units of insulin daily. She attended regularly, usually well controlled, though during a cold in 1964 the blood sugar reached 290 mg./100 ml., with considerable ketosis. Chest x-rays in 1963 and 1964 were normal.

There were no further admissions until November 1967 at the age of 17. She then needed 36 units Soluble+36 units P.Z. insulin daily, and developed a precomatose state after an emotional crisis. She again had basal crepitations and, now, tenderness in the left hypo-chondrium. Later in the day a localized "rub" developed in the left 4th and 5th interspaces, thought at first to be pericardial friction. The blood sugar was 350 mg./100 ml., and there was considerable ketosis. X-ray again showed emphysema at the root of the neck on the right, and in a thin line outside the heart shadow. She made a good recovery, and, still fit, attends the clinic regularly.

The comments of Professor B. McNicholl and his colleagues (23 November, p. 493) are of particular interest. This girl developed a very marked degree of ketotic breathing on each occasion, but there was no cough or evidence of lung disease. Would it be fair to postulate, also, a constitutional weakness of the alveolar wall in these cases, particularly if the emphysema is liable to recur?—I am, etc.,

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Measuring Blood Sugar

SIR,—Dextrostix strips provide a useful and speedy method of differentiating between hypo-, normo-, and hyperglycaemia.¹ Opinions, however, are widely divergent as to their use in routine blood sugar estimations at diabetic clinics. Furthermore, the upper limit of reading of 200 mg./100 ml. would seem to be a severe limitation to their use.

In order to check the range of error of routine Dextrostix readings and to assess the possibility of obtaining estimations in the diabetic clinic above 200 mg./100 ml. without diluting the blood, the following experiment was performed. Samples of blood were taken by venepuncture so that subsequent laboratory readings could be obtained for comparison. (This was done by the Folin-Wu method which measures total blood sugar as opposed to blood glucose, and may be the same or higher than the Dextrostix reading.) Three Dextrostix were used, and the results read at 20, 30, and 60 seconds. Where the 60-second reading was under 200 mg./100 ml. this was compared with the laboratory result. However, where the result was 200 mg./100 ml. or over, the corresponding reading at 30 seconds multiplied by two was used for comparison, unless this also was 200 mg./100 ml. or over, in which case the result at 20 seconds was used multiplied by three.

In the direct readings under 200 mg./100 ml. there were 20 readings. Seventeen of these were within 30 mg./100 ml. of the laboratory results and all within 60 mg./100 ml. There were 17 readings in the 30-second $\times 2$ group—that is, direct readings 200 mg. to 320 mg.—of which 13 were within 30 mg./100 ml. and all within 60 mg./100 ml. Over 350 mg. (in the group read at 20-second $\times 3$) there were only five readings, four of which were within 30 mg./100 ml. and one 40 mg. higher than the laboratory estimation.

These numbers, although small, suggest a

sufficient degree of accuracy for use as a routine clinic measure, and that the use of two Dextrostix—one of which be read at 30 seconds, and the result multiplied by two—is justified when the blood sugar may be expected to be high.—I am, etc.,

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REFERENCE

- ¹ Mackay, N., Gordon, A., and Neilson, J. McE., *Lancet*, 1965, 2, 269.

Brescia-Cimino Shunts for Dialysis

SIR,—I read with interest the report by Dr. R. McMillan and Dr. D. B. Evans (28 September, p. 781) on their experiences with the arteriovenous fistula in intermittent haemodialysis, and the subsequent comments of Dr. J. S. Hanson and others in the correspondence columns (30 November, p. 577).

I would like to confirm all that Dr. Hanson and his colleagues have said, and draw attention to the fact that the majority of experienced physicians endeavouring to maintain patients on long-term haemodialysis are now acknowledging the fundamental contribu-

tion that Brescia and his colleagues¹ made when they described their original technique in the creation of the arteriovenous fistula for haemodialysis.

I feel it is extremely dangerous to draw conclusions of such far-reaching importance from a solitary measurement of cardiac output in one patient. While respecting the opinions of Dr. McMillan and Dr. Evans, I nevertheless feel that one must dismiss their contribution as typical of clinical empiricism unsubstantiated by objective evidence.

However, the most serious criticism I have to make relates to their statement—"In Cambridge, haemodialysis is undertaken only as a preoperative and postoperative maintenance for patients on the renal transplant programme." One must ask the authors what will happen to the patient whose arteriovenous fistula was surgically closed when his transplant fails and he requires further haemodialysis. Or are we to believe that at Cambridge renal cadaver transplantation has become a curative operation?—I am, etc.,

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REFERENCE

- ¹ Brescia, M. J., Cimino, J. E., Appel, K., and Hurwicz, B. J., *New Engl. J. Med.*, 1966, 275, 1089.

Uses of Blood Gas Estimations

SIR,—Last winter 69 patients with chronic respiratory disease (mostly obstructive, but two restrictive) entered my general wards with acute exacerbations, and I was able to examine 236 arterialized ear-blood samples taken from 62 of them, using the Eschweiler analyser.

Results were immediately useful in recognizing the presence and degree of decompensated respiratory failure, which proved unexpectedly common (Table I); distinguishing hypercapnoeic from other comas; distinguishing underventilation, with its special problems, from simple hypoxaemia (Table I); prognosis (Table II); and, occasionally,

calculating bicarbonate dosage in gaseous acidosis.

In this series the critical value for oxygen proved to be 50 mm. Hg, that for carbon dioxide 57 mm. Hg. Subsequent definite rise in either figure modified the original prognosis; but sharp substantial change was unusual except during oxygen therapy. Gross hypoxaemia was so closely associated with serious carbon dioxide retention that their effects are difficult to separate.

The apparently increased mortality in patients treated with oxygen was due mainly to "worst case selection," but not so the difference between 28% Ventimask (9 deaths in 15 cases) and 24% Ventimask (3 deaths in 8 cases). A policy change of concentration was made in February. The effect of oxygen in either concentration was capricious. The rise in arterial oxygen tension averaged 50% of that in the inspired gas, but varied in individuals from less than zero to 100%. The carbon dioxide tension rose substantially (11 to 35 mm. Hg) in six cases, moderately

TABLE I.—Results: Classification of Patients by Blood Gas Analysis

	No. of Cases
Within normal limits	1
Hypoxaemia with normal P_{aCO_2} (<40 mm. Hg)	12
Borderline underventilation + hypoxia	3
Underventilation (hypercapnoea) (>45 mm. Hg)	4
+ hypoxaemia	46
Total	62

TABLE II.—Prognosis and Blood Gas Levels

Level First Recorded	Subsequent Course	No. of Cases	Deaths	Mortality
$O_2 > 50$ mm. Hg		25	2	8%
$O_2 < 50$ mm. Hg	No O_2 therapy: rise to > 50 mm. Hg	6	1	28%
	Metered O_2 : rise to > 50 mm. Hg*	12	4	
	No O_2 therapy: rise to < 50 mm. Hg	9	3	54%
$CO_2 > 57$ mm. Hg	Metered O_2 : rise to < 50 mm. Hg†	7	6	
	Metered O_2 : no record: early death	3	3	
$CO_2 > 57$ mm. Hg		23	13	57%
CO_2 46–57 mm. Hg	Later rising to 57 or higher	5	2	21%
	Remaining below 57 mm. Hg	9	1	
40–45 mm. Hg	Later rising to 57 or higher	1	1	11%
	Remaining below 57 mm. Hg	8	0	
< 40 mm. Hg	None rose above 48 mm. Hg	16	2	12½%
	Totals	62	19	31%

* Mean rise 26 mm. Hg in P_{aO_2} . † Mean rise 3 mm. Hg in P_{aO_2} .