used in the multivariate analysis. For instance, could social class factors (smoking history, body mass index) or other factors (drug treatment) have varied among the hospital populations and affected the results? Similarly, could the large observed differences between the sexes indicate particular comorbidities that were not measured?

The proportion of the total variability in 90 day mortality that was due to the casemix factors used in the model is not stated. If this proportion was small there may have been other casemix factors that were not taken into consideration; the modelling process used by the authors could be better judged if all the factors considered were stated and the extent of the total variability in 90 day mortality explained by the model was recorded. It seems implausible that treatment in hospital 6 should have exerted such a pronounced protective effect.

Appreciable variations in survival due to differences in the processes of care among hospitals are difficult to identify after adjustment for casemix.² Adequate adjustment for casemix is difficult, and many studies tend to collect few data with which to attempt such adjustments. This study may have considered too few casemix factors for any reliable comment to be made about the effect of the processes of care in the different hospitals.

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Patients' nutritional status is not recorded

EDITOR,—C J Todd and colleagues found considerable differences among hospitals in mortality, length of stay in hospital, and the development of pressure sores in patients with hip fracture.¹ Although the patients from the eight hospitals are said to have been well matched, no information is provided on the patients' nutritional status on arrival or on their subsequent nutritional care.

Simple anthropometric variables, such as weight in relation to height, the circumference of the mid-upper arm, and triceps skin fold thickness, have been used to assess nutritional status in patients with hip fracture and have proved to be predictors of mortality and length of stay in hospital.^{2,3} Malnourished patients receiving supplemental oral or enteral nutrition have shown fewer complications, a shorter stay in hospital and lower mortality.^{2,5} For example, patients receiving an oral supplement of 250 ml daily in one study had a median hospital stay of 40 days, compared with 24 days in a group not given the supplement.⁴

Clearly, differences in nutritional management can be important not only for outcome but also for hospital costs.

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Overall survival rate is most important measure

EDITOR,—The audit of hip fracture in East Anglia concludes that anticoagulant prophylaxis against thromboembolism reduces the frequency of fatal pulmonary embolism.¹ The haemorrhagic side effects of such treatment may, however, be important in a group of patients known to have a high prevalence of coexisting cardiovascular and gastrointestinal disease.² The overall mortality rather than the mortality related to pulmonary embolism should therefore be recorded.

When hospital 6, which seemed to confer an idiosyncratic benefit to patients, is excluded the 90 day survival was marginally lower in the hospitals in which pharmaceutical thromboprophylaxis was used routinely than in those in which it was not (table). The mortality from causes other than pulmonary embolism was significantly higher in the hospitals in which prophylaxis was used routinely ($\chi^2=5.5$, $P=0.02$).

90 Day survival and mortality from pulmonary embolism according to use of prophylaxis (figures are numbers (percentages))

Hospital	No of patients	90 Day survival	Death due to:	
			Pulmonary embolism	Other
<i>Prophylaxis given routinely</i>				
1	79	60 (76)	0	19 (24)
2	24	19 (79)	1 (4)	4 (17)
4	80	61 (76)	0	19 (24)
<i>Prophylaxis given occasionally</i>				
3	79	63 (80)	2 (3)	14 (18)
5	80	68 (85)	3 (4)	9 (11)
7	79	65 (82)	2 (3)	12 (15)
8	78	63 (81)	5 (6)	10 (13)

In a Danish prospective clinical trial of 542 patients randomised to receive either low molecular weight heparin or placebo after total hip replacement the survival was lower in the group given low molecular weight heparin, regardless of the benefit against thromboembolism (B S Andersen *et al*, proceedings of the 13th international congress on thrombosis, 1994).

We believe that the discrepancy between reduced overall survival and reduced mortality from pulmonary embolism should be clarified before the conclusions of this study are accepted, since the data suggest that anticoagulant treatment may have introduced deaths due to other causes.

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Antithrombotic prophylaxis had little effect on overall mortality

EDITOR,—C J Todd and colleagues report that antithrombotic prophylaxis significantly reduces the incidence of fatal pulmonary embolism.¹ From their remarks in their results section, I assume that their diagnoses of fatal pulmonary embolism were made at postmortem examination. It would be interesting to know what the rate of postmortem examination at each hospital was for this review as this would have a bearing on the number of deaths due to pulmonary embolism.

With regard to their figures for mortality, it is also important to look at other causes of death, such as bleeding and complications arising from wound sepsis.² How many deaths were due to these problems? In figure 1 they indicate that hospitals 3, 5, 7, and 8 were low users of antithrombotic prophylaxis. The 90 day survival curves indicate, however, that there was little difference in overall mortality between the hospitals other than hospital 6 (if there was any, hospitals 3, 5, 7, and 8 seem to have had slightly better survival than hospitals 1, 2, and 4). The authors' data show that the overall mortality in hospitals 1, 2, 4, and 6 (which used antithrombotic prophylaxis more frequently) was 20% at 90 days while that in hospitals 3, 5, 7, and 8 was 18%. Thus while fatal pulmonary embolism may be more common when antithrombotic prophylaxis is not used, overall mortality may not be very different between patients in whom it is used and those in whom it is not. It would thus be interesting to know what the overall mortality was in each group of patients.

An important concern regarding routine use of antithrombotic prophylaxis is an increase in the incidence of complications related to the wound. Was there any difference in the overall infection rate between the patients who had antithrombotic prophylaxis and those who did not?

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Author's reply

EDITOR,—Many factors contribute to mortality after hip fracture, and our audit could not consider all the possible factors. The correspondents suggest several interesting variables, which we were unable to report on because our audit depended on information routinely collected in the units studied.

David Warwick and Michael Freeman, J Calder and E C Ashby, and K C Kong request information on rates of complications related to thromboembolic prophylaxis. Of the eight patients with infections of the hip joint, seven received no prophylactic anticoagulant treatment (2.3% of the 305 who did not receive it) but only one received some prophylaxis (0.4% of the 261 who did) (Fisher's exact one tailed test, $P=0.055$). For wound infection the corresponding data are 21/305 (6.9%) and 18/261 (6.9%) ($\chi^2=0.0$, $df=1$, $P=1.00$). The rate of wound infection was highest in hospitals 1, 2, and 4. There was a correlation (Spearman's $r=0.74$, $P=0.042$) between the rate of wound infection and 90 day mortality. Wound infections may arise for numerous reasons, many of which are not directly attributable to anticoagulant treatment.

Our paper was based on total mortality, and we attempted to explain the striking differences in this. Warwick and Freeman's central point is that anticoagulant treatment may have increased mortality, but they have excluded 80 patients post hoc. A more valid analysis includes these 80 patients; then there is no significant difference in mortality ($\chi^2=0.87$, $df=1$, $P=0.35$). Overall mortality was not significantly different between those who received no prophylaxis and those who did (56/301 (18.6%) and 42/261 (16.1%) respectively (data are missing on 14 patients, of whom six died); $\chi^2=0.36$, $df=1$, $P=0.55$). Inspection of causes of death gives no reason to believe that any additional deaths are associated with anticoagulant treatment. Neither the recorded causes nor the temporal pattern of deaths suggests any general or haemorrhagic postoperative complication. None the less, those patients who did and those who did not receive prophylactic anti-