satisfy the normal requirements for screening tests: each test should be cheap, easy to apply, reliably reproduced, sensitive, and specific. Although routine weighing satisfies the first two criteria, none of the quoted references suggests that it comes anywhere near to satisfying the remainder. If we are to make progress in detecting poor fetal growth we must begin to apply scientific principles to antenatal care. No longer is it sufficient to answer the question "Why should it not be done?" The important question is "Why should this be done?"

Dawes and Grudzinskas have shown that routine repeated measurement of maternal weight in all patients adds nothing to the reliable prediction of babies who are small for gestational age.[2] Further studies have confirmed this finding and indicated why the observation lacks sensitivity and specificity.[3,4] If serial measurement of weight had never been a part of antenatal care there would not be any reason to introduce it now. This is not to imply, however, that measurement of maternal weight during pregnancy is never appropriate, merely that routine measurements are a waste of resources and may be misleading.

In the same issue as the editorial M G Dawes and colleagues highlight the confusion surrounding the perceived reasons for routine weighing in antenatal clinics.[5] Those who currently apply this test gave 40 different reasons for doing so. Clearly there is no consensus, even among practising health care workers, over its application let alone its interpretation.

Routine serial measurement of maternal weight during pregnancy is not a valuable procedure and should be abandoned.

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1 Dimperio DL, Fentzen BH. Curz A. Routine weighing during antenatal visits. *BMJ* 1992;**304**:460. (22 February.)
2 Dawes MG, Grudzinskas JG. Repeated measurement of maternal weight during pregnancy. Is this a useful practice? *Br J Obstet Gyneacol* 1991;**98**:189-94.
3 Dawes MG, Grudzinskas JG. Patterns of maternal weight gain in pregnancy. *Br J Obstet Gynaecol* 1991;**98**:195-201.
4 Lawrence M, McKillop FM, Durnin JVGA. Women who gain more fat during pregnancy may not have bigger babies: implications for recommended weight gain during pregnancy. *Br J Obstet Gynaecol* 1991;**98**:254-9.
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SIR,—Diane L Dimperio and colleagues conclude that serial antenatal weighing should continue as a screening test for preterm delivery, low birth weight, and pre-eclampsia[1] but provide no evidence that it fulfils the criteria for a successful screening test.[2] Certainly the conditions they wish to identify are common and important enough for screening to be worth while, but there is no evidence of a silent period in the development of any of these conditions during which treatment is beneficial, with the possible exception of treatment with low dose aspirin for pre-eclampsia. Pre-eclampsia is better screened by measuring urine protein excretion or blood pressure, or both, than by serial weighing.

Even if there were effective interventions none of the papers quoted by the authors give data in a form such that the sensitivity and specificity of the test can be derived. They all simply describe weak correlations between low weight gain and various poor outcomes. Only Dawes and Grudzinskas have described the test characteristics of low weight gain (below the 10th centile) for predicting small for gestational age babies (sensitivity 19%, specificity 87%) and of high weight gain (above the 90th centile) for predicting high blood pressure (sensitivity 26%, specificity 80%).[3] This performance is much worse than that of other variables measured in screening tests, such as fundal height, ultrasonographic measurements, blood pressure, and urinary variables. Dimperio and colleagues provide nothing in their editorial to contradict Dawes and Grudzinskas's conclusions that routine weighing fulfils only two screening criteria (it is cheap and acceptable) and that it should stop.[3]

It is profoundly depressing that at a time when obstetricians are attempting to rationalise their management of pregnant women[4] the editorial should respond to this excellent scientific evaluation of a common screening procedure in such an unscientific way.

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1 Dimperio DL, Frentzen BH, Cruz A. Routine weighing during antenatal visits. *BMJ* 1992;**304**:460. (22 February.)
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4 Chalmers I, Enkin M, Keirse MJNC. Effective care in pregnancy and childbirth: a synopsis for guiding practice and research. In: Chalmers I, Enkin M, Keirse MJNC, eds. *Effective care in pregnancy and childbirth.* Vol 2. Oxford: Oxford University Press, 1989:1465-77.

AUTHOR'S REPLY,—Though one objective of antenatal care is to screen for problems, another is to provide teaching and anticipatory guidance that, if followed, result in optimum outcomes for both the mother and the newborn infant. Active promotion of healthy behaviours, such as consumption of a diet that provides adequate but not excessive energy, should be part of routine prenatal care. Methods of estimating the energy requirement of a pregnant woman exist but are time consuming, do not take into account individual variation, and have not been correlated with the outcome of pregnancy. A simple and more effective method of assessing energy sufficiency during pregnancy is weight gain. A comprehensive analysis of scientific data has resulted in guidelines for weight gain that are consistent with desirable outcomes for mothers and newborn infants.[1]

As both inadequate and excessive gains in weight are associated with undesirable outcomes of pregnancy they should be avoided. Weight gain in the second half of pregnancy is especially correlated with fetal growth,[2] and thus assessments of weight after the initial booking continue to be essential for good care. Those providing care should routinely monitor weight gain to reinforce a positive pattern or intervene if the pattern is becoming abnormal. Women with poor weight gain should be assessed to determine why their energy intake is insufficient for their requirements. Unusually high weight gain may, but does not necessarily, reflect excess energy intake. When it occurs, assessment should determine whether it is a result of excess energy intake, abnormal fluid retention, or multiple pregnancy.

The routine of weighing the patient and subsequent counselling has two additional benefits: it relieves patients' anxiety about weight gain and introduces the topic of the overall nutritional adequacy of the diet. Promotion of good nutrition should be an important component of antenatal care. Women who receive intervention with emphasis on achieving an optimum weight gain and nutritional adequacy have improved outcomes compared with those who do not.[3] Routine weighing of all women as part of antenatal care is valuable and should not be discarded.

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1 Institute of Medicine. *Nutrition during pregnancy.* Washington: National Academy, 1990.
2 Lawton FG, Mason G, Krystyna K, Ramsay I, Morewood G. Poor maternal weight gain between 28 and 32 weeks gestation may predict small-for-gestational-age infants. *Br J Obstet Gynaecol* 1988;**95**:884-7.
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Manipulative therapy and physiotherapy for persistent back and neck complaints

SIR,—Bart W Koes and colleagues have shown the benefits of manipulative therapy compared with physiotherapy,[1] supporting the findings of an earlier trial conducted by the Medical Research Council.[2]

Firstly, however, contrary to the statement in their paper, it is not possible to differentiate patients with disc herniation from those with other causes of back pain on the basis of a non-specific complaint and physical examination. Radiological investigations such as computed tomography, myelography, and magnetic resonance imaging are usually required to achieve this distinction.

Secondly, intervertebral discs start to degenerate in early adulthood, becoming symptomatic after fragmentation, with herniation through an intact annulus or impingement on the spinal canal.[3] As manipulative therapy entails small movements of high velocity, applying sudden stresses to chronically degenerating discs may precipitate protrusion of a disc. Manipulating the spines of patients with back pain of undiagnosed aetiology is not without risk, and known complications, although rare, range from injury to the cervical cord[4] to brain stem infarction.[5] Our experience includes two cases of compression of the cauda equina after chiropractic manipulation[6] in which the diagnosis was delayed, resulting in long term disability. As a result we endorse calls for further trials to elucidate the role of spinal manipulation in the management of low back pain and for a review of chiropractic training in the United Kingdom.[7,8]

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1 Koes BW, Bouter LM, van Mameren H, Essers AHM, Verstegen GMJR, Hofhuizen DM, *et al.* Randomised clinical trial of manipulative therapy and physiotherapy for persistent back and neck complaints: results of one year follow up. *BMJ* 1992;**304**:601-5. (7 March.)
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SIR,—I am concerned about the inappropriate selection of patients and treatment in the study by Bart W Koes and colleagues.[1]

The introduction mentions that, in the patients selected, no underlying disease could be established and the causes of the complaints remained unknown. Why? Were the assessors lacking the