schedule as they relate to changing economic conditions and together try to relate the government's insurance payments to our attempts to redress those imbalances. Contrary to popular opinion, we don't go to government and simply say we want a six or eight percent increase across the board. We couldn't, because we're not all government employees. We're an independent organization which has to consider the overall welfare of the profession in Nova Scotia as well as the welfare of individual groups and specialties within that profession.

THE BULLETIN: But there are doctors who *are* on the government payroll.

DR. STEELE: That's true enough . . . and that does tend to complicate things. Right now we're trying to rationalize the system of remuneration so that we don't get this kind of confusing fragmentation cropping up. I can assure you, it's not an easy job . . . but we do have to consider that a government-paid physician who is performing a job which is also being done by an independent or so-called "private" physician has to be assured that he's being treated fairly in terms of his medical expertise.

THE BULLETIN: Or he'll leave the province?

DR. STEELE: Well, I can't speak for him or her on that matter . . . but there is something of a doctor drain going on right now across the country and, of course, that's reflected in Nova Scotia. But it's most obvious on the private side.

THE BULLETIN: Is this manpower drain creating problems here?

DR. STEELE: I think the recent situation in Lockeport is an example of what can happen. That wasn't so much a question of physicians leaving. Rather, it was one of nobody stepping in to fill positions created by attrition. There are signs now — good signs, I might add — that that problem has been solved, but it's the kind of problem which we're going to have to face time and time again . . . and I don't see any immediate solution.

THE BULLETIN: There has been some talk of using some form of beneficial compulsion to fill these sort of gaps . . . .

DR. STEELE: I'm not quite sure I know what you mean by "beneficial compulsion", but I certainly don't agree with any form of directive or order which demands that a physician spend a certain amount of time in a given locality. If a doctor wants to enter into a contract, however, that's his or her responsibility and right. Frankly, though, I think if the day ever comes when doctors are ordered to set up practice in a given area, then you'll really see an exodus. I can't really imagine that day coming though.

THE BULLETIN: Some people argue that because medical schools receive a great deal of money from the public purse that it amounts to a public subsidy of a doctor's training. . . and because of that the doctor owes the taxpayer something.

DR. STEELE: But you don't hear the same argument about lawyers, engineers or, for that matter, those who graduate with a Bachelor of Arts degree. It could apply equally well there. In fact, it has a logical extension to other medical schools. For instance, Nova Scotia has quite a number of doctors who are graduates of McGill. Should they have to practise in Quebec? I don't think the argument holds much water.

THE BULLETIN: Do these kind of arguments tend to draw the profession closer together, though. I mean, is the profession — the Society, in fact — looking at current conditions and trends in the way a trade union might?

DR. STEELE: Not really. To start with, the Medical Society is not a closed shop. A doctor doesn't have to belong to be able to practise. What we have is a professional association committed to a variety of ends. I'd say our primary purpose is to ensure the best possible health care for Nova Scotians and that's followed very closely by a committment to serve and to represent the interests of our membership. But I think our committment to health care must come first.

I don't think you'll find any unions whose primary commitment is, say, to provide the best possible machined parts to the consumer. Unions have a distinct, almost singular role in the matter of representing their membership . . . and that's as it should be.

THE BULLETIN: What about "unionized" physicians?

DR. STEELE: If you mean, "What about the possibility of physicians withdrawing their services in the event of some kind of administrative confrontation?" I think that's something you'll never see.

THE BULLETIN: Why not?

DR. STEELE: For the reason I've already cited. A doctor's first duty is to his or her patients. A withdrawal of services would be an abrogation of that duty. I think that subject was pretty well covered by our past president Dr. Hamm at last year's Annual Meeting.

THE BULLETIN: Where does the Society go from here . . . with you at the helm, I mean?

DR. STEELE: Obviously, we've got to continue to address ourselves to long-standing concerns — such as the rationalization of physicians' forms of remuneration, which I mentioned earlier — and at the same time stand prepared to deal with new issues. One that comes to mind is the greater degree of public and lay involvement in health care. I think lay persons who are appointed to hospital boards, for instance, need to get — in fact, deserve to get — all the information they can about the realities involved in the practice of medicine so that they can make rational decisions about expenditures and cutbacks. It's up to us, the physicians, to do all we can to provide that information and to make sure it's understood rather than complain when things go wrong. □

The New Hospitals Act and Physicians

F. R. Townsend,* M.D., F.R.C.P(C) and Lorne Elkin Rozovsky,** B.A., LL.B.,
Halifax, N.S.

A new and revised Hospitals Act comes into effect April 1st, 1979. It affects the practice of most physicians in Nova Scotia.

The new Hospitals Act integrates the Public Hospital Act, the Nova Scotia Hospital Act and the Municipal Mental Hospital Act. Nova Scotia will be the first province in Canada to eliminate specific acts dealing with psychiatric hospitals and their patients. In effect, it accepts the principle that a hospital is a hospital regardless of its specialty. A patient is a patient regardless of his illness. It is a step towards the treatment of psychiatric patients in the same manner as all other patients.

THE GOAL

This change is in accord with the overall objective of the Department of Health. It is to encourage the treatment of psychiatric illness in the same hospital system as for all illnesses. For the foreseeable future separate psychiatric hospitals will continue to exist, however they will gradually be developed into comprehensive mental health centres integrated with general hospitals where possible. As resources are available, the treatment of emotional illnesses will increasingly be shifted to general hospitals. These services will be placed regionaly throughout the province.

THE ACT

The new legislation supports this goal by permitting general hospitals to request approval to have psychiatric hospital sections of the law apply to them as well. Until such approval is given the only psychiatric hospital facilities under the Act are at the Nova Scotia Hospital, the Abbie J. Lane Memorial, Cape Breton, and Kings Regional Health and Rehabilitation Centre. When this approval is given, patients who previously could only be detained in psychiatric hospitals will be detainable in general hospitals. Hospitals wanting this power would have to develop the appropriate facilities and resources.

For the first time one act deals generally with matters of administration, certain aspects of funding, consent to treatment and confidentiality of records, relating to all hospitals both general and psychiatric. It also includes provisions concerned specifically with psychiatric hospitals: admission, detention, discharge and rights.

Those portions of the Act concerned with psychiatric patients are the result of an extensive review of similar legislation throughout the western world. Nova Scotia is one of the last Canadian jurisdictions to modernize its legislation in this area.

The new legislation has been particularly influenced by the 1959 British legislation. It reflects an underlying concern for the rights of psychiatric patients, particularly those held involuntarily. The United Kingdom legislation placed first priority on the treatment of the patient when he appeared to be a danger to himself or others. Influence was also felt from legislative developments in the U.S.A. Most American jurisdictions however, emphasize the legal right of the patient to refuse hospitalization unless he is a physical danger to himself or others, as opposed to the need for treatment. Many take the view that mental illness may simply be described as a difference in lifestyle and does not justify involuntary treatment. Recently this view has been given recognition in Ontario by amendments to the Ontario Mental Health Act which, among other things, permits involuntary admission only if the patient "suffers a mental disorder likely to result in serious bodily harm to himself or others, or, where he has demonstrated an inability to care for himself to a point that is harmful to physical health." In effect, a patient cannot be admitted involuntarily if he is mentally ill and requires treatment, unless he is also considered a physical danger to himself or others.

The committee established to draft the Nova Scotia legislation had first to reconcile these opposing viewpoints which might be labeled as the "American" as opposed to the "British" approach. These viewpoints also diverge on the question of whether determination of a patient's need for detainment should be based on a clinical decision or be left to the courts.

Until introduction of the new legislation, protection of the rights of the psychiatric patient admitted to hospital against his will was provided only by the courts in Nova Scotia. For example, commitment could be made for indefinite periods with no access to review short of an appeal to the courts. This was a forbidding and complicated procedure rarely used by patients or their relatives.

In the drafting of the legislation it became clear that patients requiring involuntary admission should not be exposed to a system similar to the criminal process. It was believed that admission should be based on a clinical decision balanced by the substitution of a maximum 7-day observation period instead of the previous method of immediate committal. This period of observation would offer the patient protection against unnecessary committal. As well, the physician who sends a patient to a psychiatric hospital would be assured that detention could only be continued after the observation period if a staff psychiatrist, at the hospital, agreed that the patient's condition required that he be detained involuntarily for a further period. As additional protection, mechanisms are provided to permit the patient to challenge these decisions, either through a review board or through the courts. Further, even if the patient does not himself challenge the detention decision, mandatory reviews by a review board are required at six month intervals for the first 2 years of detention and yearly thereafter.

A principle inherent in the legislation is that involuntary admissions should be discouraged. Patients should be encouraged to seek informal admission as for any other illness. It is anticipated that the stiffening of the criteria for formal (involuntary) admission combined with the initial period of observation will result in a shift from the present 50% involuntary admissions to 10% or even less in the future. A similar shift occurred when the revised mental health legislation was introduced in Britain in 1959.

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CRITERIA FOR INVOLUNTARY OBSERVATION

The sections of the Act providing for involuntary admission of patients for observation are of concern to all physicians. The criteria for involuntary admission for observation under the new Act are as follows:

1. A person can be admitted to a facility by the execution of two medical certificates signed by two qualified medical practitioners.
2. A medical certificate shall state that a qualified practitioner has reasonable and probable grounds to believe

   (a) that the person suffers from a psychiatric disorder, and;

   (b) that the person should be admitted to the facility because,

   (i) he requires the in-patient services provided by that facility, and;

   (ii) he requires care that cannot be adequately provided outside this facility because he is a danger to his own safety or the safety of others.

The actual certificates to be completed by the physicians are essentially the same as under the previous legislation, except for two changes as follows:

1. The same certificates will be used for admission to the Nova Scotia Hospital and Municipal Hospitals and later to any general hospital approved for involuntary admissions.
2. No longer will a family statement be required; however, good medical practice requires that the physician will forward to the hospital an appropriate medical history.

All practicing physicians will be sent copies of these certificates along with a brochure summarizing the new legislation and its application.

Commencing April 1st, 1979, (except for patients referred from the courts or the penitentiary system), all admissions to psychiatric facilities will be by physicians. While the previous legislation permitted a magistrate to send a person directly to a hospital this will not be available under the new Act. Rather, the new legislation provides the magistrate with authority to direct two physicians to visit the person and determine if Certificate for observation should be completed. As another alternative, the magistrate can order a peace officer to take a person to a physician for the same determination. This authority of the magistrate is particularly useful to those who are aware of a person whom they believe to be in need of care and treatment, and for whom no one is accepting responsibility. Any individual (physician or otherwise) can appear before a magistrate and give information that he believes a person is mentally ill and being neglected. The magistrate may initiate the process to have this person examined.

In addition, a peace officer who has reason to believe that a person is suffering from a psychiatric disorder, and in danger to his own safety or the safety of others, can take that person directly to an appropriate place for a medical examination. An appropriate place is defined as a hospital, medical facility, doctor's office or other suitable place for a medical examination, but does not include a jail or "lock-up" unless no other suitable place is available. The intent, of course, is to prevent persons allegedly suffering from a psychiatric disorder from being held in jail. Again, two physicians must determine whether the person should be admitted to a hospital for observation. If a person is brought to an appropriate place for examination, the person must be examined forthwith and, in any case, cannot be held longer than 24 hours for such an examination. In addition, after examination, the physicians have only 48 hours to complete the medical certificates for admission to a facility or otherwise another examination is required. The Medical Certificates must be presented to the hospital within seven days of being signed by the physicians or they are of no effect.

If a second physician is not immediately available to complete a medical certificate, the Act provides that a person may be admitted to a facility for observation by the completion of one medical certificate. It must be accompanied by a second prescribed form outling the reasons for admission and stating that a second physician is not readily available. This method of admitting a person to hospital should only be used in emergencies when a second physician is not available.

Certificates will be sufficient authority for any person to convey a person to a facility for observation. As well a qualified medical practitioner may hand the Certificate to a peace officer who is obliged to take the person into his care and convey him, or cause him to be conveyed, to a facility for observation.

All physicians should encourage patients to voluntarily seek treatment. Involuntary admission should only be considered when the physician believes that the person is suffering from a psychiatric disorder and is a danger to his own safety or the safety of others and is not agreeable to seeking treatment on his own. This can mean a danger to the person's health as well as a physical danger. The physician should be reasonably certain that he can substantiate that involuntary admission is required under the criteria as set out in the Act. Under no circumstances should involuntary admission be used to obtain early admission to hospital.

APPLICATION

Everyone should be aware that abuse of the Act could result in legislation similar to that previously mentioned as recently proclaimed in Ontario, which in effect could severely limit involuntary admissions. The Nova Scotia legislation recognizes that it is important to protect a patient who does not recognize he is ill, and to ensure that such patients receive treatment. In the long run, abuse of this legislation could be detrimental to the best interest of the patients in need of treatment for psychiatric disorders, and also to the families who are severely disrupted by such illness.

SUMMARY

Nova Scotia is introducing a Hospitals Act on April 1, 1979 that will also include legislation concerning psychiatric facilities. The intent of the legislation is to protect patients against unnecessary loss of rights and coercion to accept treatment. It is equally the intent to assure that patients who require treatment are treated. It promotes the treatment of psychiatric illnesses in the same manner as all other forms of illness by encouraging patients to seek voluntarily admission to hospital. The success of this legislation will depend on the support of the medical profession and the general public.

If any physician would like further information concerning these matters or would like a copy of the Hospitals Act, he should contact the Division of Psychiatric Mental Health Services, Department of Health, P.O. Box 488, Halifax, Nova Scotia, B3J 2R8; or telephone 424-4232. □

Evoked Response Audiometry (ERA)

Michael R. Seitz,* B.A., M.A., Ph.C. Ph.D.,
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INTRODUCTION

Conventional methods of measuring hearing depend on the ability and willingness of the patient to co-operate. For those who cannot or will not co-operate, more automatic and objective audiometric methods are required.

Recently Rubin and Wali[1] described impedance audiometry for the general practitioner. We would now like to describe another objective audiometric technique that has been in limited use at our centre and, undoubtedly, will be used more in the next few years in the diagnosis of hearing disorders. It is known by a number of names: electric response audiometry, evoked response audiometry, evoked potential audiometry, or simply ERA.

PRINCIPLE

The principle underlying ERA is the same as that used for any evoked potential study. Basically, EEG changes resulting from auditory stimuli are recorded by electrodes (usually scalp). These auditory evoked EEG changes are usually too small to be observable in the ongoing EEG and therefore, to extract these minute potentials, amplification and signal averaging must be used. It is necessary that the auditory stimulus (usually a click or puretone) used to elicit ERA, be repeated a number of times. The electrical response as recorded by the scalp electrode is time locked to stimulus onset. With the use of a signal averaging computer, the random background EEG activity that is not associated with the brain's response to auditory stimuli averages to zero, while the EEG responses to the auditory stimuli summate. The result is specific wave forms which may be recorded and empirically measured. (Figure 1)

Evoked response audiometry is more complicated than other established audiometric procedures, and is more expensive in terms of equipment and time. However, the technique provides at least three kinds of information that the other methods do not.[2]

First, ERA can be used to evaluate the hearing levels of those patients who are unable to give the accurate behavioural responses that are required by conventional testing procedures, i.e., too young, too old, too sick or retarded. Patients who are unwilling to give accurate behavioural responses such as the hysterics, malingerers and psychotics are also included in this 'difficult-to-test' group. Secondly, ERA can provide information about the location of the pathological process that caused the hearing loss. Thirdly, data provided by ERA can help clarify data collected by more conventional audiometric procedures.

AUDITORY EVOKED RESPONSE WAVEFORMS

There are many potential waveforms that could be measured and used as indicators of hearing threshold. These waves occur at different times (latency) after the onset of the auditory stimulus, and have been found to reflect activity of various portions of the auditory pathway from the cochlea, VIII cranial nerve up to the auditory cortex.

Davies[3] has classified these responses according to their relative latency of response by dividing them into the following categories

Category	Latency	Problem Source
First	0-4 msec.	Organ of Corti and N. VIII
Fast	2-12 msec.	N. VIII and brain stem area
Middle	12-50 msec.	myogenic from the head and neck
		neurogenic from upper brainstem areas
Slow	50-300 msec.	auditory cortical and association areas
Late	250-600 msec.	far field cortical responses

Brackmann[4] organizes the auditory evoked potentials according to their probably anatomic source in the following manner:

I. Cochlear — cochlear microphonic and/or summating potential
II. Auditory nerve action potential
III. Brainstem
IV. Auditory Cortex — fast responses (2-50 msec.)
— slow responses (50-250 msec.)

All in all, there are some 15 to 17 different wave peaks that are available to use as measurement points, some more stable than others; each reflecting different aspects of neural or cortical activity in the auditory pathways in response to the auditory stimuli.

EVOKED RESPONSES AUDIOMETRIC TECHNIQUES

Clinical evoked response audiometric procedures do not use all the waveforms available. Basically, three different types of waveforms are used, each having its own advantages and disadvantages. They are electrocochleography (ECoG), brainstem evoked response audiometry (BERA) and cortical evoked response audiometry (CERA).

ELECTROCOCHLEOGRAPHY (ECoG)

Electrocochleography involves the measurement of potentials arising from the cochlea itself and the auditory portion of

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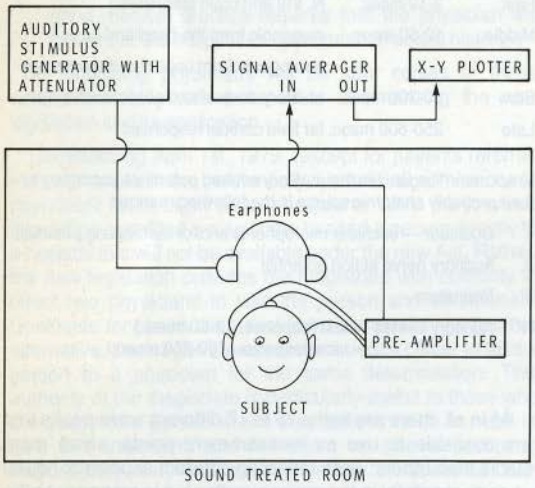
cranial nerve VIII. These waves occur within the first 4 msec. after the onset of the auditory stimulus. Generally, a needle electrode, inserted through the tympanic membrane onto the promontory of the middle ear between the oval and round windows, is used for ECoG measurements. However, surface electrodes placed on or in the skin of the external ear canal have also been used but with less success.

ECoG can provide highly objective and very accurate data concerning the function of the peripheral auditory system, especially hearing threshold measurements. ECoG responses are not affected by the use of anaesthesia or sedation and therefore are particularly favoured by some practitioners for assessment of cochlear function.

ECoG responses only reflect activity of the cochlea and auditory nerve activity, therefore are of little help in locating hearing loss that is caused by brainstem or central disorder. The technique, in addition, is invasive, requiring general anaesthesia in most areas. Thus there are the potential dangers that are associated with penetration of the tympanic membrane with the recording electrode, i.e., infection, damage to middle ear structure, etc..

In spite of these disadvantages, ECoG is routinely used in many centers and highly regarded as the ERA method of choice.

FIGURE 1



Contains a block diagram of the procedure used to obtain auditory evoked responses. The patient's EEG is obtained via scalp electrodes attached to specific portions of the scalp and head area and this signal is amplified by a preamplifier prior to its transmissions to the signal averager. The EEG signals are amplified about 20,000 times for ERA.

BRAINSTEM EVOKED RESPONSES AUDIOMETRY (BERA)

BERA measures EEG waveforms derived from various areas of the brainstem, as recorded by scalp electrodes. The active electrode is placed on the vertex of the scalp (Cz in the 10-20 system) and referred to an electrode placed on the mastoid or attached to the ear lobe. Brainstem evoked responses reflect changes in the auditory pathway that occur within the first 10 msec. after the onset of the auditory stimulus. Basically, the brainstem evoked response is composed of seven different waves, each having its own Roman numeral designator and anatomical location. Wave I is thought to be generated by the cochlea and auditory nerve, Wave II by the cochlear nuclei, Wave III by the superior olivary complex, Wave IV by the nuclei of the lateral lemniscus, Wave V by the inferior colliculi, and Wave VI and VII by the medial geniculate and thalamo-cortical projection area.

The most stable and reliable component of this wave complex is Wave V from the area of the inferior colliculus. Wave V has been found to vary systematically with changes in signal intensity and is the wave most often used in diagnostic hearing evaluations.[2 3 4] (Figure 2)

FIGURE 2

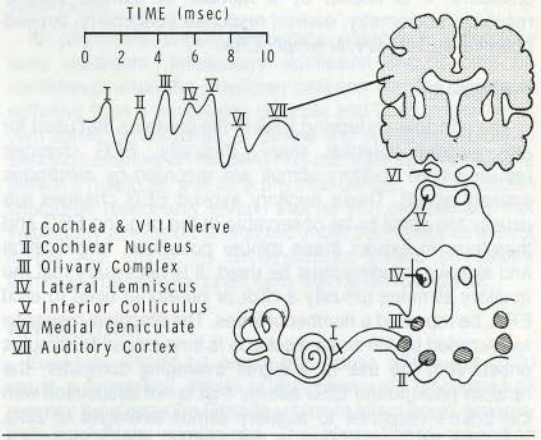


Diagram of wave pattern of BERA.

BERA offers many advantages. It is utilized to test very young (from birth) or old patients; it can be administered with or without sedation and is not affected by sedation; it does not require general anaesthesia because it used surface electrodes; and it can be carried out in almost any audiological or ENT clinic. It gives an accurate, objective assessment of the receptive capacity of the auditory pathway through the brainstem, and it can obtain accurate threshold estimates and differentiate between conductive or sensorineural hearing loss. While BERA can accurately assess normal hearing, the interpretation of results from some patients may be difficult, particularly those with CNS disorders such as spastic children or stroke patients.

BERA has also been used in diagnosis of neurological disorders of the brainstem. Since individual waves originate from different levels (areas) of the brainstem, abnormalities of the waveform in terms of absence, bizzare pattern, abnormal latency, not only indicate brainstem dysfunction, but also indicate the location of the dysfunction. The potential of BERA in the diagnosis of neurological disorders is currently being explored.[5 6]

CORTICAL EVOKED RESPONSE AUDIOMETRY (CERA)

Cortical evoked response audiometry measures responses occurring at the cortex (50-300 msec) in response to an audiotory signal. As with BERA, scalp electrodes are used with the active electrode placed on the vertex of the scalp and the reference electrode on the mastoid. Prior to the development of BERA, cortical evoked responses were used as a clinical tool for threshold estimates. They do, in fact, give fair threshold estimates in co-operative patients. However, researchers[2 3 4] discovered that these late component waves are affected by sedation, sleep and various other mental states, thus reducing the usefulness of these waves for threshold measurement particularly in the difficult to test group. The slow components have been found however to be very effective in measuring cortical function. Presently, cortical ERA is best utilized in the diagnosis of central auditory disorders and speech and language perception disorders.

Let us summarize the advantages of ERA:

1. ERA is an objective method of measuring hearing requiring little active participation or cooperation of the patient.
2. In a particularly difficult-to-test patient, ERA provides additional information to confirm or dispute audiometric data from other more conventional methods such as behavioural audiometry and impedance audiometry.
3. ERA is a qualitative as well as quantitative measurement of hearing.
4. ERA is a noninvasive method of measuring hearing (with the exception of ECoG).

THE CLINICAL USE OF ERA

Sufficient research in ERA has been done to warrant clinical use. However, because of the cost and time factors, ERA should not and could not be used on every subject. The usefulness of ERA lies in its objectivity and general applicability to difficult-to-test patients.

It must be emphasized that the presence of a normal evoked electrical response does not prove hearing is normal. It only indicates that the particular part of the auditory pathway that is being tested is intact or not. The higher functions of hearing, such as comprehension and general cognition, are not tested by the methods discussed in this paper. However, even in this area, the measurement of contingent negative variation (CNV) by ERA methods show promise in the future.[7]

We have been operating an ERA system at the School of Human Communication Disorders, in conjunction with the Department of Otolaryngology at Dalhousie University, but its present use is limited to special diagnosis of difficult-to-test patients and research. While we are equiped to do all forms of ERA, our preference has been for brainstem ERA. We feel BERA has several advantages over the other ERA methods: it is totally noninvasive; not affected by sedation, i.e., patients may be tested while asleep; less time consuming; applicable to patients of all ages; and diagnostically useful in a large range suspected pathologies.

CLINICAL EXAMPLES

We have included summaries from two cases where we have found BERA to be diagnostically useful.

Example I:

A three and one-half year old girl was referred for audiological evaluation because of delayed development of speech. The patient was a premature baby, had a stormy course in the neonatal period, and had to be resuscitated from several episodes of respiratory arrest. There was probably diffuse cerebral damage. Conventional audiometric results were unsatisfactory due to the patient's inability to co-operate, but the results suggested a moderate degree of sensorineural hearing loss. Brainstem ERA was carried out under sedation and confirmed the finding of moderate hearing loss. The patient now wears a hearing aid.

Example II:

A 49 year old woman suffering from unresectable carcinoma of the pharynx complained of bilateral hearing loss after radiotherapy and chemotherapy. Conventional audiometry suggested moderate bilateral sensorineural hearing loss. There were grounds to suspect that the hearing loss was psychogenic, because the patient was unsatisfied with her treatment, and was complaining of many other nonspecific symptoms. Brainstem ERA confirmed the hearing loss to be genuine and located the hearing loss as resulting from cochlea damage. □

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Nova Scotia Program for Screening for Congenital Hypothyroidism

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Summary

About one in every 6,000 infants born in North America has congenital hypothyroidism.[1,2] If it is not diagnosed and appropriate treatment begun in the first few weeks of life, the majority will develop some degree of mental retardation.

In order to ensure early diagnosis and treatment, a screening test for the condition, using dried capillary blood on filter paper circles, has been made available for all new-born infants in the Province of Nova Scotia. The test will be performed on the same filter paper circles as the PKU test, currently performed between three and five days of age.

SCREENING FOR CONGENITAL HYPOTHYROIDISM

Fetal thyroid function is normally stimulated by activation of the fetal hypothalamic-pituitary system from mid gestation onward, resulting in a progressive increase in thyroxine production.[3] Development of the fetal thyroid is independent of maternal pituitary-thyroid function, which will not compensate for fetal thyroid deficiencies.

Failure of fetal thyroid development results in congenital hypothyroidism. Normal mental development, which is dependent upon normal late fetal and neonatal thyroid function, may be seriously compromised as a result. However, if treatment of the condition is started before three months of age, the mental retardation associated with the condition can be prevented.[4,5]

In recognition of the importance of congenital hypothyroidism as a preventable cause of mental retardation, a screening program for early diagnosis of the disease has been established in Nova Scotia. It is supported by the Provincial Department of Health and administered by a committee comprised of representatives of the Atlantic Research Centre for Mental Retardation, the Izaak Walton Killam Hospital for Children and the Hormone Laboratory of the Dr. D. J. MacKenzie Laboratories (Victoria General Hospital).

The blood sampling technique to be employed in this screening program is virtually identical to that currently being used to screen for PKU. Specimens of blood should be obtained from the baby by heel-prick at three to five days of age, at the same time and using the same requisition and filter-paper sampling card used for PKU screening. The circles on the filter paper should be filled completely with blood to ensure a sufficiently large sample for repeat hormone assays in cases of doubt. The filter paper and accompanying requisition should then be mailed directly to the Izaak Walton Killam Hospital for Children, PKU Screening Laboratory, for processing. Thyroxine (T_4) levels will be measured by radioimmunoassay; plasma phenylalanine will be measured spectrofluorometrically, currently performed to screen for PKU.

The results of all tests will be communicated to the attending physician. If the results of the screening test suggest that an infant may have hypothyroidism, the attending physician will be contacted by telephone. This screening test does not establish the diagnosis; it merely identifies babies who should be investigated further. The diagnosis can be confirmed by the measurement of thyroid stimulating hormone (TSH) and thyroxine (T_4) levels in a venous blood sample, obtained and forwarded to the Izaak Walton Killam Hospital for Children by the attending physician.

Further Information

For further information about the screening program or the diagnosis and management of congenital hypothyroidism, contact Dr. Sonia Salisbury, Endocrinologist, Izaak Walton Killam Hospital for Children, telephone 424-8707. □

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Improving Leisure Opportunities for Disabled Persons in Nova Scotia

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"Leisure is not *not-work:* leisure is not time left over *after* work. Leisure is a state of mind, it is a way of being, of being at peace with oneself and what one is doing".†

INTRODUCTION

Leisure simply defined, is time spent involving oneself in activity by choice. The activity or behavior can range from high level competitive sports, to attending a jazz concert, painting, or relaxing, and is fundamental for a fulfilling lifestyle. However, long term disabling conditions often severely limit leisure behavior for about one out of seven Canadians. The limitations are usually not imposed by the disability itself, but by socially imposed barriers. In Nova Scotia barriers to participation faced by many physically and mentally disabled people include:

- negative attitudes by the public and professionals based on fear and ignorance, e.g. "you'll get hurt", "you can't do it", "this program is not for the disabled".
- inadequate finances to cover the cost of equipment, transport, and course fees
- physical inaccessibility: entrances, washrooms, and equipment which can meet the needs of only completely mobile persons
- no transportation
- the unavailablity of recreation programs which meet the interests and abilities of the individual
- no positive support, encouragement, or motivation from family members and the community
- no friends with whom to enjoy leisure activity

In seeking to remove these barriers, a critical question must be answered. Who is responsible?

The Structure of RCDNS

It was apparent to many concerned citizens that the aforementioned barriers span many professions, funding sources, and social groups, and could be tackled by the individual and joint action of several groups.

In 1975 an innovative collection of individuals from university, government, voluntary agency, and medical circles created an organization known as the Recreation Council for the Disabled in Nova Scotia. Funded by the Nova Scotia Department of Recreation and by the Fitness and Amateur Sport Branch of Health and Welfare Canada, the principal objective of the Council is to promote and support the involvement of disabled persons in community leisure activity; leisure, not as a replacement for meaningful work, but complementary and necessary for a fulfilling lifestyle. The emphasis is on the individual. The specific leisure activities are generally those which are selected by the individual, not extrinsically imposed, and those which involve the "dignity of risk". This for many people is initially *any* activity outside their home.

REGIONAL DEVELOPMENT — THE MAJOR FOCUS OF RCDNS

The chief aim of the Council is to have change happen where it inevitably matters, locally; — to assist in the creation of joint efforts at the regional and community level in Nova Scotia, and to tackle the barriers disabled people face. At the present time, five action groups exist outside of Halifax and Dartmouth centered around the following areas: Sydney, Truro, Pictou, Kentville, and Bridgewater. Membership includes disabled persons, family members, and professionals in the fields of recreation and rehabilitiation, plus other interested persons. Each committee sets its own particular priorities and develops strategies concurrent with the intrinsic nature of the area. Projects which committees have implemented include, awareness days, public education programs, leisure interest surveys, demonstration projects, workshops, action to improve accessibility and transporation, social functions, the initiation of new community recreation programs, and the commencement of "facilitator" programs.

THE REGIONAL FACILITATORS PROGRAM

A year ago, the Recreation Council embarked on a project which provided financial assistance to three of the regional committees for each to employ a facilitator a person who would provide assistance to disabled persons in the community who wished to participate in leisure activity but required support to do so. Facilitators provide leisure counselling and information services, volunteer helpers, assistance in procuring transportation, finances, and technical aids; also, consulting services to voluntary agencies and institutional settings. The facilitator attempts to maximize utilization of the existing recreation service delivery system and at the same time educate service providers how to work effectively with disabled persons.

THE REFERRAL SYSTEM

The process varies with the individual and his/her particular situation; however, a simplified outline of the steps involved is as follows:

1. A referral is received from physician, social worker, rehabilitation counsellor, or contact is made by the disabled person and, possibly a family member.

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†Neulinger; XV (1974)

2. A visit is arranged with the disabled person and, possibly a family member, by the facilitator.
3. Leisure interests and supports required are identified.
4. Existing opportunities are reviewed and a selection of one or more activities is made.
5. Plans are devised to provide the supports required.
6. The leisure activity is initiated.
7. Regular follow-up is arranged with the person to measure progress.

If the person has a specific disability for which special adaptations must be utilized, the facilitator may discuss these with the recreation leader or volunteer. In some cases, medical consent is required. There may be the need to provide the individual with an opportunity to upgrade skills or increase self-concept before entering a regular community recreation program. This may be done with small groups or individually. In rural areas, there are usually insufficient numbers of people with similar skill levels and disabilities to organize large group activities. This situation can have positive implications such as involvement in community activities with non-disabled persons and family members; however, a person will not integrate until he or she is ready. Forcing integrated activities on persons who are not prepared can be more disasterous than doing nothing at all. A few uncomfortable experiences can result in a conscious avoidance of community involvement by the disabled individual.

THE ACCOMPLISHMENTS OF RCDNS

As opportunities for leisure become available to persons with a disability, more and more are meeting the challenge.

Some examples of change include:

1. Increased physical accessiblity of recreation facilities, including gymnasia, community halls, pools, playgrounds, parks, shopping centres, and restaurants; also increased modifications to disabled persons' homes, and sidewalks.
2. Modes of transportations being planned and implemented which can accomodate both individual and group requirements of persons with mobility problems.
3. Many training sessions have occured which prepare community recreation leaders instructing programs of swimming, skiing, riding, and YMCA programs to work with disabled persons, including the teaching of signing (manual alphabet). (See Table 1.)
4. Disabled persons actively participating in leisure persuits in all areas of sport, recreation, and culture. (See Table I..)

   e.g. — blind persons are cross-country skiing, riding, teaching recreation skills such as gymnastics, and competitive sport activities.

   — paraplegics have begun archery, fishing, and boating

   — hemiplegics are taking up woodworking, and starting self-help groups

   — mentally retarded persons have moved away from "special camps" and are now tenting at campsites and trailer parks

   — persons who are severely disabled and homebound are receiving the services of visiting crafts teachers

   — hearing handicapped children are being integrated into regular playground programs

   — persons with cardiac conditions are forming clubs to encourage social interaction and physical activity

5. Persons who require assistance in developing friendships and social skills are receiving support.

These are only a few examples of recent developments in Nova Scotia. The changes are usually low-profile, but very significant in the life of the disabled individual. The benefits for the disabled person in active participation are similar to the benefits gained by all, physical and mental well-being.

TABLE I

NUMBER OF PERSONS WHO HAVE BECOME INVOLVED WITH RCDNS AND ITS PROGRAMS (SEPT. 1978)

	Disabled Persons	Service Providers
Demonstration Projects	280	35
Student Summer Program	310	25
*Workshops: Regional (Awareness and Problem Solving Seminars)	120	560
Specialized:		
1. Childrens Training Centres	120	46
2. Residences for Elderly Persons	410	35
3. Residences for Mentally Retarded Adults	128	30
4. Leisure Counselling	1080	180
5. Volunteer Training	510	75
6. Annual Meeting Workshops	70	120
7. Riding	105	25
Direct Involvement in Regional Committees	200	230
Board Membership	15	25
General Membership	60	120
Facilitator Program	2100	45
Program Consultations-Social Services Dept.		
Adult Residential Centres	1000	170
Regional Rehabilitation Centres	450	110
Totals	7023	1271

*Does not include workshops sponsored by other organizations with significant involvement by RCDNS, e.g. ski clinics, Recreation Association of Nova Scotia Annual Conferences, annual conferences of voluntary associations, and municipal recreation activities.

PROFILES

Nancy

Nancy is a 20 year old, very obese woman who lives in a rural area of Nova Scotia. Due to a learning disability and her obesity, she left school early and for the next five years she stayed within her home, with no social contacts or activities other than those which took place inside her house. A local

public health nurse referred Nancy to the facilitator, who was able to locate a volunteer "leisure buddy" for Nancy. Initially the volunteer visited Nancy once a week in her home. The two now take part in social activities outside of the home, go for regular walks together, and Nancy is consciously attempting to lose weight. Also, Nancy will now venture out into the community with family members.

Harold

Harold is a paraplegic with speech difficulties, who was referred to the facilitator from the Nova Scotia Rehabilitation Centre by the recreation coordinator. Harold had indicated an interest in learning to play the guitar but due to his disabling conditions had been reluctant to follow through with his interest. The facilitator contacted a local guitar instructor who agreed to give Harold lessons at home. Harold has now purchased his own guitar and is taking lessons on a regular basis. He also has begun working at a local rehabilitation workshop.

John

John is a 19 year old man who is legally blind with some residual sight. While attending the Halifax School for the Blind, he took part in gymnastics but after leaving the School, he found he had very little to occupy his time in the small town in which he resides. The recreation director of the town had been interested in initiating a gymnastics program but could not locate an instructor. With the assistance of the recreation facilitator and the recreation director, John is now instructing gymnastics to two groups of school children, and conducting a ladies fitness class. For his own leisure involvement, John has taken woodworking and pottery classes in Sydney.

THE ROLE OF THE PHYSICIAN

The physician is frequently the initial contact person for the disabled person and has an important role to play in his rehabilitation. Persons who are disabled require encouragement, motivation, and support to make the big move to involvement in the community and they may be unaware of their potential or the opportunities available. *Encourage involvement.* Regardless of the type of disability or the degree; there is a program which can be tailor made to suit the individual's needs.

Most communities in Nova Scotia employ municipal recreation directors who are responsible for providing recreation for their constituency. These persons are more than willing to assist a person who has special needs with leisure persuits and they will contact the local facilitator or regional committee if help is required.

For further information on recreation opportunities for disabled persons, or names of your local resources, contact The Coordinator, Recreation Council for the Disabled in Nova Scotia, Suite 308, 5516 Spring Garden Road, Halifax, N.S. B3J 1G6 (902) 423-6482 □

Resources

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*Available free of charge from the Recreation Council for the Disabled in Nova Scotia 5516 Spring Garden Road, Suite 308, Halifax, N.S. B3J 1G6

NEW AUDIO CASSETTES HELP INFORM PATIENTS

A new system of patient education is being developed by Medifacts and the College of Family Physicians of Canada, based on the patient's use of audio cassettes and illustrated brochures as learning aids.

This system involves the patient, and often members of his family as well, listening to a cassette dealing with his medical problem. Subsequently the patient is able to discuss his problem more intelligently with his physician, with greater understanding of the need for patient compliance.

Among the cassettes produced so far are these titles which may have a direct application to many of your patients:

1.	Growing up (Adolescence)	46 minutes	$6.95
2.	Teenage Drinking & Drugs	37 minutes	$6.95
3.	Your Blood Pressure	66 minutes	$8.95
4.	Talking about Sex	89 minutes	$9.95
5.	Birth Control (Contraception)	41 minutes	$6.95

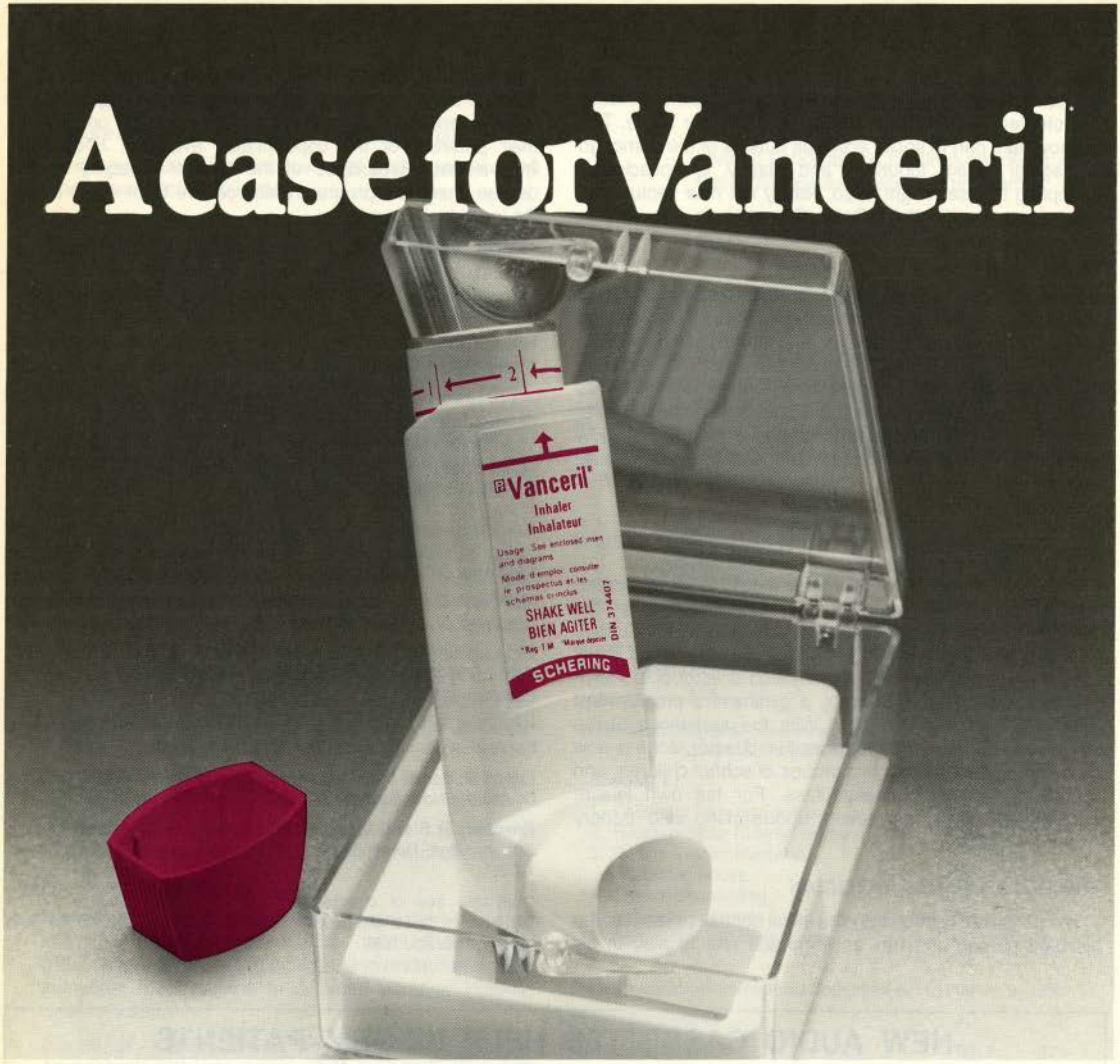
Each cassette presents information in lay language in the form of dialogue, narrative and dramatized vignettes which often enable the patient to see himself as others see him.

In a recent survey of physicians who are participating in the Medifacts Patient Education program, 81% of those who replied to a questionnaire reported that they were lending their cassettes to patients for listening at home. Most of the others had facilities for patients to listen in their offices.

Other significant figures: 86% of these doctors said their patients readily accept medical information on tape, and 91% said they would recommend Medifacts Patient Education Cassettes to other physicians.

Members interested in further information on these Patient cassettes should write to Medifacts Ltd., 43 Eccles Street, Ottawa, Ont. K1R 6S3.

A case for Vanceril



VANCERIL (beclomethasone dipropionate) from Schering is the aerosol corticosteroid that has changed medical opinion about steroids in chronic asthma. VANCERIL offers these patient advantages:

- Metered dose inhaler delivers effective asthma control *directly* to the bronchical mucosa.
- Provides selective, potent, *topical* anti-inflammatory activity and *virtual freedom from side effects* at recommended dosage.
- Is indicated for patients whose chronic asthma is inadequately controlled by non-steroid medication such as bronchodilators and/or sodium cromoglycate.
- May replace oral corticosteroids with a programme of gradual patient withdrawal from systemic medication.

VANCERIL offers packaging designed for maximum patient convenience and co-operation.

1 "Dosage reminder" canister.

2 Convenient plastic carrying case.

3 Instruction sheet in four languages.

4 Identity card advising that patient is asthmatic using corticosteroid therapy.

Vanceril Oral Inhaler

(Beclomethasone Dipropionate Inhaler)

A Newspaper for the Handicapped by the Handicapped

From producing out of one room of a partially abandoned schoolhouse to working out of commodious space uptown in the Halifax Insurance Building, is a significant climb for any new venture — especially one in the publishing business and most especially after only four months of operation.

But that's only part of what makes *Touchstone,* the newest tabloid published in Halifax, Nova Scotia, unique. For one thing, most of the newspaper's nine member staff are either partially sighted or blind. And one of its highly popular freelance writers, Stephen Young, is a paraplegic.

What they have evolved is something that is one of a kind — Canada's first on-the-stands newspaper designed to accomodate the visually impaired (taped cassettes of each issue are produced for those who are completely blind). The scope of the monthly, however, is much broader. Touchstone's publisher, Terry Green puts it this way: "we want to present to the public our view of ourselves — the handicapped's view of the handicapped. Editor Stephen Freygood adds, "we want to be regarded as a reliable source of information . . . and we refuse to be a soapbox for 'poor me' stories."

The intention is clearly to attract general reader interest and the extent to which this is being fulfilled can be gauged partly by the impact on affairs *Touchstone* has had during its relatively brief existence. As of November 1978, the paper had produced only its fifth issue. But previous ones had already had the effect of persuading Nova Scotia's premier to agree to an amendment of the province's Human Rights Act. And the tabloid's news coverage had already provided stories that were picked up by the CBC national network and the Toronto *Globe and Mail.* Maclean's magazine (October 23, 1978) summed up *Touchstone's* impact with a story headed: "A newspaper that really speaks out."

The paper's uniqueness, then, together with the ability of staff members to cope with special problems go far in accounting for the popularity of the venture with readers and with the media. The format of the publication is built around large typeface and oversize photographs. And, in order to employ blind and partially sighted people, new methods of production have been developed. For example, reporter Barry Abbott develops a story first by doing an interview on tape, then editing the tape. Afterwards, he creates a braille manuscript which he reads to the editor for corrections. Then he types the copy.

Ingenuity doesn't stop with production. New techniques in advertising sales are necessary in order to create awareness of the large market among the physically handicapped and elderly (One has only to consider that one out of every ten Canadians has an appreciable physical handicap). And new distribution methods have to be developed to reach this new market. By definition, many of the people who read *Touchstone* are not even able to *get* to a news-stand.

Finally, the paper has an independent editorial policy. Many handicapped people find themselves in the position of being dependent on a multitude of bureaucracies, organizations that are virtually inaccessible to public criticism. But who wants to read a newspaper seething with controversy yet is utterly dreary in all other respects? "We are proud," says Freygood, "when we hear that even those we criticize

find the journal downright entertaining. The newspaper is aimed at many people who are not physically handicapped — doctors, lawyers, social workers. And they want to be informed, not browbeaten."

On major issues that affect the physically handicapped, *Touchstone* takes essentially simple positions: full human rights, the right to public transportation, housing, health care, education and employment. Freelance contributors come from a variety of professions and political opinions. A number of community organizations from across the country are also sending material to the paper.

At this time, says the editor, "*Touchstone* is asking for articles and information from the medical community, in some cases to explain the mysteries of a medical problem, in others to explain the mysteries of the doctor-patient relationship. For instance, how is one to tell a patient that she or he is about to lose an arm, or their eyesight?"

TOUCHSTONE would like to publish medical articles suitable for a general readership. If you are a doctor or medical student and would like to provide information to your community, contact *Touchstone* in Halifax at 422-9683 or write to **Touchstone,** Box 1612, Halifax, N.S. B3J 2Y8. Subscriptions may be ordered at the same address. $3.50 one year; $8.00 three years. □

Heparin

Alexander G. G. Turpie,* M.B., Ch.B, F.R.C.P., F.A.C.P., F.R.C.P.(C),
and Jack Hirsh,** M.D., F.R.A.C.P., F.R.C.P.(C),

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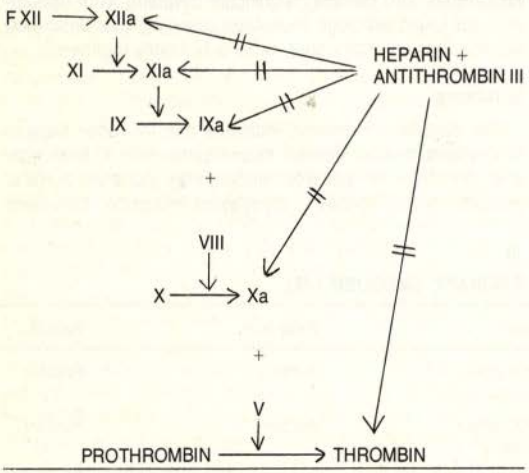
Heparin is a naturally occurring anticoagulant drug which has been used for approximately 40 years for the treatment of thrombosis. The main evidence for its clinical effectiveness comes from evaluation of its use in clinical trials on the prevention and treatment of venous thromboembolism. The evidence that it is clinically effective in arterial thromboembolism is less certain.

Heparin is a polydispersed, negatively charged, sulfated mucopolysaccharide with a molecular weight ranging from 3,000 to 57,000.[1] After intravenous injection, heparin distributes throughout the plasma volume, is bound to a number of plasma proteins and has a circulating half-life in man of approximately 60 minutes.[2] Little is known about the metabolism of heparin but it is partly cleared by the liver and reticulo-endothelial system and partly by excretion by the kidney. Therefore, increased sensitivity to heparin may occur in patients with liver or renal disease.

Heparin exerts its anticoagulant effect only in the presence of a plasma cofactor, antithrombin III (ATIII) which is a naturally occurring α_2-globulin that inhibits the activated clotting factors XIIa, XIa, Xa, IXa and thrombin which have serine reactive residues (Figure 1). Antithrombin III inactivates the activated clotting factors in a progressive and irreversible manner and it has been proposed that heparin markedly accelerates the speed of their inactivation by changing the configuration of antithrombin III to facilitate its binding to the activated clotting factors.[3] There is evidence that after the heparin/antithrombin III complex has been formed, heparin is released from the complex and becomes available for complexing with other antithrombin III molecules.[4]

FIGURE 1

INHIBITION OF ACTIVATED COAGULATION FACTORS BY HEPARIN/ANTITHROMBIN III COMPLEX



Heparin is prepared for therapeutic use from pig intestinal mucosa or purified beef lung and is available as sodium or calcium salts. There are no major differences in the potency between the various types of heparin, although recent studies indicate that the heparin derived from porcine gut and bovine lung have different relative effects on thrombin and activated Factor X.[5] Heparin must be given parenterally since it is not absorbed from the gastro-intestinal tract. It can be given by continuous intravenous infusion, intermittent intravenous injection or by subcutaneous injection and is available in concentrations of 5.000 units/ml. to 40,000 units/ml. Because heparin inhibits many steps in the coagulation system, its effects on blood coagulation can be measured by a number of laboratory tests. The most widely used of these are the whole blood clotting time, the plasma activated partial thromboplastin time, the activated whole blood clotting time and the plasma thrombin clotting time (Table I).

TABLE I

TESTS USED TO MONITOR HEPARIN

Blood Sample	Test
Whole Blood	Whole blood clotting time Activated clotting time Whole blood partial thromboplastin time
Platelet-Rich Plasma	Activated platelet-rich plasma recalcification time
Platelet-Poor Plasma	Activated partial thromboplastin time Factor Xa inhibitor assay Thrombin clotting time Protamine sulphate titration

TABLE II

CLINICAL USES OF HEPARIN

1. Venous Thromboembolism
   a) Prophylaxis
   b) Treatment
2. Acute Peripheral Arterial Occlusion
3. Extracorporeal Circulation
4. Disseminated Intravascular Coagulation

The aims of heparin therapy are to either prevent thrombus formation or inhibit thrombus propagation without causing bleeding. In practice, heparin is mainly used clinically for the prophylaxis and treatment of venous thrombosis and pulmonary embolism. Heparin is also used in some patients with arterial thrombosis, with microvascular thrombosis, and

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to prevent thrombus formation on foreign surfaces such as artificial heart valves, during haemodialysis, cardiopulmonary bypass and arterial catheterization. Heparin may also be beneficial in some patients with haemostatic failure due to intravascular coagulation (Table II).

Heparin Prophylaxis

VENOUS THROMBOSIS

Venous thromboembolism is a common cause of morbidity and mortality in hospitalized patients and a number of methods of prophylaxis have been proposed. The ideal prophylactic agent should be effective, safe, acceptable to patients and staff, and inexpensive. The value of anticoagulant drugs for the prevention of venous thrombosis was shown using Vitamin K antagonists but the risk of haemorrhage and need for laboratory control has prevented their routine use. In the late 1960's, it was reported that small doses of heparin, which were insufficient to prolong the whole blood coagulation time, were effective for the prevention of clinically detected venous thrombosis. There are now a number of prospective trials, using objective methods for the diagnosis of venous thromboembolism, that have demonstrated the effectiveness of heparin when given in doses of 5,000 units subcutaneously, 8 or 12 hourly. Low-dose heparin prophylaxis has been evaluated in patients undergoing general abdomino-thoracic surgery. There are fifteen randomized prospective trials comparing low-dose heparin with placebo or no treatment and in thirteen of these, heparin significantly reduced the frequency of ^{125}Iodine-labelled fibrinogen leg scan detected venous thrombosis from approximately 30% in the control groups to 7% in the treated groups. In the two studies in which there was no significant difference between the heparin-treated patients and the control patients, frequency of venous thrombosis in the control groups was low. Patients who had surgery for malignant disease were included in some of these studies and although the frequency of venous thrombosis was greater in this group, both in the control and treated patients, low-dose heparin was found to be effective in reducing the frequency of post-operative thrombosis.

The reported frequency of clinically significant bleeding in the heparin group was varied in the various studies. In most reports, clinically significant bleeding was not found although, in two of the larger reports, there was a significant increase in the percentage of patients who developed post-operative wound haematomas and a number of recent studies have reported an increase in post-operative bleeding which was considered to be of minor clinical significance. However, it should be stressed that death due to bleeding has not been reported, and that major bleeding due to low-dose heparin prophylaxis is very uncommon.

Low-dose heparin prophylaxis appears to be ineffective in patients undergoing surgery for hip fracture, and the evidence for its effectiveness is inconclusive in patients having elective hip surgery. Furthermore, the risk of haemorrhage with low-dose heparin prophylaxis in patients undergoing orthopedic procedures is significant. Heparin prophylaxis may also be ineffective in patients undergoing suprapubic prostatectomy.

The value of low-dose heparin prophylaxis has been less well defined in medical patients but there have been 4 controlled trials evaluating its effect in patients with myocardial infarction and in 3 of these, there was a marked reduction in the incidence of leg scan-detected venous thrombosis without risk of haemorrhage. There is one small study in which the frequency of venous thrombosis following strokes was dramatically reduced with low-dose heparin but the differentiation of thrombotic from haemorrhagic stroke remains imprecise without computerized transaxial tomography and therefore routine use of heparin following acute stroke cannot be recommended. The results of these studies are fully analyzed in 2 recent reviews.[6,7]

PULMONARY EMBOLISM

Since the majority of pulmonary emboli originate from venous thrombi in the legs, the studies that demonstrate effectiveness of low-dose heparin for the prevention of venous thrombosis provide a basis for the hypothesis that low-dose heparin might prevent pulmonary embolism. Four prospective trials on the use of low-dose heparin to prevent fatal pulmonary embolism diagnosed at autopsy have been reported (Table III).[8,11] In 3 of the 4 trials, heparin was found to reduce the frequency of pulmonary embolism at autopsy and in the fourth study,[11] there was no difference in the frequency of pulmonary embolism between the heparin-treated and control groups. Two of the trials involved large populations and clinically significant bleeding from heparin was not found although increased bleeding was described with the 8 hourly[8] compared with the 12 hourly regimen.[9]

Summary

The evidence, therefore, indicates that low-dose heparin prophylaxis against venous thromboembolism is both safe and effective in patients undergoing general surgical procedures and following myocardial infarction. Low-dose

TABLE III

HEPARIN — PREVENTION OF PULMONARY EMBOLISM (PE)

	Heparin	Dose	Endpoint	Result
International Multicentre Trial[8]	Calcium	5,000 units 8 hourly	Autopsy	Positive
Sagar et al[9]	Sodium	5,000 units 12 hourly	Autopsy	Positive
Kiil et al[10]	Sodium	5,000 units 12 hourly	Autopsy Lung scan	Positive
Gruber et al[11]	Calcium	5,000 units 8 hourly	Autopsy	Negative

heparin prophylaxis is recommended in patients over the age of 40 undergoing major elective abdominal or thoracic surgical procedures and following myocardial infarction. Other high risk groups who should receive heparin prophylaxis are the elderly, patients with malignant disease, heart failure, obesity or previous venous thromboembolism and patients undergoing prolonged surgery. There is also an increased risk of postoperative venous thrombosis in patients on oral contraceptives. For prophylaxis against venous thromboembolism, heparin should be given in a dose of 5,000 units subcutaneously 2 hours before operation, followed by 5,000 units 8 hourly or 12 hourly until the high risk period ends. In non-surgical patients, prophylactic heparin should be given in doses of 5,000 units 8 or 12 hourly subcutaneously. Monitoring of heparin therapy by laboratory testing is not required other than baseline values to determine that the patient is hemostatically competent.

Low-dose heparin prophylaxis is of limited value in patients undergoing elective hip and knee joint reconstruction, surgery for fractured femur and open prostatectomy. It is contraindicated in patients undergoing operations on the eye and brain and those having spinal anesthesia. Low-dose heparin prophylaxis is ineffective in patients with an active thrombotic process. Although low-dose heparin is regarded as a safe form of prophylaxis, it does cause a slight increase in the frequency of minor wound haematomas, but this potential disadvantage is more than compensated by its benefit in high risk patient groups.

Heparin Therapy

VENOUS THROMBOEMBOLISM

Heparin is generally regarded as the treatment of choice in acute venous thromboembolism where the aim of treatment is to prevent extension of thrombosis or to prevent pulmonary embolism. The evidence that heparin is effective for the treatment of venous thromboembolism comes primarily from a controlled study in which it was demonstrated that clinically diagnosed pulmonary embolism had a fatal recurrence rate of 26% and a similar incidence of non-fatal recurrence in untreated patients, and that both fatal and non-fatal recurrence could be virtually abolished by heparin treatment.[12] The beneficial effect of heparin has been subsequently borne out by a number of controlled prospective studies but a formal double-blind controlled trial comparing heparin treatment against no treatment in venous thromboembolism has not been carried out. The evidence that anticoagulants are of benefit in patients with venous thrombosis is less direct but still convincing enough to recommend their use. Before introduction of anticoagulant thearpy, one quarter of the patients with clinically diagnosed postoperative deep vein thrombosis developed clinical symptoms and signs compatible with pulmonary embolism, and fatal pulmonary embolism was reported in 11 to 23% of patients with clinically diagnosed venous thrombosis.[13] Recent evidence indicates that patients with leg scan-detected venous thrombosis, who are untreated, have a high risk of developing lung scan or clinically-detected pulmonary embolism, and that the incidence of pulmonary embolism is low when anticoagulants are used to treat patients with venous thrombosis diagnosed either clinically or by leg scanning.[14]

There are a number of questions regarding the use of heparin in venous thromboembolism which remain controversial.

These are:

1) How long should heparin treatment be continued.
2) Should heparin therapy be followed with oral anticoagulants.
3) Whether heparin should be given in a standard dose or whether the dose should be monitored and adjusted to produce a pre-determined anticoagulant effect.
4) Whether heparin should be given by intravenous infusion, intermittent intravenous injection or by subcutaneous injection.

1) Duration of Heparin Therapy

Heparin is the drug of choice for the initial anticoagulant treatment of venous thromboembolism. The anticoagulant effect of heparin is immediate and there is indirect evidence from experimental and retrospective clinical studies that it is a more effective antithrombotic agent than oral anticoagulants. Heparin is usually given for 7 to 10 days, based on the observation that it takes up to 7 days for experimental thrombi to become adherent to vein walls, and from retrospective studies that indicate the risk of recurrence of venous thromboembolism is lower in hospitalized patients who are receiving heparin than in those who are being treated with oral anticoagulants.[15]

2) Heparin and Oral Anticoagulant Therapy

The risk of recurrent venous thromboembolism is greatest in the first month and gradually reduces to a minimum at 6 months. Secondary prophylaxis with oral anticoagulants for 6 to 12 weeks after initial heparin treatment has been reported to reduce the risk of recurrence of venous thromboembolism but thereafter, the risks of anticoagulation outweigh the benefits. It is usually recommended therefore that the initial 10 day course of heparin be followed with 3 to 6 months of oral anticoagulant therapy.[16]

3) Dose and Monitoring of Heparin

The optimal dose of heparin for the treatment of venous thromboembolism is that which would prevent thrombus extension and embolization without causing haemorrhage. It is likely that thrombi extend mainly through interaction between thrombin on the surface of the thrombus and circulating fibrinogen, and since there is no practical test available to measure the extent of this interaction, the tests of blood coagulation which are used to measure the effect of heparin measure anticoagulant effect in the circulation as a whole. The value of the test used will therefore depend on whether its results can predict that heparin is present in sufficiently high concentration to produce an antithrombotic effect without producing excessive bleeding.

A number of prospective trials have shown that when heparin was given by intravenous infusion, recurrent thromboembolism is unlikely to occur if the result of either the whole blood clotting time or the activated partial thromboplastin time is greater than twice the control value.[17] However, there is no good evidence that laboratory control of heparin, given by intermittent injection, influences its

effectiveness in preventing recurrent thromboembolism. The results of prospective studies indicate that bleeding does not correlate with the results of tests used for laboratory monitoring even when heparin is given by continuous intravenous infusion. However, there is some evidence that the risk of bleeding is related to the heparin dose, and to clinical factors such as the age, sex of the patient, the presence of associated trauma or recent surgery, and concurrent drug therapy.[17 19]

The coagulation tests which can be used to monitor the anticoagulant effect of heparin are the whole blood clotting time, activated clotting time and activated recalcification time, the activated partial thromboplastin time (APTT), partial thromboplastin time (PTT) Factor Xa inhibitor assay and the thrombin clotting time (TCT). The APTT and whole blood clotting time are the most widely used tests to monitor heparin therapy and have acceptable sensitivity to heparin.

4) **Administration of Heparin**

The results of randomized prospective studies demonstrate that the administration of heparin by continuous intravenous infusion is associated with fewer major bleeding complications than when heparin is given by intermittent intravenous injection and that both methods of administration are equally effective in preventing recurrent thromboembolism.[18 20] Heparin may be given by subcutaneous injection in therapeutic doses for the long term management in patients who are resistent to oral anticoagulants or in pregnant patients in whom oral anticoagulants are contraindicated.

5) **Practical Aspects of Heparin Treatment for Venous Thromboembolism**

Heparin can be given intravenously (I.V.) or subcutaneously (S.C.). The I.V. route is preferred for acute management but subcutaneous administration of heparin is useful for long term out-patient treatment of patients who are resistant to oral anticoagulant treatment.

a) ***Continuous Infusion***

A loading dose of 3,000 to 5,000 units of heparin should be given as an initial bolus and followed with a maintenance infusion of 24,000 to 30,000 units per 24 hours. The partial thromboplastin time or activated clotting time should be measured before treatment and again after 6 and 24 hours of treatment and then once daily. The dose of heparin is adjusted to maintain the PTT between $1^1/_2$ to 2 times normal or the clotting time between 25 and 30 minutes. If the plasma heparin concentration is used to monitor heparin therapy, this should be maintained at between 0.3 to 0.5 units per ml.

A lower initial dose should be used in the immediate postoperative period and in patients with liver or renal disease who may show increased heparin sensitivity. In these situations, an initial bolus of 2 to 4,000 units and the laboratory effect of the heparin should be monitored more frequently. In the immediate postoperative period, the PTT or clotting time should be maintained in the lower part of the therapeutic range.

Heparin treatment should be continued for 7 to 10 days or longer if symptoms persist. Treatment with oral anitcoagulants is then started so that it is overlapped with heparin for 3 to 5 days.

An alternative method of anticoagulation is to commence intravenous heparin and oral anticoagulants at the same time and to maintain heparin until the antithrombotic effect of the oral anticoagulant drugs is present. This latter technique is not recommended since it has been shown that in the acute phase of venous thromboembolism, heparin is a more effective antithrombotic agent than the oral anticoagulants.

b) ***Intermittent Intravenous Injection***

Intermittent intravenous injections of heparin are usually given every 4 hours, either in a fixed dose or in a dose which is adjusted to produce a PTT or clotting time in the lower therapeutic range before the next injection is due. The usual dose is 30 to 40,000 units per 24 hours. In practice, careful laboratory control of intermittent intravenous heparin is difficult. In general, it is necessary to perform 1 or 2 tests in the first day of treatment and then to continue 1 test each day.

c) ***Subcutaneous Injection***

Heparin can be given in therapeutic doses by subcutaneous injection (S.C.). Treatment is started with a dose of 10,000 units, 8 hourly, or 15,000 units, 12 hourly. The dose and frequency of injection are then adjusted to produce an anticoagulant effect in the therapeutic range for most of each 24 hour treatment period. To avoid serious local bleeding, injections should be given through a fine gauge needle into the subcutaneous fat of the anterior abdominal wall or thigh, and pressure should be applied for at least 5 minutes after the injection. Concentrated heparin, 25 units per ml., should be used to minimize the injection volume but this must be dispensed with care to avoid overdose.

The administration of heparin by intramuscular injection is not recommended because of the unpredictability of the anticoagulant effect, because of the risk of accumulation and because of formation of painful haematomas at the injection site.

ARTERIAL THROMBOEMBOLISM

The value of anticoagulation with heparin in patients with arterial thromboembolism is less well documented. Heparin is commonly given for the treatment of arterial embolism in patients with rheumatic heart disease, chronic atrial fibrillation, cardiomyopathy and myocardial infarction. In the patients who develop cerebral embolism, anticoagulant therapy is usually delayed for 48 hours to minimize the risk of intracerebral bleeding. There is no evidence that heparin is of benefit in patients with completed strokes although in patients with stroke-in-progression, there is some evidence that heparin may be beneficial in arresting the process.[21]

Heparin is routinely used in patients undergoing extracorporeal circulation including cardiopulmonary bypass and extracorporeal renal dialysis and has been shown to reduce the frequency of thrombosis in patients undergoing cardiac catheterization.

Side Effects

The most important side effect of heparin is bleeding and other side effects are rare. These include osteoporosis, transient alopecia, thrombocytopenia, arterial thrombosis and embolism and hypersensitivity reactions. The reported frequency of thrombocytopenia when heparin is given in

therapeutic doses varies between 1% and 30% and there are also isolated reports of thrombocytopenia occurring with low-dose heparin.[22] The mechanism of heparin-induced thrombocytopenia is uncertain but some cases appear to be immune mediated although this is not invariable.[23]

Contraindications

The contraindications to heparin therapy are a bleeding diathesis, known allergy to heparin and malignant hypertension. Heparin should be given cautiously in the early postoperative period.

Heparin Neutralization

When it becomes necessary to neutralize heparin, protamine sulphate must be given intravenously. Although the potency of batches of heparin and protamine sulphate may vary, the usually accepted dose of protamine sulphate to neutralize heparin is 1.5 mg. of protamine sulphate for each milligram (100 units) of heparin. Since the half life of intravenous heparin is approximately 1 hour, the quantity of protamine sulphate required to neutralize heparin falls rapidly. The usual indication for a heparin antagonist is severe haemorrhage or to reverse anticoagulation following extracorporeal circulation.

Summary

Heparin is a naturally occurring anticoagulant drug which combines with antithrombin III to inhibit many steps of the coagulation pathway. Clinically, heparin is used in small doses for the prevention of venous thrombosis and pulmonary embolism and in large doses is the treatment of choice in acute venous thromboembolism. It may be given by intermittent intravenous or continuous intravenous injection, usually in doses of approximately 30,000 units/day. The main side effect of heparin is haemorrhage. Haemorrhage appears to be less frequent when therapeutic heparin is given by continuous intravenous infusion than by intermittent intravenous injection.

Heparin is also used for the treatment of some acute arterial thromboembolic events. □

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ATTENTION

The Accident Prevention Committee of The Canadian Paediatric Society and the Poison Control Centre of The Izaak Walton Killam Hospital for Children draw to your attention the extreme hazard of the SMALL BATTERIES USED TO ENERGIZE WATCHES, ETC.

DO NOT ALLOW CHILDREN to have these batteries as play things.

DISCARD the exhausted batteries in such a fashion that they will not fall into the hands of children.

DEATH CAN RESULT FROM INGESTION.

IN THE EVENT OF ACCIDENTAL INGESTION, CALL THE POISON CONTROL CENTRE.

When someone says to us, "You're entitled to your opinion," we get the uneasy feeling that we wouldn't be if he had his way about it.

— Sidney J. Harris

Varicose Veins

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Diseases of the veins are ten times as common as arterial disease. Varicose veins are one of the commonest complaints of the human race. There are some 300,000 sufferers in Switzerland, a country of five million people. Not all varicose veins are visible and all visible veins are not necessarily varicose. A true varicosity is a vein whose valves have become incompetent through valvular insufficiency, due to dilatation of the veins. This dilatation produces decreased leak pressure of the valves, loss of muscle and elastic tone with lengthening tortuosity — changes typical of varicosis.

CLASSIFICATION

Primary varicosities result from direct changes in the vein itself and secondary varicosities occur from more remote causes.

FIGURE 1

CLASSIFICATION OF VARICOSE VEINS

PRIMARY	SECONDARY
1. CAPILLARY ANGIOMATA	POST THROMBOTIC SYNDROME
2. RETICULAR VEINS	ANGIODYSPLASIAS
3. INCOMPETENT LONG & SHORT SAPHENA	AV MALFORMATIONS
4. PRIMARY INCOMPETENT PERFORATORS	HORMONAL-PREGNANCY
5. ATHLETES VEINS	PROXIMAL OBSTRUCTION a. Negus Syndrome b. Tumors c. Adventitial Degeneration

PATHOPHYSIOLOGY

Primary varicosities affect the superficial veins (usually a hereditary disorder). Studies have shown that muscle cells in the vein wall become altered, break down, and release lysosomes and othere degenerative products. These can be measured in the urine and serum and are found to be increased in patients with primary varicose veins. The saphenous veins are most commonly affected. The process starts proximally and extends distally. Deep veins being non muscular are not subject to varicosities, except secondarily. Muscle and elastic tissue in the varicose veins become replaced by fibrous tissue, so that the vein wall is weakened.

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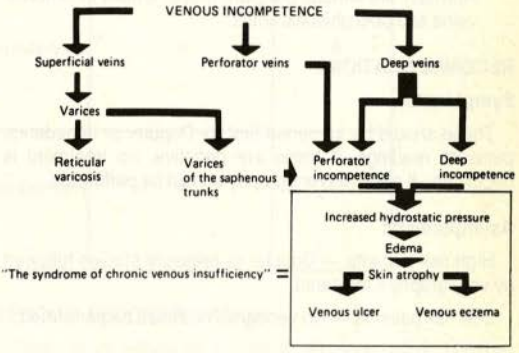
VALVES

Studies on venous flow have shown that they remain competent in primary varicosities unless damaged from the effects of deep vein thrombosis.

FIGURE 2



EPIDEMIOLOGY

The Basel Study showed: —

1. Varicosites (primary) are hereditary and result from the degenerative process described.
2. Varicosis is primarily a disease of European origin.
3. Varicosis is a degenerative process of aging, especially in people over fifty years of age.
4. Occupation is an aggravating factor and is never the primary factor in their production.

DEEP VEIN THROMBOSIS

The high frequency and potentially lethal effect of this condition makes the diagnosis important and often urgent. Unfortunately fifty percent of leg pains are due to deep vein thrombosis and fifty percent of deep vein thromboses have no clinical manifestation. Special techniques are therefore necessary.

DIAGNOSTIC TECHNIQUES

Invasive Methods

1. *Venography* — Renografin 60 is injected into dorsal vein of the foot with the affected limb compressed by a tourniquet. 250 ml. saline is injected after the Renografin to wash it out.
2. *Technetium 99 Scan* — This is a simple method and gives a good lung scan.

3. *^{125}Iodine fibrinogen uptake* — After intravenous administration the limb is scanned. Local uptake in the thrombus can make even a small clot detectable.

Non Invasive Methods

4. *Doppler Ultrasound* — With improved apparatus now available, Doppler Ultrasound can be used to test venous flow. The equipment is not expensive but requires practice and skill in interpretation. The ultrasound readings are taken from the femoral and popliteal veins and compared with the unaffected side. It is a useful screening method.
5. *Impedance Phlebography* — A cuff is placed above the knee and pressures in the femoral vein measured by a strain gauge. The apparatus is expensive but the method is promising.
6. *Venous pressure studies* — The patient is exercised. Normally the venous pressure drops. It rises in varicose veins and post phlebitic limbs.

RECOMMENDATIONS

Symptomatic

These should be screened first by Doppler or impedance pressure readings. If these are negative, no treatment is necessary. If positive, venography should be performed.

Asymptomatic

High risk patients — Doppler or pressure studies followed by venography if indicated.

Low risk patients — No venography should be performed.

Prophylaxis

In the following conditions, the risk of pulmonary emboli is increased. (Figure 3)

The incidence of deep vein thrombosis is about five times higher in this group compared with the low risk group. Failure to use DVT prophylaxis in these patients is regarded as an unnecessary risk from the medicolegal viewpoint in some centres.

FIGURE 3

PATIENTS AT RISK FOR DVT

1. HIP FRACTURES & HIP SURGERY
2. PELVIC AND LEG TRAUMA
3. PAST HISTORY OF DVT OR PE
4. OBESITY
5. AGE 60 YRS
6. MALIGNANCY
7. PROLONGED BED REST
8. CONTRACEPTIVE PILL & SURGERY

Prophylaxis of Venous Thrombosis

A. Physical Methods
B. Drug Therapy

Physical methods such as the pneumatic calf compression, physiotherapy, or elastic compression bandages, have not been found to be of much benefit unless combined with drug therapy. Oral anticoagulants are too risky and difficult to control. Intravenous Dextran 70 or subcutaneous low dose heparin combined with physiotherapy seems to give the best results.

TRIALS IN GENERAL SURGERY PATIENTS

The following results have been recorded with the above methods. (Figure 4)

FIGURE 4

RESULTS : — GENERAL SURGERY TRIALS

USING FIBRINOGEN 125

CONTROL	37%
COMPRESSION	38%
DEXTRAN 70	22%
DEXTRAN COMPRESSION	18%
LOW DOSE HEPARIN	12%

HIP FRACTURES - DEXTRAN 70 + COMPRESSION

ELECTIVE HIP SURGERY - LDH OR DEXTRAN 70

Problems of Heparin Administration

In order to obtain adequate blood levels of heparin, a cartridge or jet type of injection is necessary. Alternately the syringe can be primed otherwise the patient only receives 3,000 units instead of 5,000 units.

Treatment of Established Deep Vein Thrombosis

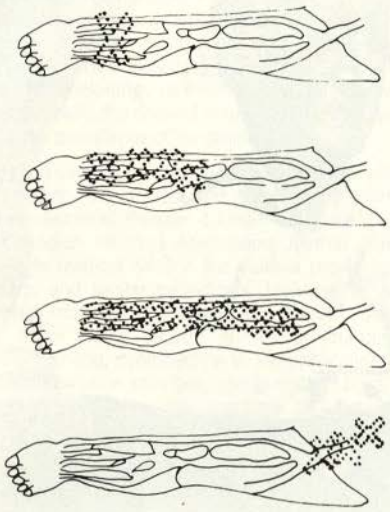
1. ***Calf Vein Thrombosis***
   - — if ambulatory — subcutaneous heparin and compression.
   - — if confined to bed — Give anticoagulants
2. ***Calf and Thigh*** — Give 1,000 units of heparin i/v hourly to a total of 20,000-40,000 units heparin

   Change to oral anticoagulants after five days and continue for six months
3. ***Iliofemoral*** — Give i/v heparin as above followed by oral anticoagulants for five months
4. ***Phlegmasia Cerulea Dolens*** — A thrombectomy should be carried out
5. ***Recurrent Pulmonary Emboli in cases where anticoagulants are contraindicated*** — Caval ligation or clamp is indicated.

FIGURE 5

DVT CHOICE OF TREATMENT - Tentative recomendations

level occluded



1st. Phase	2nd. Phase ORAL ANTICOAGULATION	duration
s c heparin 2 x 20 000 u/d	(+)	1
i/v heparin - 30 000 u d	+	6
thrombolysis	+	6
thrombectomy	+	6

THROMBOLYSIS

Thrombolytic agents, streptokinase and urokinase, have been used successfully in Europe for extensive deep vein thrombosis with good results. These agents are not available in Canada. Patients may be allergic to them.

TREATMENT OF VARICOSE VEINS

1. ***Compression and Sclerotherapy***

This is indicated in capillary and reticular varicosities. Inject 1% or 3% Tetradecyl sulphate into varicose vein with small needle and apply compression immediately and allow patient to ambulate. The effect takes six weeks to occur.

2. ***Stripping and Ligation***

Modern incision for the internal saphenous ring is placed high in the groin. Stripping should start at the ankle and proceed proximally. Small tributaries should be cauterized with hyfrecator through small incisions.

3. ***Incompetent Perforating Veins Varicose and Graviditas Ulcers***

Review of several hundred ulcerated limbs associated with varicose veins has shown that 86% have incompetent ankle perforating veins. These veins which communicate between the superficial and deep saphensous system at the ankle are largely responsible for venous flow in the lower third of the leg. Threatment of these ulcers should therefore be: —

1. Apply compression bandage and apply local pressure to ulcer.
2. If ulcer is resistent, it should be excised and skin grafted. A posterior second incision will allow ligation of incompetent perforating veins at the same time.

VENOUS RECONSTRUCTION

There is no adequate substitute for deep veins. Dacron works well in replacing the superior or inferior vena cava. Where valves are required, the saphenous vein should be used. Prerequisites for success are a good pressure gradient, adequate outflow and inflow.

CONCLUSIONS

1. Diseases of varicose veins are extremely common.
2. Hereditary factors are the most important predisposing causes of primary varicose veins.
3. Occupation is only an aggravating factor in their production.
4. New techniques in the detection of deep vein thrombosis include non invasive methods, ultrasound, and invasive procedures which include venography, radioactive scanning.
5. High risk factors — hip surgery, obesity, bed rest, "the pill", and the over sixty patient must be remembered in the surgical patient.
6. Anticoagulant therapy should be regulated according to the type and extent of the thrombosis. Heparin therapy requires careful administration.
7. Each type of varicose vein requires specific management.
8. Varicose ulcers require initial healing with elevation followed by ligation of incompetent communicating veins. □

References available from the author on request.

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Correspondence

To the Editor:

I am preparing a bibliography of secondary sources in the history of Canadian medicine and health care. The scope is intended to be as broad as possible: included will be theses and published material of any kind — journal articles, monographs, book chapters, pamphlets, etc. The bibliography is intended to encompass the entire time span of Canadian history, including references to aboriginal medicine; geographically, the present boundaries of Canada will circumscribe the boundaries of the project.

All of the common sources for references have been or will be consulted, including the complete runs of periodicals such as the *Canadian Historical Review, L'Union Médicale Du Canada,* the *Canadian Medical Association Journal,* the journals devoted to medical history, the various provincial historical journals, and similar periodicals. However, it is evident that much material has been published in less obvious sites; these would include articles in journals published outside Canada, contributions to the publications of local or regional historical societies, and journals, books, and book chapters for which the journal or book title is such as to make it unlikely to be examined for references for such a bibliography.

The purpose of this note is to request readers to submit full bibliographic details (and reprints or xerox copies if possible) of any items thought to be suitable. The aim of the project will be not only to provide a printed checklist, but also to store and cross-index all references so that pertinent information will be available to scholars on request. It is also intended that the project will be maintained and expanded continuously once the bulk of the data is on file.

Any items considered appropriate should be sent to the undersigned.

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OBITUARIES

Dr. James Robert Brown (54) of Dartmouth died January 10, 1979 in the Victoria General Hospital after a brief illness. Born in New Glasgow, he graduated from Dalhousie Medical School in 1950 and has practised in Dartmouth since that time. He is survived by his wife, the former Shirley Roberta Lund and a brother Harry L. Brown of Halifax to whom we extend our sincere sympathy.

Dr. Walter C. MacKenzie, (69) of Edmonton died in December, 1978. A native of Glace Bay, N.S. he graduated from Dalhousie University Medical School in 1933, and was made an Honorary Member of The Medical Society of Nova Scotia in 1966. He is survived by his wife, the former Dorothy Rosier of Newport, N.S., two sons and a daughter. To his wife and family the Society offers sincere sympathy.

Dr. James W. Lewis (54) of River John, N.S. died Wednesday, January 24, 1979 in Lillian Fraser Memorial Hospital, Tatamagouche. Born in Northern Ireland, he received his medical degree from Trinity College, Dublin. After service as a member of the Royal Army Medical Corps in World War Two, he practised medicine in England before coming to River John in 1963. He is survived by his wife, the former Sybil Pattison and two sons to whom we extend our sympathy.

Dr. J. Russell McLellan (68) Sydney, N.S., died January 30, 1979 in Sydney City Hospital. He graduated from Dalhousie Medical School in 1937 and practised in Sydney, specializing in eye, ear, nose and throat. He is survived by his wife, two daughters and two sons, to whom we extend our sincere sympathy. □

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