

A Longitudinal Chart Audit of Hypertension in a Family Practice Center

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This is a paper in which a practice looks critically at itself through a longitudinal chart audit of 40 patients with hypertension of at least one year's duration. Diagnosis was properly made in all of the patients. The evaluation by physical examination and laboratory studies seemed appropriate and adequate. Therapy was effective. Optimal patient education toward eliminating risk factors was precluded by poor recording of the family history and past medical history of the patient. To overcome these deficiencies a new history data base sheet was designed and a chronic disease flow sheet was developed. This flow sheet is adaptable to any office practice setting and not only affords better patient care, but sets the stage for future prospective studies.

Hypertension is an extremely common yet complex disease^{1,2} which, if untreated or inadequately controlled, leads to end organ damage to the central nervous system, kidneys, eyes, and cardiovascular system.³⁻⁶ The disease may be primary (essential), secondary to another disease, or, if inadequately controlled, secondarily accelerated by its own ravages.

The vast majority of patients with hypertension are symptom free. This unfortunate circumstance taxes the physician's ability to enlist the patient's compliance.⁷

It is essential in the treatment of this lifelong, costly, potentially dangerous disease that a methodology be available to assess and evaluate each patient intelligently and rationally in an ongoing fashion. Appropriate patient education, so necessary for adequate patient compliance, should be provided at the same time as results of diagnosis and therapy are ascertained. Design of a system should allow for further investigation to uncover causes of secondary hypertension or to pick up new developments in the course of

the disease necessitating new modalities of treatment.

The Blackstone Family Practice Center serves a patient population of 12,157 of which 1,199 are hypertensives. Appropriate care of these patients dictates a system capable of critical assessment. This paper reports an experience with a longitudinal chart audit of 40 randomly selected hypertensive patients who were followed during the period January 1, 1973 to January 1, 1974.

Background

The Blackstone Family Practice Center, an integral part of the Medical College of Virginia's (MCV) Department of Family Practice, serves the town of Blackstone and the surrounding area and represents the only local means of entry into the health-care system for patients of all socioeconomic groups. The center uses the MCV Data Recording and Retrieval System,⁸ which consists of a problem-oriented medical record (POMR),⁹ the diagnostic index (E-Book),¹⁰ and an age/sex index incurred at both practice and computer levels.¹¹ This data collection system¹² allows objective measurement of the medical care provided to the practice population of the Blackstone Family Practice Center.

In 1975 the MCV Department of Family Practice Curriculum and Evaluation Committee decided that the

survival of our discipline was dependent on the development of an appropriate curriculum. This curriculum had to be dynamic and pertinent to patient needs. Construction arbitrarily on the advice of non-family-physician specialists would have invited deficiencies and extravagancies. Dogmatic dictation by anecdotally influenced members of the discipline would have invited disaster. The content of family medicine which had been identified¹² was the matrix on which this curriculum was to be built.

The Blackstone Program assumed responsibility for that portion of the curriculum which dealt with the cardiovascular system. Since hypertension was the most common problem encountered in International Classification of Health Problems for Primary Care (ICHPPC) Category VII, initial efforts were made in this direction.

Aiming at a meaningful curriculum, the following course of action was followed:

1. Decide what information in the POMR would be of value in assessing the quality of care delivered to the hypertensive patient.

2. Obtain this information by means of a longitudinal chart audit.

3. Tabulate and critically evaluate this information, looking for any means of improving patient care; and, more importantly, implement the necessary improvements into practice.

4. Develop a protocol for the diagnosis and management of hypertension in a family practice environment embodying information from steps 1, 2, and 3 and from a search of the literature.

5. Develop a curriculum that would provide graduating residents with the skills, knowledge, and attitudes necessary to allow them to manage all aspects of the protocol dealing with the hypertensive patient.

The contents of this paper are a byproduct of these efforts toward curriculum development. The protocol and the curriculum are presented separately.

Methodology

A longitudinal audit sheet was constructed to provide maximum information from the POMR. This was the first attempted audit. At that time it was not known what information the

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audit would provide or what might be done with the information.

Hoping to avoid repeated chart review, it was decided to abstract the maximum amount of information on the first audit of a given chart. This was an ambitious goal that yielded

perhaps too much information, but this in itself was a lesson.

Salient features included the patient's family history, past medical history (with emphasis on risk factors), presenting signs and symptoms (emphasizing complications and causes

of secondary hypertension), criteria for proper diagnosis, initial laboratory evaluation, and referral information (whether patient was referred, to whom, and why). The audit sheet also recorded criteria for compliance, medications, and laboratory evaluations during one year. The side effects of medication, complications of the disease, associated diseases, and changes in the patient's life-style secondary to the disease or its therapy also were included.

Using an MCV computer, a random sample of 40 patients with hypertension was selected from the total population of 1,199 hypertensive patients in the Blackstone practice — a small fraction if studying disease profile, but a sufficient number for the purpose of critiquing patient care.

To qualify for audit, the diagnosis of hypertension had to be made prior to January 1, 1973 on each chart selected.

A team of three physicians, thoroughly sensitized through discussion of the process of chart audit, performed the review. The physician in position one recorded and the physician in the second position searched the chart, while the third physician reviewed the next group of two or three charts to be audited. Rotating positions with every third chart provided the auditors with the proper rest interval and change of pace needed to assure alertness, a real necessity if any degree of accuracy was to be maintained.

It was decided that no information from any source other than the POMR would be acceptable.

After completion of the audit, the results were tabulated.

Results

The random sample of 40 patients consisted of 18 men and 22 women. Table 1 shows that the illness of 45 percent of the sample patients between 40 and 60 years of age was diagnosed as hypertension. Only five patients (12.5 percent of those studied) had hypertension prior to age 40.

Table 2, which lists the duration of the disease, may reflect increased awareness of the importance of hypertension brought about by the Veterans Administration Cooperative Study¹³⁻¹⁵ and the Framingham Study.⁵

**Table 1. Age of Onset of Hypertension in 40 Randomly Selected Patients:
18 Males, 22 Females**

Age of Definition of Hypertension	No. of Patients	%
0- 9 years	0	0
10-19 years	0	0
20-29 years	1	2.5
30-39 years	4	10
40-49 years	12	30
50-59 years	6	15
60-69 years	9	22.5
70 or more years	2	5
Unknown	6	15
Total	40	100.0

Table 2. Duration of Disease

	No. of Patients	%
Less than 5 years	23	57.5
5- 9 years	5	12.5
10-14 years	3	7.5
15-19 years	4	10.0
20 or more years	1	2.5
Unknown	4	10.0
Total	40	100.0

Table 3. Recording of Family History

	Positive		Negative		Not Recorded	
	#	%	#	%	#	%
Hypertension	4	10	2	5	34	85
Stroke	3	7.5	2	5	35	87.5
Heart disease	4	10	4	10	32	80
Renal disease	2	5	4	10	34	85

Hypertension was defined as being greater than 160/95 mm Hg on three occasions in those patients over 40 years of age. If less than 40 years of age at the time of diagnosis, the values were age-corrected according to the tables drawn up by Nadas¹⁶ and Master et al.¹⁷

There was poor recording of family history, with failure to note positive or negative data, in over 85 percent of the charts. Nearly as deficient was the recording of the patient's pertinent medical history with over one third of the charts giving no hint of other risk factors present (Tables 3 and 4).

The clinical and laboratory assessments were fairly well carried out (Tables 5 and 6) as was the evaluation of end organ disease (Table 7). It is evident from Table 8 that thiazides were considered the cornerstone of therapy despite evident side effects (Table 9). The study was done prior to the approval of propranolol for therapy in hypertension.

The usual complications of hypertension were encountered (Table 10). Thirty-nine of the 40 patients studied were classified as having essential hypertension. The other patient was myxedematous and with thyroid therapy alone normotension was achieved.

An attempt was made to estimate patient compliance based on whether the patients kept their appointments, understood their disease, and had prescriptions filled appropriately at local drug stores. Eighty percent were believed to be compliant. This figure compares well with the degree of control as seen in Table 11. It might be noted here that if there was any history of transient ischemic attack, organic brain disease on a vascular basis, or other reason to suspect decreased cerebral function, efforts to reduce blood pressure were less vigorous.

Table 12 gives an index to the cost of being hypertensive in this study group. From evidence in the charts, only 25 percent of those studied had to change their life-style appreciably because of complications of the disease or therapy. Reasons for change in life-style may be seen among the reasons for referral listed in Table 13 or in the complications listed in Table 10.

The above results present an objective evaluation of the diagnosis and management of a random sample of the hypertensive patients within this

Table 4. Recording of Past Medical History of Patient

	Positive		Negative		Not Recorded	
	#	%	#	%	#	%
Pre-eclampsia	2	5	35	87.5	3	7.5
Birth control pills	0	0	37	92.5	3	7.5
Smoking	10	25	16	40	14	35
Hyperlipidemia	2	5	25	62.5	13	32.5
Diabetes	4	10	26	65	10	25
Obesity	21	52.5	17	42.5	2	5

Table 5. Extent of Clinical Assessment

Signs Recorded	No. of Patients	%
Weight excess	36	90
Pulses	35	87.5
Bruits	34	85
Thyroid dysfunction	33	82.5
Uremia	33	82.5
Signs of Cushing disease (Buffalo hump, truncal obesity, striae)	33	82.5
Polycythemia	33	82.5

Table 6. Initial Laboratory Tests for Hypertension Evaluation (within one year of diagnosis)

	No. of Patients	%
ECG	18	45.0
Chest x-ray	13	32.5
Urinalysis	38	95.0
Electrolytes	18	45.0
Renal function (BUN/Cr)	18	45.0
Other	18	45.0
Intravenous pyelogram	2	5
Renal arteriogram	1	2.5
Thyroid functions	2	5
Pheochromocytoma screen	3	7.5
Urine 17 KS, 17 OH Steroids	0	0

Table 7. End Organs Evaluated Either by Physical Examination and/or Laboratory

	No. of Patients	%
Cardiovascular system	37	92.5
Central Nervous System	34	85
Fundi	36	90
Renal system	35	87.5

Table 8. Type of Therapy

	No. of Patients	%
Diet (salt restricted)	6	15
Thiazide	40	100
Methyldopa	15	37.5
Hydralazine	1	2.5
Reserpine	3	7.5
Guanethidine	2	5.0
Propranolol	0	0
Potassium-sparing diuretics	4	10

Table 9. Apparent Side Effects of Drug Therapy

Side Effects	No. of Patients	%	Associated Drugs
Hypokalemia	10	25	Thiazide
Impotence	2	5	Methyldopa
Fatigue	4	10	Thiazide
Depression	0	0	
Ulcer	1	2.5	Reserpine
Rhinitis	1	2.5	Reserpine
Acute gout	3	7.5	Thiazide
Hyponatremia	1	2.5	Thiazide

Development of Flow Sheet

On critical appraisal of the tabulated results it was evident that diagnosis, evaluation, and management were done fairly well. Family history and personal past medical history, which are essential data in group practice, were recorded poorly. Other failures in recording were noted, but those mentioned were most glaring.

A protocol was developed from the audit data to improve patient care in the management of hypertension. The two areas most in need of improvement were identified as the history sheet and the flow sheet. A baseline history sheet suitable for physician and paramedical personnel was drafted. The new history sheet provided for the recording of more accurate information and, more importantly, was readily accepted and used by the physicians in the practice.

To facilitate continuing evaluation and management and to provide pertinent data readily, a flow sheet for hypertension was developed.

What areas were to be included?

It was necessary to know what risk factors were present when the diagnosis of hypertension was made in order to reduce risk factors and to plan appropriate patient education. These factors also would be essential in determining whether a patient with borderline hypertension needed therapy.

Identification of correctable causes of secondary hypertension and evaluation of the target organs in hypertension dictate that the physician have ready access to the lifetime physical and laboratory evaluation of the patient. Some of these studies need never be performed. Should some change in events occur in the course of the disease or should treatment fail, the physician knows at once what has not been done. Guidance for future therapeutic plans is more readily obvious.

After considerable discussion and searching of the literature, agreement was reached on the most important elements of care in following hypertensives. It first was decided what data should be nurse-gathered. In addition to recording vital signs the nurses posed screening questions which, when answered affirmatively, would point to an abnormality. For example, to screen for heart failure, questions

Table 10. Complications*

	No. of Patients	%
Stroke	2	5.0
Heart disease	14	35.0
Myocardial infarction		
Angina pectoris (4)		
Congestive heart failure (4)		
Left ventricular hypertrophy or left ventricular enlargement (3)		
Atrial fibrillation (2)		
Hypertensive encephalopathy	0	0
Renal disease	5	12
Creatinine 1.5-2.0 mg/24 hr (4)		
Creatinine 8.9 mg/24 hr (1)		
Retinopathy	6	15
Grade II (4)		
Grade III (2)		
Grade IV (0)		
*1 Death (Renal Failure)		

would include: (1) Have you been short of breath? (2) Have you had to sit up suddenly at night to catch your breath? (3) Does walking make you short of breath? (4) Are your ankles ever swollen? Where indicated, the physician would expand this history.

Next in order came the pertinent areas in the physical examination. These included funduscopy, heart and lung examination, evaluation of the abdomen, palpation of the pulses, auscultation for bruits, determination of presence of edema, and neurological examination. If any parameters needed more detailed assessment than the limited space for recording allowed on the hypertensive flow sheet, a note was included which referred to the proper place in the progress note section of the chart.

Laboratory studies most significant in following the course of the disease of hypertension or the effects of therapy were the next objective findings to be recorded.

Under therapy it was decided to list medications and the presence of side effects, and indicate patient education, the return date (one means of assessing patient compliance), and the diagnostic or therapeutic plan for the next visit.

A hypertensive flow sheet* was completed but never actually used since other data indicated that hypertension was present so often in a constellation of diseases including diabetes mellitus, obesity, and heart disease. If separate flow sheets were developed for each of these problems, the POMR would become a burden.

Therefore, a chronic disease flow sheet* encompassing all these diseases was developed and is in regular use in the practice. For the sake of simplicity, it is not presented in this paper.

Discussion

The hypertensive flow sheet is the byproduct of an effort to arrive at a proper curriculum in hypertension for family practice residents. Not reflected in the results are the difficulties inherent in the chart audit process even with a POMR. The flow sheet has simplified the chart audit as the sheet tells the entire story of an important disease, making easy the retrieval of maximum information with minimum

* Available on request

Table 11. State of Control*			
		No. of Patients	%
Excellent	(Diastolic less than 90 mmHg)	12	35
Good	(Diastolic 90-100 mmHg)	19	47.5
Poor	(Diastolic more than 100 mmHg)	7	17.5

*Five patients corrected for inherent low cerebral perfusion

Table 12. Yearly Evaluation*		
Tests	No. of Patients	%
Electrolytes	28	70
Complete blood count	32	80
Urinalysis	38	95
Renal function	17	42.5
ECG	17	42.5
Chest x-ray	10	25

*Laboratory studies performed July 1, 1973 to July 1, 1974

effort. Anticipated with eagerness is a future audit of hypertension both for the reassessment of care for comparative purposes, and for the provision of a true profile on a statistically significant number of patients.

The results presented here are from a retrospective study of hypertensive patients from a family practice. There are interesting possibilities in properly constructed prospective studies,¹⁸ for example: (1) determination of the cost effectiveness of treatment in the family practice environment; (2) determination of the proper interval for follow-up; (3) indications for follow-

ing certain clinical and laboratory parameters; (4) improvement of patient compliance; and (5) development of improved drug regimes. Perhaps the redefinition of the natural history and the investigation of unrecognized precursors of this extremely important disease would evolve.

The methodology presented in this paper may be applied to diabetes mellitus, thyroid disease, childhood growth and development, or to any behavioral problem or physical ailment. The work of the discipline of family practice may be envisioned for years to come.

Family practice is the cornerstone of all medicine. Poor recording methods have caused much valuable information to be lost. There were reasons for this: a lack of time due to the pressure of patient care, lack of means for indexing charts by morbidity, and lack of structure in the source-oriented record preventing retrievability of pertinent data.

The future of family medicine as an academic discipline is dependent upon the gathering and reporting of information available only to its practitioners. The discipline will not attain validity or credibility on data obtained

Table 13. Total Number of Hospital Referrals During Lifetime of Patient Due to Hypertension or Complications		
Reason for Referral	Number Referred	%
Myocardial infarction	2	5
Unstable angina	1	2.5
Pulmonary embolism	1	2.5
Stroke	2	5
Complete heart block	1	2.5
Myxedema*	1	2.5
Bilateral internal carotid artery occlusion	1	2.5
Total	9	22.5

*Referred to rule out pituitary myxedema because of fine skin wrinkling and borderline thyroid-stimulating hormone studies.

either from secondary and tertiary sources or from primary care sources dealing with skewed patient populations. It is necessary to begin to study illness in its earliest stages, as it presents in the family physician's office, rather than after it has reached the tertiary care center and the pathologist's microscope.

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