Presymptomatic diagnosis

A study in a country practice

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INTEREST in pre-symptomatic diagnosis was stimulated in this area by the Rotherham Multiple Screening Clinic (Donaldson and Howell 1965). We decided to see how relevant such a clinic would be to the problems of general practice. Previous reports from a rural area (Cope and Brown 1966) had indicated the enthusiasm of patients for such a clinic. We wished to confirm these findings, to analyse them further, and to find out whether the labour involved was worthwhile.

Our practice covers a rural area of 80–100 square miles including 14 villages and many isolated farms, but with an increasing proportion of commuting and professional households. The screening clinic was held in our surgery headquarters on two half days only and coincided with a visit from the Mobile Mass X-ray Unit a few 100 yards away. The only publicity was a circular letter which we sent to each household registered with the practice under the National Health Service. Patients under 15 years of age were not permitted to attend and the elderly were gently discouraged from doing so.

With much help from varied sources it was possible to provide a wide range of tests. We crowded into our waiting room, registration, tests for anaemia and glycosuria, the measurement of weight, blood pressure and Wright Peak Flow Meter reading, a history of cough and sputum and smoking, and a personality adjustment rating. The small examination room housed the electrocardiograph and its technicians. One consulting room had observers examining for goitre and technicians taking venous blood for biochemical estimations. Another separate consulting room was used for breast examination and cervical cytology. Working conditions were noisy, tiring and very crowded.

In the two half-days 791 patients were screened—about a quarter of those eligible. The total was made up of 355 males and 436 females. The average age of men attending was 47, of women 48 years. In the same two days, the Mobile Mass X-ray Unit took over 1,000 chest x-rays.

The enthusiasm of the patients was indeed obvious. Scott and Robertson (1968) report a 43 per cent acceptance rate but their patients were offered an appointment for screening by a personal letter of invitation. We attempted to spread the load by asking patients to attend in an alphabetical sequence but we offered them only a queue in the open air. Despite a staff of about 25 people this queue was usually 10 or 20 yards long and on one of our two days it was raining. The patients had replied on a tear-off strip telling us how many were intending to come. We catered for about 800 on the basis of their replies. We could not have coped with more.

Findings

Anaemia

The Phillips-Van Slyke copper sulphate method of estimating haemoglobin was

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used, levels of below 12G for females and 12.5G for males being classed as abnormal. Fourteen cases of anaemia were found but only six were confirmed when rechecked. These were all symptom-free females who responded rapidly to oral iron. No faecal specimens contained occult blood. Two women had menorrhagia (one also had fibroids) and another had had coeliac disease as a child. These results gave an anaemia incidence of less than one per cent without any grave associated disease. Cope and Brown (1966) in Lincolnshire had found an incidence for anaemia of 7.9 per cent and Donaldson and Howell (1965) in Rotherham an incidence of 6.49 per cent. Logan (1966) and Kilpatrick (1961) led us to expect an incidence of undiagnosed anaemia far higher even than these figures. So far as our findings are concerned, we have no choice but to agree with the Cardiff M.R.C. Unit (Elwood *et al.* 1967) that anaemia screening of the general population is not a worthwhile procedure.

Glycosuria

The W.H.O Expert Committee (1965) defined diabetes as a blood sugar of more than 120 mg per cent two hours after a standard glucose loading. Such a definition would lead us to diagnose diabetes in about ten per cent of our practice (Butterfield 1967) and such an 'epidemic' would do more harm than good. We were, however, interested in picking up those diabetics who were passing sugar in their urine and who might have very early symptoms. The patients were, therefore, asked to test their own urine with Clinistix (Ames) two hours after their main meal, and to report any positive or doubtful results to us. Fifteen did so but in eleven of these glycosuria was not confirmed and random blood sugar levels estimated by dextrostix (Ames) were within the normal range. The remaining four patients had glucose tolerance tests and one new diabetic was found as a result. It is clear that no simple screening technique for the early detection of diabetes is yet available. From our practice sample we could diagnose from one to 70 'diabetics' by merely adjusting the stringency of the screening procedure. This is still a research problem (Sharp 1964, Butterfield *et al.* 1967).

Chest disease

Of the 646 who attended both the screening clinic and the Mass X-ray Unit 598 had normal chest x-rays. Fifteen people showed radiological evidence of bronchitis or emphysema. One bronchial carcinoma patient (already known) was diagnosed again and 33 other abnormalities were noted. These were mostly minor but included three restrosternal goitres all previously unknown to us. Ten chest x-rays showed evidence of hypertension. No case of active pulmonary tuberculosis was found—a very different picture from Glasgow (Horne *et al.* 1967) where 3.2 per 1,000 men x-rayed were in need of immediate antituberculous therapy. The Wright Peak Flow Meter reading was less than 300 ml in 93 patients. Of these 24 (6 per cent) were men and 69 (14 per cent) were women. The commonest group providing over half of these low readings was the non-smoking female.

Smoking

Low Wright Peak Flow readings were common in females and there was no correlation with smoking. Correlation with a low reading did attain a pattern in the heavily smoking males (table I). In the very small number of x-rays showing bronchitis or emphysema 1.6 per cent of the men and one per cent of the women were non-smokers but 3.5 per cent of the men and 2.4 per cent of the women smoked.

Of the total attendance 19 per cent were light smokers (less than 15 cigarettes daily), 19 per cent were heavy smokers (more than 15 cigarettes daily) and 62 per cent did not smoke at all; 49 per cent of the men smoked but only 28 per cent of the women. As expected the proportion of heavy smokers was greater in the men (28 per cent) than in the women (11 per cent). The 107 smokers who had a chronic cough or sputum com-

prised 13 per cent of the total attendance. Chronic cough or sputum occurred in 20 per cent of non-smokers, in 30 per cent of light smokers and in 51 per cent of heavy smokers. Of those under 40 years of age 45 per cent of the men and 34 per cent of the women smoked.

Fourteen middle-aged and 12 young patients with signs of early lung damage were invited to attend an anti-smoking clinic. Only seven attended at first, though several

TABLE I
EFFECT OF SMOKING ON PEAK FLOW RATE

	Men			*Women*		
	300+	*290 or less*		*300+*	*290 or less*	
			Per cent			*Per cent*
Non-smokers	176	66	(*4*)	260	52	(*17*)
Light-smokers	68		(*8*)	66	10	(*12*)
Heavy-smokers	87	12	(*12*)	41	41	(*14*)

others are reported to have stopped smoking as a result of our findings and follow-up. After six months, the anti-smoking clinic has been stopped for lack of support.

An unexpected discovery was the increased frequency of neurotic traits in women smokers. Abnormal personality adjustment ratings occurred in two per cent of men non-smokers, in one per cent of men smokers and in four per cent of women non-smokers. No less than 13 per cent of women smokers had an abnormal personality score. This is a highly significant difference ($p = <.001$) but the interpretation is less obvious. It may be that the men smoke as a tribal custom and the women more as a symptom of insecurity.

Another fascinating association was the diminished incidence of hypertension in heavy smokers, especially women (table II). This is a reasonable inference for the whole

TABLE II
DIMINISHED INCIDENCE OF HYPERTENSION AMONG SMOKERS

Males with diastolic pressure of 100 mm +			*Females with diastolic pressure of 100 mm +*		
		Per cent			*Per cent*
Total	76	(*21*)	Total	94	(*22*)
Non-smokers	44	(*24*)	Non-smokers	79	(*25*)
Light-smokers	18	(*24*)	Light-smokers	12	(*16*)
Heavy-smokers	14	(*14*)	Heavy-smokers	3	(*6*)

attendance but is only statistically significant for women. Recent work (Russell *et al.* 1968) showing increased foetal loss as well as smaller babies in mothers who smoke may be relevant to our finding that the diminished incidence of hypertension among smokers was most marked in women under 30 years of age.

Obesity

The weight tables of the Metropolitan Insurance Company were used, as no figures from British sources were readily available. We found 14 males (4 per cent) and 30 females (7 per cent) grossly obese to the extent of being 25 per cent or more overweight for their age, height, and sex. Over half of them (nine men and 17 women) were under 50 years of age.

Biochemical abnormalities occurred in 46 per cent of these grossly obese patients compared with 32 per cent of the remainder; 31 per cent of them had a diastolic blood pressure of 100 mm or more, compared with 20 per cent of the rest. No association between obesity and an abnormal ECG was found.

An overweight clinic has been started in the practice, and this has proved a success so far. Well over 30 patients are attending; these include some moderately overweight patients with evidence of early ischaemic heart disease. The average weight loss in the first six months was over 15 pounds per patient. No drugs are being used. Although longer-term results are likely to be much less impressive, the contrast with the results of the smoking clinic needs no emphasis.

Mental health screening

We consider that 20 per cent of our work is concerned with psychiatric problems.

In a reasonably static practice population we hope we know most of the severely-disturbed patients. The Anglesey Mental Health Survey (Jones and Miles 1964) found that practitioners knew 85 per cent of the severely-disturbed patients in their area and they quote an Oxfordshire survey by Monro as finding a prevalence rate for mental ill-health of 21.9 per cent. Other surveys (Logan 1963) paint a much more depressing picture of the scale of unknown psychiatric illness.

With a problem of this magnitude, with an ever more mobile and rootless population, and with an average consultation in general practice lasting only some 6½ minutes (College of General Practitioners 1965), a screening test that would alert the family doctor to the increased vulnerability of some of his patients would be of obvious value. Such a test, simple, speedy and unembarrassing, has already been described (Orme 1965). The test was used in the Rotherham screening clinic (Kerry 1967) and we wished to gauge its accuracy.

Twenty-eight patients (4 males, 24 females) according to the criterion used on this occasion had an abnormal personality test rating. Four cases were thought by us to be false positives but on interview two turned out to be neurotic personalities previously unknown to us. There were some false negatives. Two known hysterics passed the test and another normal score was attained by a patient admitted to hospital with acute schizophrenia a few weeks later. No less than 23 of the 28 were already well known to us as abnormal personalities, seven of them having needed fairly intensive psychiatric treatment in the past. This gives the test a 95 per cent accuracy in its positive findings and we feel it represents a genuine advance in mental health screening.

Breasts

The doctors examining the breasts were asked to report the slightest abnormality: 387 women had normal breasts and 20 had nodular breasts; a further six were classed as suspicious. After further examination by us we found no important abnormality in five cases but the sixth case—a patient with an inverted nipple—was referred for mammography, and this proved negative as expected. No patient, therefore, was referred for a surgical opinion. We are convinced that the lack of referral was clinically justifiable and in the best interests of our patients. Each patient has had the technique for self-examination of the breasts individually demonstrated to her.

Cervical cytology and gynaecological findings

For about three years in this practice cervical smears have been done on demand, and on routine gynaecological and postnatal examination. In the screening clinic spinsters were discouraged from having a smear taken and no one was eligible if they had had a smear in the past year. Despite this no less than 196 cervical smears were taken in the two days. Nearly one fifth of the middle-aged women in the practice

attended and 57 per cent of the smears taken were from the 45 to 65 years age group. We disagree, therefore, that patients are unwilling to attend special clinics for this purpose (Cullinain and Montgomery 1965).

One early carcinoma of cervix was found and has had a hysterectomy. This gives us a positive smear incidence of 0.51 per cent compared to the Rotherham figure of 0.58 per cent and the Aberdeen (Macgregor and Baird 1963) figure of 0.67 per cent.

Although the vaginal examination was nothing more than a rapid adjunct to the taking of the cervical smear, gynaecological abnormalities were noted in 11 per cent of those examined. Some of these abnormalities had been responsible for much chronic discomfort and the more noteworthy comprised three cervical polyps, four large cervical erosions, one case of fibroids, six cases of marked prolapse and five trichomonas infections. Although two patients have chosen to live with their prolapse for the time being, two have already been repaired and two are awaiting surgery.

Goitre

As a follow-up to a recent survey of the goitre still endemic in this area (West Derbyshire Medical Society 1966) two independent observers examined our patients. Considering the observer error implicit in a survey of this type, their findings confirmed ours to a surprising degree: 18 per cent of positive cases had a family history, 57 per

TABLE III
GOITRE INCIDENCE

Age-group	*Number of patients*	*Total thyroid abnormalities*	*Per cent goitrous*	*Per cent of goitres*	*1966 Survey Per cent*
Under 40	227	26	*11*	*28*	*30*
40 – 59..	397	52	*13*	*57*	*43*
Over 60 years	167	14	*8*	*15*	*27*
Total	791	92	116 per 1000	*100*	75–115 per 1000

cent of goitre cases were between 40 and 59 years of age and 28 per cent were under 40. The incidence of thyroid abnormality in this slightly suburbanized rural area comes to 116 per 1,000. The comparison with our previous findings is tabulated (table III).

Cardiovascular disease

First, a single reading of the blood pressure was taken in a crowded and noisy room. This was found to be the most tiring of all duties and personnel needed frequent relief. One hundred and fifty five (19 per cent) had a diastolic pressure of 100 mm or more but when many of these high pressures were checked again in calmer surroundings we got much lower readings. We tended not to treat a symptomless labile hypertension or the elderly. Eventually one lorry driver, symptomless but with a diastolic pressure of 150 mm, was referred for further investigation and one other was started on hypotensive therapy.

A standard 6-lead ECG was done on 355 patients (45 per cent of the attendance). Patients who were obese or hypertensive were given preference but as many normal people as possible were included: 236 tracings were normal, 59 showed possible ischaemic changes, 41 possible hypertensive changes, and minor miscellaneous abnormalities were noted in the remaining nineteen.

Assuming that an abnormal tracing plus hypertension denote probable disease and that one of these alone is evidence of possible disease, eight per cent of the sample had

probable and a further 20 per cent possible cardiovascular disease. Over a third of both these groups were under 50 years of age. These figures seem depressing but acceptable (Oliver 1966).

In view of the anxiety that may be caused by such findings, a detailed break-down of our disposal of these cases may be of interest. It is only proper to make clear our opinion that an easy and informal follow-up is essential for any successful screening programme; that presymptomatic diagnosis is long-term medicine, and that only the general practitioner is routinely equipped to practise it. Of the 221 cases of probable or possible cardiovascular disease 14 per cent were already known to us: 18 per cent were grossly over-weight. Advice or treatment resulting from attendance at the screening clinic was given to seven per cent. We considered the 16 per cent over 65 years of age and the 11 per cent with exceptionally apprehensive temperaments mostly unsuitable for warning or further investigation. This included a young man with a possible atrial septal defect. No action was taken in the remaining 34 per cent.

Even if no advice whatever is given—and it would be improper to over-estimate the importance of an inverted T wave in leads III and a VF without other supporting evidence—we can in general practice, when the time comes, more closely supervise convalescence, the investigation of possibly related symptoms, or the control of obesity.

We were reminded of the limited reliability of our findings by the two known cases of angina of effort who had no abnormality revealed by our tests. A man who had had a myocardial infarct over ten years before also got a clean bill of health but collapsed and died suddenly with a second myocardial infarct a few months later. Two patients under suspicion as a result of our findings have had confirmed infarcts since the clinic was held. It seems to us that screening for cardiovascular disease is simple to organize, difficult to implement with discretion, but still worth while. At the very least we have a baseline of knowledge from which to work (Ashworth 1959).

Biochemistry

Biochemical investigations were made on 439 patients, including blood urea, uric acid, cholesterol, inorganic phosphate and various enzyme estimations including alkaline phosphatase, SGOT, SGPT, creatine phosphokinase and 5-nucleotidase. Detailed reports on the enzyme analyses will be published by the laboratories concerned. Histograms of the urea, uric acid and cholesterol levels are shown (figures 1, 2 and 3).

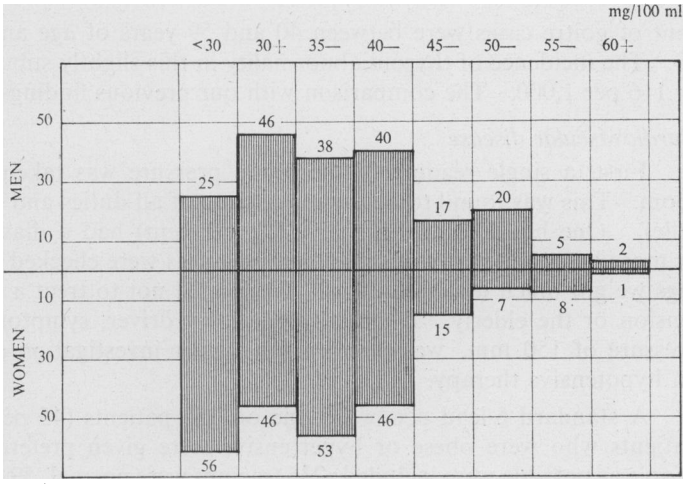

Figure 1. Blood urea.

Two possible cases of subclinical hepatitis were discovered and some confirmatory biochemical evidence of ischaemic heart disease (Gertler and White 1954) was found in 16 cases.

The range of normal values was somewhat greater than anticipated. Although labile values could be anticipated for substances such as cholesterol, a blood urea of

58 mg per cent in a healthy female could revert rapidly to 33 mg per cent without apparent cause. Similarly a uric acid of 9 mg per cent in a man with ischaemic heart disease was reported as 3.9 mg per cent on rechecking. This variability would explain minor differences between the uric acid levels of our sample and the Wensleydale survey (Lawrence 1966), and could possibly be explained by recent differences in diet or level of physical activity or by sampling or experimental errors in the laboratory.

Because of the small numbers in our sample, significant findings will have to await events and further analysis. Certain trends can be seen, however. The influence of obesity has been mentioned. Uric acid levels of over 7.5 mg per cent were found in 19 per cent of the grossly obese, but in only five per cent of the rest. Raised SGOT levels were found in 18 per cent of the grossly obese but in only four per cent of the rest. No crude association between obesity and hypercholesterolaemia was noted but, as expected, women have higher cholesterol and lower uric acid levels than the men.

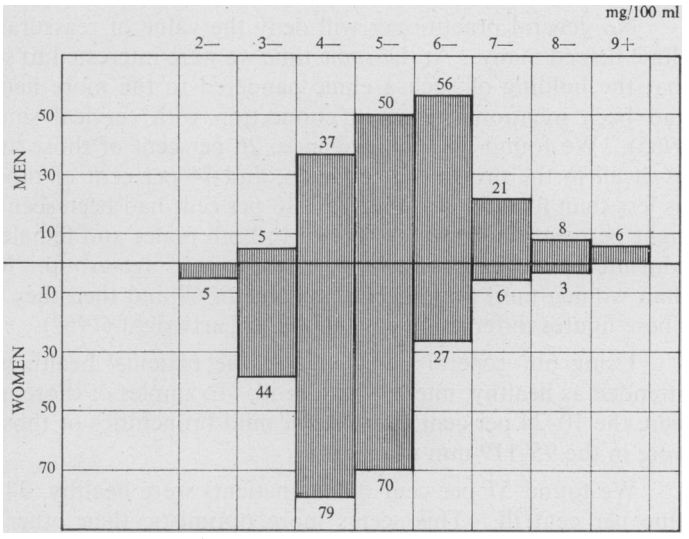

Figure 2. Uric acid.

Social class influence

It is a truism that screening clinics are most attractive to those least in need of them. Our sample is no different for slightly more social class I patients attended the clinic than social class V. The actual attendance figures by social class are I–103, II–156, III–313, IV–128, V–91. In table IV we tabulate the percentages by social class of a sample of the practice population and of those who attended.

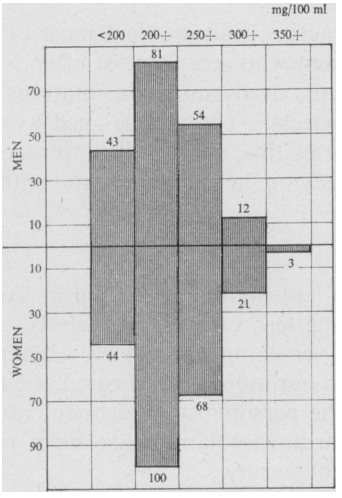

Figure 3. Cholesterol.

TABLE IV

SOCIAL CLASS OF ATTENDANCE AND RANDOM 15 PER CENT SAMPLE OF PRACTICE POPULATION
(All figures percentages)

Screening clinic	*I*	*II*	*III*	*IV*	*V*
Attendance (791 patients) ..	*13*	*19*	*40*	*17*	*11*
Practice sample (628 patients) ..	*11*	*16*	*41*	*22*	*10*

The self-selected sample who attended seem typical at least in social class.

There was no evidence in our small sample of a social class bias in attendance, smoking, obesity, heart disease or, surprisingly, goitre. However, there were nearly three times more smokers with chronic cough and sputum in social class V than in social class I and though only two per cent of patients from social class I were classed as ill, 24 per cent from social class V were in this category.

Consultation patterns

No general practitioner will deny the value of reassurance and we know that this clinic helped many. At the same time we were interested to see if there was any evidence that the holding of such a clinic pandered to the more neurotic element. Such fears had been mentioned even in connection with cervical smears (Wakefield and Baric 1965). We found no such evidence: 26 per cent of those attending had not consulted us at all in the previous 12 months, and 74 per cent of those attending had consulted us less than five times in the year; 18 per cent had been seen five to nine times and only eight per cent ten times or more. In both males and females the 40–59 age-group had consulted us twice as often as the 20–39 years age-group. Men consulted us less often than women until they reached the age of 60 and then they consulted us slightly more. These figures differ little from those of Cartwright (1967).

Using our general knowledge of the patients' health we classified all those who attended as healthy, intermediate or ill. Examples of those in the intermediate category were the 10–24 per cent overweight, mild bronchitics or those whose diastolic pressures were in the 95–119 mm range.

We found 57 per cent of our patients were healthy, 34 per cent intermediate and nine per cent ill. This seems more optimistic than other surveys (Schneider 1961), but we were keen not to concern ourselves with trivia. As expected there was more illness among the elderly. Under 40, 71 per cent were healthy and six per cent were ill. In the over sixties, 47 per cent were healthy and 19 per cent were ill.

The category of health did not greatly alter the consultation rate: 70–80 per cent in each of the three groups had less than five consultations each year and 16–20 per cent had 5 to 14 consultations yearly; 17 per cent of the ill had kept away from the doctor in the preceding 12 months. Of the 65 patients in this sample who had consulted us ten times or more in the year 33 per cent were well, 43 per cent intermediate and 24 per cent ill. In this high consultation group 66 per cent were men and 34 per cent were women, 20 per cent were under 40 years of age, 49 per cent were aged 40–59 years and 31 per cent were 60 or older.

These figures confirm three truisms of general practice; that we deal most of the time with people who are not seriously ill, that the patient who sees us most often is the middle-aged woman, and that a small number of patients need many consultations not necessarily related to any conventional pathological process. The middle-aged woman who saw us most often in the year is a prime example of this; there is little physically wrong with her but her cottage is squalid, her job unsatisfying, her life lonely and without savour and her husband is dead.

Discussion

We have not yet got to the routine estimation of aldosterone excretion in hypertensives or the forecasting of breast cancers from the pattern of urinary steroids. But we have got to the stage when the old mainstays of screening procedures—anaemia, glycosuria and the chest x-ray—seem less helpful to us in our more sophisticated attempts to improve the accepted standard of medical care. The personality adjustment rating, the control of obesity and the early assessment of cardiovascular disease seem more geared to preventive medicine in a sedentary and affluent society.

We would wish to add urine analysis to our future screening programme while

glaucoma screening may also be considered (Perkins 1965, Banks *et al.* 1968).

Although the majority of the screening tests were performed by ancillary helpers, the screening clinic obviously made extra work for the doctors: 187 patients (24 per cent) were recalled for reassessment or advice. As a result of the two-day clinic one new diabetic was stabilized, two severe hypertensives began treatment, one carcinoma of cervix was found, seven other gynaecological problems were referred and five cases of *Trichomonas vaginalis* infection were treated. Eleven patients with heart disease were advised, four anaemias were corrected, one thyroid nodule has been excised. Including the smoking and over-weight clinics, nine per cent of the attendance have received treatment. Our knowledge of our patients has been greatly increased.

Summary

A two-day screening clinic and its findings are described. Chest x-rays and screening for anaemia and glycosuria seemed of little value. Mental health screening was accurate in its positive findings. Smoking was associated with poor personality adjustment and with a diminished incidence of hypertension. Goitre occurred in 116 per 1,000. Twenty-eight per cent had possible cardiovascular disease. Gynaecological disorders were common. A smoking clinic was a failure but obesity control still seems promising. Patterns of consultation are discussed.

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Talking like an apothecary

Which according to the True Meaning, and Purport of the Word, [Empiric] Signifies, A Physician, Whose Skill, and Knowledge in Physick, is from Observations, and Experience, which, to be Sure, is The Very BEST of Masters.

The Practice of Physick, was altogether in the Hands of Such, before Hippocrates's Time, Till afterwards, by Degrees Chicanning, Wrangling, Squabbling, and Barren Philosophy, made up of Hard Words, to Puzzle the Ignorant, Jostled Medicinal Knowledge from Experience, almost out of Doors, being Overuled by Hard Words, and Discourses, made Use of in Physick, tho' Often, but Little to the Purpose.

From whence Came the Common Saying of Talking Like an Apothecary. That is, from a Desire of being thought, and Esteem'd Knowing, and Learned.

Hence Dr Peachy, a very Eminent Physician of the College of Physicians in London, In his Introduction to the Art of Physick, Page 197. Expressly Saies Thus.

> It is much Better to be an Empirical Physician, that is, One, Who Practises according to his Own Experience, than a Speculative One. For, Experience has long since Informed all Accurate Observers of Things in Physick, That those Physicians, unjustly Called (with a Kind of a Sneer) Empiricks, are more Successful in their Practice, than Those whose Knowledge is only from Dry, Barren, Puzzling School Knowledge, and Chicanning Speculative Philosophy.
>
> These merely Speculative Physicians, are so much More Miserable in their Folly, Because, They make Others Miserable, with Themselves, But there is Nothing to be Said, The World will be Deceived with Hard, and Cramp Words.
>
> *An Enquiry in Dr Ward's Practice of Physick.* And his practice fairly stated. With an examination into the origin, and meaning of the words Empiricism, Empirick, Quack-Doctor and Quack, etc. London. Printed for J. Humphrey. 1749.