

Supplementary appendix – “Variation in access to community rehabilitation services and length of stay in hospital following a hip fracture: a cross-sectional study”

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There are three parts to this supplementary appendix:

- 1) Data supplement - information about community rehabilitation services
- 2) Correlation coefficients for risk-adjusted measures
- 3) Cost calculation

The questionnaire used in the organizational survey is attached as a separate document.

1) Data supplement - information about community rehabilitation services

Table A gives information collected from the organisational survey about the number of community rehabilitation hospitals (CRHs) and CRH beds provided in each former Primary Care Trust (PCT). This is combined with information from ONS Mid-2001 population estimates [7] to provide estimates of the number of beds per 10,000 older adults (65 years or older).

Table A Number of Community Rehabilitation Hospital (CRH) beds available per 10,000 adults aged 65+ years in each PCT

| | Total no. adults aged ≥65 ^a | Acute hospitals serving PCT | No. of CRHs | No. CRH beds | No. CRH beds per 10,000 adults aged ≥65 |
|--------------|--|-----------------------------|----------------|--------------|---|
| PCT 1 | 43,047 | A | 1 ^c | 18 | 4 |
| PCT 2 | 56,074 | A, (B) ^b | 2 ^b | 78 | 14 |
| PCT 3 | 44,756 | B | 1 | 20 | 5 |
| PCT 4 | 29,844 | C | 1 | 60 | 20 |
| PCT 5 | 86,434 | C, D | 3 ^d | 82 | 9 |
| PCT 6 | 11,2724 | D | 3 | 75 | 7 |

^a Taken from ONS Mid-2011 Population Estimates for Primary Care Organisations in England by Single Year of Age and Sex; based on the results of the 2011 Census

^b In practice these 78 community beds, together with limited availability of social care facility beds, are predominantly available to hospital A, not hospital B.

^c Not available to all individuals within this PCT, rather only available to patients registered with specific GPs in one town, otherwise no CRH available.

^d Plus one social care facility with 6 available beds

2) Correlation coefficients for adjusted measures

The main analysis presents correlations between unadjusted transfer rate and lengths of stay in the acute hospital, and the NHS. We also calculated risk-adjusted rates and lengths of stay for each of eight groups with different levels of access to community rehabilitation services (based on combination of acute hospital and PCT). We adjusted for age, gender, comorbidity, socio-economic deprivation and rural habitation. We used multivariable logistic regression to calculate adjusted transfer rates, with groups included as fixed effects, and multivariable log-linear regression to calculate adjusted log lengths of stay. A higher adjusted transfer rate was associated with a shorter adjusted length of stay in the acute hospital ($r_s = -0.9$; $P = 0.004$), but a longer adjusted combined length of stay in the acute hospital and CRH ($r_s = +0.8$; $P = 0.01$). Since adjustment did not alter our conclusions, we decided to present simpler unadjusted figures. The interpretation of unadjusted median length of stay is also more intuitive than adjusted (geometric) mean LOS.

Table B Relationship between adjusted rate of transfer to community rehabilitation hospitals (CRH) and adjusted length of stay (LOS), across eight groups categorised by the combination of acute hospital and Primary Care Trust (PCT)

| Group | Acute hospital and PCT | No. of patients | Adjusted transfer rate to CRH, % | Adjusted LOS in acute hospital | Adjusted combined LOS |
|-------|------------------------|-----------------|----------------------------------|--------------------------------|-----------------------|
| 1 | Hospital B, PCT 2 | 141 | 2.1% | 22.6 | 20.6 |
| 2 | Hospital B, PCT 3 | 185 | 4.4% | 19.9 | 20.5 |
| 3 | Hospital C, PCT 5 | 137 | 33.6% | 13.4 | 21.3 |
| 4 | Hospital A, PCT 1 | 70 | 35.9% | 14.1 | 23.1 |
| 5 | Hospital C, PCT 4 | 211 | 37.8% | 12.3 | 22.3 |
| 6 | Hospital D, PCT 5 | 189 | 38.3% | 14.1 | 22.5 |
| 7 | Hospital A, PCT 2 | 233 | 45.6% | 10.2 | 23.1 |
| 8 | Hospital D, PCT 6 | 64 | 48.8% | 8.8 | 27.1 |

3) Cost calculation

For purposes of illustration only, we calculated the cost savings from reducing rates of transfer to community rehabilitation hospitals from 50% to 20% in 20,000 patients with hip fracture. We based the calculation on median length of stay, although from a cost perspective this is not as relevant as mean length of stay and is not strictly additive. However, basing the calculation on mean length of stay (and adjusted mean length of stay) gave a similar estimate for 50% vs. 20% transfer rate.

Table C Figures used in cost calculation

| Transfer rate | LOS in days for different transfer rates taken from Figure 2 | | | Comparison with LOS for 50% transfer rate | | | | Overall saving for 20,000 patients ^d |
|---------------|--|----------|------------------|---|-----------------------------|----------------------------|-------------------------------|---|
| | AH | Combined | CRH ^a | AH extra days ^b | CRH saved days ^b | AH extra cost ^c | CRH cost savings ^c | |
| 20% | 16 | 20 | 4 | 5 | 9 | £1,320 | £2,268 | £19 million |
| 30% | 14 | 20 | 6 | 3 | 7 | £792 | £1,764 | £19 million |
| 40% | 12 | 22 | 10 | 1 | 3 | £264 | £756 | £10 million |
| 50% | 11 | 24 | 13 | 0 | 0 | 0 | 0 | 0 |

AH: Acute Hospital

^aThis is the difference in days between the combined and acute hospital length of stay.

^bThis is the difference between the LOS for a given transfer rate compared to a 50% transfer rate

^cThis is the cost associated with each extra bed day, based on £264 per day for acute hospital and £252 per day for community rehabilitation hospital

^dThis is the savings from shorter CRH stay minus the extra costs from longer AH stay multiplied by 20,000