MEDICAL PRACTICE

Occasional Review

Screening for hypertension

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Abstract

In an open access screening campaign for hypertension lasting six weeks 6259 individuals were screened with a Vita-Stat blood pressure computer and an estimated 4.2% to 5.4% of new cases were detected.

Introduction

The risk factors associated with coronary arterial disease have been listed as follows¹: cigarette smoking, the greater the amount smoked the greater the risk; blood pressure, the higher the pressure the greater the risk; blood cholesterol, the greater the concentration the greater the risk; and family history, the longer parents live the less risk for their children. Lesser factors are diabetes mellitus, sufferers have a higher risk; obesity, being overweight may increase the risk; stress, which may increase the risk; personality, some types may be more prone than others; physical activity, the less exercise taken the greater may be the risk; and hardness of tap water, the softer the tap water the greater may be the risk.

The Department of Health and Social Security pamphlet *Care in Action*² emphasises the need for health promotion and preventive medicine programmes, but a health education programme directed towards all these factors would be difficult to mount. To increase public awareness eye catching publicity is needed. The mystique of electronic medical apparatus could provide such a focus of attention and with the aid of ICI Pharmaceuticals Division I acquired a Vita-Stat blood pressure computer on loan. Consultations with the company's head of

medical services section produced an offer to print publicity material about a blood pressure survey. The only reference to the company was on the bottom of the notepaper used in correspondence about the survey.

Every prospective study to date agrees that the level of a person's blood pressure will give a good indication of the risk of developing arterial disease.³ Effective treatment for hypertension is available,⁴ and attempts have been made with varying success, to screen populations considered to be at risk.^{5,6}

Vita-Stat computer

The weight of the Vita-Stat computer is about 120 lbs (54 kg) and it is roughly 122 cm high, 91 cm in diameter, and 68 cm wide (48 in × 36 in × 27 in). It has a laminated wood cabinet with a built in seat and requires 6.75 sq ft (0.6 sq m) of floor space (fig 1). Power needed is 120 V, 6 Hz, 2.5 amps, but is adjustable to 220 V, 50 Hz with a three wire grounded outlet. A coin operated model is available, and the machines have been approved for electrical safety by the City of Los Angeles, California. They are marketed in the United Kingdom by Electramed (Ireland), 130 Phibsborough Road, Dublin 7. Depending on the exchange rate the models cost about £3000 each.

The apparatus has a prepositioned cuff which at the touch of a button constricts around the seated client's left arm, providing consistent positioning without training or help (fig 2). A microphone in the cuff is connected to a microprocessor which produces a digital read out on a console. The microphone is automatically positioned over the brachial artery. The machine has a modular construction with plug in printed circuit boards. There are two safety releases—an electrical release mechanism and a manual back up system as a means of aborting the test and releasing the arm. The manufacturer provides detailed instructions about calibration, which is accomplished by connecting a mercury sphygmomanometer to the computer at the air pump. The potentiometer can be adjusted so that there is minimal discrepancy between the light emitting diode display and the mercury column readings.

At Northwick Park Hospital, Whelton and colleagues evaluated the readings of two Vita-Stat machines in 408 adult volunteers by comparing them with the measurements obtained by two trained observers using random zero sphygmomanometers.⁷

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For diastolic blood pressure values there was close agreement between the different measurement techniques and each was associated with a similar degree of repeatability between duplicate recordings. In contrast, both Vita-Stat machines overestimated systolic blood pressure and there was substantially more variability between duplicate readings of systolic blood pressure obtained with the Vita-Stat machines than from random zero values. Therefore the use of either Vita-Stat machine for population screening would have probably correctly identified almost all those with a high diastolic blood pressure but would have led to overdiagnosis of systolic hypertension. Possibly the machines measure systolic blood pressure more accurately than human observers. Nevertheless, the large difference between readings obtained with each of the two machines makes this improbable. An alternative explanation is that the dif-

FIG 1—Vita-Stat blood pressure computer.

ferences resulted from a more stressful response of participants to Vita-Stat than random zero measurements.

Despite their limitations, the accuracy of diastolic blood pressure measurement and the consideration of cost and convenience suggest that these machines could be a useful initial screening tool for detecting people with high diastolic blood pressure, but the use of a particular machine should be preceded by an evaluation against a standard method of blood pressure estimation.

Survey

Within the Mid Surrey Health District's boundaries lie all of Epsom and Ewell Borough Council and parts of three other district councils—Reigate and Banstead, Elmbridge, and Mole Valley. The planning group of myself, the divisional nursing officer, and the administrator of the community health services department began early in 1982 to search for sites where the public could be screened in each of the centres of population. It was not possible to accomplish this completely and the survey was scheduled to run for six weeks from 7 June to 16 July at five different places in three of the local authority districts—at a new shopping centre, a railway station booking hall, a civic centre complex, a mobile "clinic" in the forecourt of a hotel, and the car park of a parish church. Finally, screening was available for health service staff for one day in each of the district's three major hospitals.

This period was chosen because it gave just sufficient time to plan the exercise, it was before the major holiday season, and in the warmer

weather people would not be wearing heavy clothes, although the Vita-Stat computer functions adequately with the cuff over shirt sleeves. The unit, comprising the computer and stands holding packs of health education material and staffed by a community nurse and a voluntary helper, operated from 10 am to 6 00 pm on Mondays, Tuesdays, and Wednesdays, and from 10 00 am to 8 00 pm on Thursdays and Fridays so as to be available for late shoppers. Although Saturday would clearly have been a popular day for the public the difficulty in obtaining staff and the extra cost precluded our operating the unit at the weekend.

In consultation with the head of medical services, ICI, and the senior physician at Epsom District Hospital, we agreed that anyone whose blood pressure values on a second reading exceeded the predetermined systolic or diastolic figures given below would be referred to the family doctor.

Beevers has said that with regard to hypertension no clinician should make any therapeutic decision on the basis of a single blood pressure reading and that three separate assessments are needed.⁸

The blood pressure values used were: under 35—140/90 mm Hg; 35—54—150/95 mm Hg; and over 55—165/95 mm Hg.

Those aged 18—70 would be offered screening after resting for five minutes; we considered an upper age limit of 65 but thought that many members of the public over this age would feel unhappy at not being included.

Record sheets were printed in pads with two self-carbon copies, one of which was given to the client and the other sent in batches to family doctors (initially, only records of abnormal readings were sent).

The client was also asked to record an estimate of his height and weight and smoking habits so as to focus attention on other aspects

FIG 2—Prepositioned cuff in place.

of the prevention of arterial disease. A Commodore 8096 computer using the Silicon Office software package from the Bristol Software Factory was used to store and process the data of referred patients.

Local consultant physicians were enthusiastic about the project but the representatives of the district's general practitioners, although agreeing to cooperate, had some reservations. They considered that screening should take place with selected groups, such as factory workers, rather than by allowing the public open access. Family doctors also requested that expenditure on the project be kept within existing budgets and this was agreed. All the district's general practitioners and the local medical committee were advised of the survey and the dates and times the unit would be operating.

Publicity

About two weeks before the survey started local dignitaries, such as the mayors of the district council areas concerned, were invited to a press conference to be photographed having their blood pressure checked. The local press cooperated by publishing these photographs just before the screening unit began operating in the newspapers' "territories." Local radio and television channels also responded. Posters in three sizes were distributed to shops and public places a few days before the screening unit's arrival. District councils and Rotary, Round Table, and other organisations were also circularised.

Results

The survey was completed with only minor setbacks; 34 people did not produce any reading at all on the console, which may have been due to the sensor not being in apposition to an aberrant brachial artery.

The microprocessor was said to read either accurately or zero, and in one location, in the forecourt of a hotel, virtually continuous zero readings were noted. This was due to the proximity of the electronic circuits of the traffic lights, so the unit was moved to a nearby public hall. The mobile caravan, when it arrived, did not provide suitable access for the machine and Surrey Ambulance Service came to a speedy rescue with the loan of an ambulance. Originally 6259 individuals were screened, but 619 were eventually removed from the survey because they were either known to be hypertensive or outside the age range, or because they had zero readings. Table I shows the age and sex distribution of the remaining 5640. Table II shows

TABLE I—Hypertension survey: age distribution

Age group (years)	Men	Women	Total
18-20	100	89	189
21-30	292	258	550
31-40	419	579	998
41-50	456	703	1159
51-60	526	981	1507
61-70	516	721	1237
Total	2309	3331	5640

that 688 were referred to their family doctor, but I was subsequently told by general practitioners that 106 of these were already known to be hypertensive, which left 582 true referrals. I received 594 replies to inquiries about the referred patients (86.3%), and table III shows the age and sex distribution of the 150 new confirmed cases of hypertension.

Of the 582 referred, however, 201 had not returned to their general practitioner by the time of my inquiry and as there was no response from the doctors to 94 inquiries the 150 new cases were derived from 287 referrals (52.3%). Table IV indicates 37 returns when the family doctor disagreed that the level of blood pressure recorded on the referral form indicated the possibility of hypertension. Most of these cases had systolic hypertension readings only, but to avoid this sort of difficulty those patients aged 65-70 who had systolic pressure of up to 170 mm Hg were not referred. None of the 37 were classed as confirmed cases as new information on them was lacking. The Framingham studies have indicated a stronger association of systolic than diastolic pressure with risk of coronary heart disease.^{9 10}

TABLE II—Total number of patients referred

Age group (years)	Men			Women			Total		
	Total referred	Known hypertensive patients	Final total	Total referred	Known hypertensive patients	Final total	Total referred	Known hypertensive patients	Final total
18-20	17	0	17	4	0	4	21	0	21
21-30	75	2	73	14	1	13	89	3	86
31-40	78	1	77	21	3	18	99	4	95
41-50	56	7	49	52	9	43	108	16	92
51-60	84	19	65	92	19	73	176	38	138
61-70	86	19	67	109	26	83	195	45	150
Total	396	48	348	292	58	234	688	106	582

Three patients were treated by their family doctor when the doctors' recorded level of blood pressure was below that recommended for treatment.

TABLE III—Number of confirmed new cases

Age group (years)	Men	Women	Total
18-20	0	0	0
21-30	6	1	7
31-40	9	6	15
41-50	15	16	31
51-60	19	22	41
61-70	24	32	56
Total	73	77	150

TABLE IV—Number of patients tested when general practitioner did not agree with values used

Age group (years)	Men	Women	Total
18-20	0	0	0
21-30	6	0	6
31-40	0	1	1
41-50	3	7	10
51-60	2	6	8
61-70	6	6	12
>70	0	0	0
Total	17	20	37

Discussion

If true hypertension exists in the 295 referred clients about whom not as much information is known as in the rest of the referred group, then the number of hypertensive cases would be: $((295 \times 150)/287) + 150 = 304$. This gives an incidence of hypertension of 5.4% in the whole group of 5640, which compares with a survey conducted in Hove when 302 (7.2%) cases were detected out of a group of 4216 individuals aged 15-75.¹¹

With the approval of the representatives of local family doctors the above hypothesis was tested by sending a questionnaire to the 295 people who had been referred asking if high blood pressure had been diagnosed since they had been screened by the community unit or whether they were being treated before the electronic test.

There were 259 replies: no further check had been carried out in 88, 125 said that they had been rechecked and were not hypertensive, 36 confirmed that they were subsequently being treated for hypertension, and 10 confirmed pre-existing disease. Thus there were 36 new cases from 161 (22.4%), but there was still no follow up information on 124. Information derived from the public is, however, clearly less reliable than that from family doctors and some patients are likely to have been unaware of the condition for which they were being treated or followed up. Adding this data into the formula given above the estimated number of new hypertensive cases would be: $((124 \times 186)/448) + 186 = 237$ —an incidence of 4.2%.

Controversy exists as to the beneficial effects of treating mild

hypertension, which is illustrated by the significant reduction of mortality reported by the WHO/ISH trial¹² whereas the *Drug and Therapeutics Bulletin* reports that the treatment of patients with diastolic pressures of 90 to 100 mm Hg has not convincingly been shown to be beneficial.¹³

Nevertheless, a major public health campaign to control blood pressure by advocating dietary changes and reduction in cigarette smoking is surely necessary, as recommended by the Coronary Prevention Group,¹⁴ and community medicine would seem to be the focus for such a drive.

Many general practitioners have this aspect of preventive medicine in mind,¹⁵ but a study in central London showed that only 24% of adults had had blood pressure measurements taken by their family doctors in the previous five years and that 39% of hypertensive patients detected in this way had not been followed up.¹⁶

A survey of general practitioners' records in north east Scotland showed that 34% of all blood pressures recorded were raised, but only 56% of these patients were noted to have had a follow up blood pressure measurement.¹⁷ Indeed, a general practitioner with an industrial practice has said that in the absence of screening about half the patients with hypertension who need treatment will be missed over a seven year period.¹⁸

A portable Vita-Stat 9000A, which can easily be carried under the arm and transported on the seat of a car, costs £1700, and such equipment, generously donated by the pharmaceutical company, will be used on a continuing basis by this community health services department and any local practitioner who wishes to borrow it. Screening for hypertension can effectively be carried out with a low cost mercury sphygmomanometer, but trained staff would be needed.

I thank Dr G H Robb, consultant physician, Mid Surrey Health District, and Dr J H Sanderson, head of medical services section, UK Medical Products Division, ICI Pharmaceuticals Division, for their advice. Mr M S Howdle, deputy treasurer Mid Surrey Health District provided computer services.

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MATERIA NON MEDICA

The year of the minnows

If 1982 saw "a summer of euphemisms," 1983 will be remembered for the cricketing minnows. "A black day for cricket" was the headline on the front page of a national daily referring to the two finalists in cricket's world cup. It was a pun in bad taste.

In the early part of the summer of 1982 cricket commentators were straining hard to find complimentary words for the cricket of the visiting team. In 1983 the team from the same country was doing things quite alien to itself—winning one day cricket matches when it mattered. This time the commentators, instead of having to look for euphemisms, were hard put to it to find the right words of astonishment. Even the most phlegmatic of them was ruffled, as if to say, "Surely, lightning can't strike in the same place twice!" It actually struck four times—twice against the West Indies and once each against Australia and England. The last was perhaps "the unkindest cut of all"—beating the country that had actually taught them to play the game.

Predictions can turn out to be hilarious or cruel, depending of course, which side you are on. The amiable Jim Laker was asked which team—India or Australia—he would like to see in the semi finals as England's opponent "purely from a selfish point of view." "India; but I don't think they will play India, somehow," he opined. His wish was granted, albeit against his better judgment; but alas, his hopes were dashed. He was not interviewed after the match, much to his relief, I suspect.

So the minnows went to Lords daring to play in the finals depriving the hosts of their "rightful place." We were constantly reminded that India had had only victory in the previous two world cups and that was against lowly East Africa. The final was going to be such a one sided affair that one felt sorry for those with tickets. Touts, it was feared, would be left with tickets on their hands, perhaps even having to get rid of them at cut prices.

The talking point of the final was not, "Who is going to win?"—that was, after all, a foregone conclusion—but, "How soon is the game going to be won and with how many overs to spare?" With Richards at his majestic best a commentator gasped, "It looks as though Richards has got an early evening engagement, the way he is going." The predictions were working out, or so it seemed, until suddenly lightning struck again, this time with devastating finality. The 66-1 outsiders had won the world cup. I wish I had put my money where my heart lies.

It certainly was not a black day for the 600 million or so some 6000 miles away; they are probably still celebrating. For them it was their finest hour since 15 August 1947, the day they got rid of their "masters" who had taught them to play the game of cricket.—PRADIP K DATTA, consultant surgeon, Wick, Scotland.

Is it possible to become infected with infectious hepatitis through using a swimming pool?

The recommended chlorine content (0.2 to 0.6 parts per million) and pH (7.2 to 7.6) of swimming pools is sufficient to eradicate most bacteria and viruses, including polio, and should prevent contamination with hepatitis A, although this point has not been specifically evaluated. Outbreaks of hepatitis A originating in swimming pools have not been described, although it is theoretically possible for this to occur if fresh water supplies which have been contaminated with sewage are used in unchlorinated swimming pools.—ROGER WILLIAMS, consultant physician and director of liver unit, London.