Individual Studies

THE PRESCRIBER AND THE METRIC SYSTEM

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It was announced last year by the General Medical Council that in January, 1963 the *British Pharmacopoeia* will be produced in the metric system and that the use of the apothecaries' system of weights and measurements will cease. The B.M.A. Council thereupon stated that *The National Formulary* of January 1963 will be produced in metric system, though it was not stated whether the apothecaries' system will be quoted in this edition or not.

These decisions prompted me to try to use the metric system on all occasions for all possible prescriptions, and these remarks are preliminary thoughts on some of the practical issues involved from the prescriber's point of view.

Of course the intended use of the metric system is only a logically progressive step, for it is already in wide use in medical and pharmaceutical practice. Thus the B.P.1953 gives all formulae in metric and imperial systems. The B.P.C.1954 uses metric and imperial systems, but gives all doses primarily in metric terms; *The National Formulary* 1955 gives imperial and percentage figures for most prescriptions except mixtures, and many doses are given in metric measure ; the Drug Tariff, April 1956, uses metric quantities for all drugs and preparations, and imperial measure in the List of Appliances. Medical journals for some years at least have been quoting doses in metric system with imperial equivalents in brackets.

But the writing of a full prescription in metric system in practice is, however, likely to be a revolutionary change for the average medical prescriber and one for which he is ill-prepared at present. This particularly applies to the busy general practitioner who is after all the originator of most prescriptions. I personally was taught the apothecaries' system but have now used the metric system for nine months, and found the change difficult at first, but have become quite accustomed to the routine and am now thinking in metric terms easily.

As a preliminary, I approached all dispensing chemists in the district and warned them of my intentions. I stated that I would use the conversion tables of the B.P.1953, and of Martindale Extra Pharmacopœia, 23rd Edition, 1951. If any gross or obvious mistakes were suspected, they were invited to draw my attention to any points. In actual fact, only one or two simple mistakes have been made, which have had no untoward results; nevertheless, some

constructive criticism has been made. Since then most of the local chemists have acquired or completed sets of metric measures.

The difficulties arise for two reasons. Firstly, anomalies appear to occur in metric measurements in equivalent values for imperial figures, nessitating approximation, and which must be accepted. Secondly, bottles and containers in present use are all designed to contain apothecaries' quantities.

The dispensing pharmacist who has been accustomed to detailed accuracy will find the approximations difficult to accept, yet against this must be weighed the convenience and simplicity of thinking in metric measure. The younger generation of pharmacists to whom I have spoken think the apothecaries' system archaic, and I understand that medical students and young doctors are being taught the metric system.

Solids. One grain is equivalent to 64.8 mgm., but when hastily calculating gr. 5 of any substance one can become too involved with digits and some approximation is essential. As is stated in the Preface to the N.F. 1955, " The conversion of imperial to metric units gives unwieldly figures." Therefore 60 mgm. is used as a guiding figure for gr. 1; grs. $1\frac{1}{2}$ is interpreted as 100 mgm. or 0.1 G. In actual fact, some tablets are produced by manufacturers made up to 97 mgm.—how is one to reconcile 97.2 mgm., 97 mgm., or 0.1 G. as equivalent to grs. $1\frac{1}{2}$? Until such time as agreement is reached on standard quantities, I shall continue to write 0.1. G. for simplicity's sake alone, and trust the chemists to dispense the nearest equivalent; thus grs. 3 is equivalent to 0.2 G., grs. 5 to 0.3 G., and so on. Difficulty is likely to be greatest perhaps with the smallest equivalencies, but one soon learns that gr. 1/120 is equivalent to 0.5 mgm. When writing doses, may I perhaps mention the B.P. recommendation—that quantities of and greater than 100 mgm., be written as 0.1 G. etc., i.e. in gram wt. (G), quantities less than 0.1 G. as mgm.

I make up my ointments to 15 G for $\frac{1}{2}$ oz., 28 G. for 1 oz., 56 G. for 2 oz., 112 G., 225 G., and 450 G. for 4, 8 ozs., and 1 lb. respectively. Containers do not provide a problem here, but could be modified with advantage. Patients are not unduly worried if they receive a carton only half filled with an ointment.

Mixtures. The dram is equivalent to 4 ml. and 2 drams to 8 ml. Yet this is only an approximation, for some consideration must be given to ease of arithmetic in calculating total doses. Actually I have personally estimated in millilitres in patient's houses, a large number of domestic teaspoons, dessertspoons, and tablespoons, and a widespread scatter of measure has been found from 2.5 ml. to 6 ml. for one teaspoonful. Manufacturing chemists interpret 5 ml. by providing a large teaspoon, and so I have used 4 and 8 ml.

to be interpreted as one and two domestic teaspoons respectively. Likewise 15 ml. for ½ fl. oz. seems accepted, yet it must be noted that not being a multiple of 4 and 8, the use of this figure invites criticism. Nevertheless, it is a convenient arithmetical figure for calculating doses and is an average millilitre measurement of domestic tablespoons. The B.P.C. 1954 uses these figures for its doses of mixtures.

Unfortunately the B.P.1953 equivalent values are such that they cannot be used for present dispensing bottles. Thus 30 ml. of a mixture cannot be contained in a 1 fl. oz. bottle; 60 ml., 90 ml., and 115 ml. respectively are likewise too great a quantity for 2, 3, and 4 fl. oz. bottles. My personal chemist and I have calculated that in order to use the present containers, in a 1 fl. oz. bottle mixtures are best made up to 28 ml., for 2 fl. oz. to 56 ml., for 3 fl. oz. to 84 ml., for 4 fl. oz. to 112 ml., and for 6 fl. oz. to 168 ml. These figures are multiples of 4 ml., but it is to be noted not all of 8 ml. In the larger bottle sizes, 8 fl. ozs. contains 225 ml., 10 fl. ozs. 285 ml., 12 fl. ozs. 330 ml., and 16 fl. ozs. 450 ml. Patients are quick to criticize the dispenser if a quantity other than a full bottle of medicine is prescribed. These figures are satisfactory from this latter point of view, and being multiples of 15, the number of doses is easily calculated.

It must be noted that where the quantity of a mixture ordered is not a multiple of the dose as measured in millilitres, e.g. 84 ml. ordered and 8 ml. doses, an exact number of doses cannot be dispensed satisfactorily unless total quantities of items are used by the prescriber, instead of quantities to be made up to a single dose. This particularly applies to prescriptions other than those quoted from a standard formulary. In this connection, it is noted that the B.P.C. 1954 makes mixtures up to one litre in the metric prescriptions, but to ½ fl. oz. in imperial terms. But any slight surplus of a dispensed mixture in a bottle ensures that the total number of doses prescribed is actually available.

Wholesale manufacturers are already supplying bulk liquids in metric quantities, and also in bottles of ¼ litre, ½-litre, and 1-litre capacity, etc. Until dispensing bottles of 100, 200, 250 ml. and so on are made, there must be some confusion from the prescriber's and dispenser's point of view.

There would appear to be an advantage gained by encouraging patients to purchase domestic dosage measures for giving medicine, such as are in daily use in hospitals. Some chemists are already doing this, and at least we should ensure that our patients are getting the quantity of medicine that we order, and not that dictated by the size of the kitchen cutlery.

Dressings. The Drug Tariff 1956 uses imperial measure in its Lists of Appliances. It has been obviously impossible to prescribe bandages and plaster of all sorts by other than the imperial measures. For example, until such time as 2.5 cm. bandages may replace 1-inch bandages, it will be unnecessary to change the routine.

How far in fact will the use of the metric system extend? Thus will babies and adults be weighed and measured in chemists' shops and doctors' surgeries in kilogrammes and metres, or will this be a later stage in a national transfer of weights and measures?—for we do not know if the metric system will be ultimately extended into a widespread usage.

Cotton wool is ordered by me by gram weight, using the word " approx." for the larger packets, viz. 112 G., 225 G., and 450 G. approx. for 4 oz., 8 oz., and 1 lb. respectively. Absorbent gauze is ordered by gram weight. The Drug Tariff quotes 1 sq. yard as weighing grs. 180, which is equivalent to 12 G., and I therefore order 1 sq. yard as 12 G., 3 sq. yards, and 6 sq. yards as 36 and 72 G. respectively. The local chemists were quick to note this change and it is accepted.

Conclusion. As it seems that further use of the metric system is inevitable, I believe that here is a chance for members and associates of the College of General Practitioners as prescribers to gain experience in its use, and of assisting in the further development by their observations.

I wish to pay tribute to the chemists in my area who have accepted my prescribing in the spirit in which it has been intended: my particular thanks are due to Mr. Robert Comyns, M.P.S., of Sandhurst, Berkshire, with whom the whole problem has been discussed at length.

Locums for General Practitioners in Obstetric Hospitals

One of the best ways of refreshing one's knowledge of obstetrics is to do a short term as a locum in a maternity hospital. This is now possible in the Loveday Street and the Heathfield Road Maternity Hospitals in Birmingham. Interested practitioners should apply to the Chairman of the Midland Faculty Postgradute Education Committee, 1536 Persgore Road, Birmingham 30.