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A whole system study of intermediate care services for older people

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Abstract

Background: intermediate care (IC) services have been widely introduced in England and have the strategic objectives of reducing hospital and long-term care use. There is uncertainty about the clinical outcomes of these services and whether their strategic aims will be realised.
Setting: a metropolitan city in northern England.
Design: a quasi-experimental study comparing a group of older people before and after the introduction of an IC service. A quota sampling method was used to match the groups.
Subjects: patients presenting as emergency admissions to two elderly care departments with falls, confusion, incontinence or immobility.
Intervention: a city-wide service in which a joint care management team (multi-agency, multi-disciplinary) assessed patient need and purchased support and rehabilitation from sector-based IC teams.
Outcomes: Nottingham Extended Activities of Daily Living score, Barthel Index, Hospital Anxiety and Depression score, mortality, readmission to hospital, and new institutional care placement at 3, 6 and 12 months post-recruitment.
Results: there were 800 and 848 patients, respectively, in the control and intervention groups. Clinical outcomes, hospital and long-term care use were similar between the groups. Uptake of IC was lower than anticipated at 29%. An embedded case–control study comparing the 246 patients who received IC with a matched sample from the control group demonstrated similar clinical outcomes but increased hospital bed days used over 12 months (mean +8 days; 95% CI 3.1–13.0).
Conclusion: this city-wide IC service was associated with similar clinical outcomes but did not achieve its strategic objectives of reducing long-term care and hospital use.

Keywords: *intermediate care, older people, clinical trial, elderly*

Introduction

In England, and elsewhere, recuperation and rehabilitation of older people has taken place largely in hospitals, but recent policy emphasis favouring a primary care-led National Health Service has stimulated a need to examine alternatives with a more home-based orientation [1–3]. A range of services under the umbrella term intermediate care (IC) have been proposed and have become an established health care policy within the National Service Framework for Older People (NSF) [4]. However, concern has been expressed that these services might be inferior to existing hospital services [5, 6] for which there is considerable evidence of effectiveness [7]. We therefore report a controlled clinical trial that examines the concept of a home-based recuperation and rehabilitation policy for older people in respect of a newly introduced IC service in a metropolitan city in England. The study investigates the clinical outcomes of the new service and its effects on hospital and institutional care use.

Leeds intermediate care service

Leeds Health Authority and Leeds City Council developed jointly a commissioning framework for older people's services designed to provide support and rehabilitation either at home or through short-term care home placements [1]. It is a city-wide service [8] in which a joint care management team (multi-disciplinary, multi-agency) assesses need and purchases services for individuals delivered through primary care trust (PCT) based IC teams comprising nurses, therapists and social service staff (see Appendix 1). There was an expectation, in line with national policy [4], that short-term contact following hospital admission or during a health crisis at home would reduce demand for hospital and institutional care. Thus, the new service was in part funded by transfer of money from secondary care [8].

Methods

A quasi-experimental study design [9] was developed in which a group of frail older patients recruited before the introduction of IC services (control group) was compared with another group of similar patients recruited and followed up after the introduction of IC (intervention group).

Patient recruitment

Patients with an address within three of the five local PCT areas, and admitted as emergency referrals to the two elderly care departments in Leeds with the clinical syndromes of falls, incontinence, confusion or poor mobility, and who were still in hospital after 7 days, were eligible for the study. Patients with rapid recovery and discharge within 7 days, or with continuing medical instability, or considered by the clinical team to have a poor short-term prognosis, were excluded. The aim was to recruit 50 consecutively admitted frail older people from each elderly care department each month as this was consistent with the anticipated capacity of the IC services. To optimise between group matching, a quota-sampling frame was designed to produce a 2:1 female to male ratio, and equal numbers of patients with pre-admission confusion and mobility restriction: two factors known to influence medium-term outcomes [10]. Patients were identified by twice-weekly visits to the participating wards by research nurses until the monthly quota-sampling cells were complete. Recruitment from each of the two elderly care departments took place separately during approximately 6-month blocks (November 1998–July 1999 and May–November 2000 for the control group; and January–July 2001 and May–October 2001 for the intervention group). Consent was sought when medical stability had occurred or, if mental incapacity was apparent, a family member was asked for assent. The local ethics committee approved the study.

Baseline assessments

Baseline assessment by research nurses recorded age, sex, accommodation type, living arrangements, assessed cognitive function (Abbreviated Mental Test, AMT) [11], current activities of daily living (Barthel Index, BI) [12], pre-admission extended activities of daily living (Nottingham Extended Activities of Daily Living, NEADL) [13] and mood state (Hospital Anxiety and Depression score, HAD) [14].

Outcomes

The primary outcome was independence at 6 months post-recruitment measured by the NEADL score [13]. A sample size calculation using a previously obtained NEADL standard deviation of 5.8 [15] with a non-inferiority (clinically irrelevant) [16] tolerance limit of one scale point indicated that over 600 analysable patients would be required in each group. Secondary outcomes recorded at 3, 6 and 12 months post-recruitment were BI, HAD, mortality, readmission to hospital and new institutional care placement. Outcomes were obtained during research nurse home visits. After completion of the final follow-up assessments, the IC service registers were inspected to identify contacts with the intervention group patients during the 12 months of the study.

Analysis

An independent statistician not otherwise involved with the study produced statistical summaries and analyses using the software SPSS 11.0.0 and Microsoft Excel. The primary analysis was a non-inferiority test of NEADL score changes from baseline to 6-month reassessment. The null hypothesis was that response for the intervention group patients was more than one NEADL score point worse than for the control group. This was tested using the Mann–Whitney U test (MWU) for the difference between the means of baseline to reassessment score changes of the two groups and interpretation of the results was aided by calculation of 95% CIs. The between-group score changes were also examined with adjustment for baseline variables (age, sex, institutional care or living at home, cognitively impaired (AMT score 7 or less) and PCT) using analysis of covariance. There was a high mortality during follow-up and as this might be associated with a survival response bias, the analyses were repeated after assigning the worse NEADL score value (zero) for the patients who had died by 6 months. Additionally, the IC service contact for the intervention group was less than anticipated and demonstration

of non-inferiority in these circumstances might be simply a dilution effect. To address this, an embedded case– control study was undertaken in which patients who had received IC in the intervention group were matched (by locality, sex, institutional care (yes/no), age and baseline NEADL) with randomly selected patients from the control group. Adjustment for imbalance due to deaths was carried out as before with assignment of worst NEADL score (zero) and non-inferiority between the groups tested by Wilcoxon's matched pairs signed rank test.

Comparisons between the groups for the secondary outcomes were made by calculating 95% CIs for changes from baseline to the reassessment points. In addition, for the HAD scores, the percentage in each group classified as a 'case' (HAD score ≥11) is presented. The percentage of deaths, new institutional care placements (using a denominator of the number of patients living at home at recruitment), the mean number of hospital readmission episodes per patient and mean hospital days used were compared by tabulation and 95% CIs for the differences between the groups calculated.

Results

The study recruited 1,648 patients: 800 before (control group) and 848 after (intervention group) the introduction of the city-wide IC service. Of these, 333 (39%) in the intervention group and 301 (38%) in the control group had died by 12 months. The study groups were similar and comprised largely community-dwelling but disabled older people, and a high proportion had mental impairment (Table 1). Patient follow-up was incomplete for 33 and 24 patients, respectively, in the control and intervention groups.

Primary outcome (Table 2)

The 95% CIs for the comparison between the mean differences of the baseline to 6-month reassessment NEADL score changes for the two groups were well within the tolerance limit of ±1 NEADL score point, allowing the conclusion that IC was not inferior to the previous care system (difference of the mean differences = –0.29; 95% CIs –0.69 to 0.11; MWU $P < 0.001$). Adjusting for baseline variable imbalance supported the non-inferiority conclusion (difference of the mean differences = –0.33; 95% CIs –0.73 to 0.07; MWU $P < 0.001$). The analysis to investigate the potential bias due to mortality by allocating the worst NEADL score of zero to the non-surviving patients was also consistent with the non-inferiority conclusion (difference of the mean differences = 0.18; 95% CIs –0.27 to 0.62; MWU $P < 0.001$).

Secondary outcomes (Table 2)

The between-group differences of the mean score changes from baseline to reassessments at 3, 6 and 12 months after recruitment for the BI and HAD scores, and their associated 95% CIs, were small and unlikely to be of clinical significance. Differences in mortality, new institutional care placement and hospital readmissions were also small, but with wider CIs and trends to lower institutional care placement but higher use of hospital care for the intervention group.

Embedded case–control study

Only 246 (29%) of the intervention patients actually received the IC services: 90% hospital-at-home and 56% within 10 days of hospital discharge. These patients were matched with a random sample from the control group. The IC group had slightly worse NEADL change scores

Table 1. Baseline characteristics of the intervention and control groups

		Intervention group (n = 848)	Control group (n = 800)
Age (years)	Median	85	83
	Range	66–100	63–104
Sex	Male	278 (32.8%)	241 (30.1%)
	Female	570 (67.2%)	559 (69.9%)
Accommodation	Lives alone	374 (44.2%)	382 (47.8%)
	Not alone	221 (26.1%)	212 (26.5%)
	Sheltered	138 (16.3%)	123 (15.4%)
	Residential care	93 (11.0%)	59 (7.4%)
	Nursing home	20 (2.4%)	24 (3.0%)
Mental test score		(n = 833)	(n = 795)
	Median	8	8
	Range	0–10	0–10
	Score ≤7	326 (39.1%)	348 (43.8%)
Barthel Index score		(n = 848)	(n = 800)
	Median	15	15
	Range	0–20	0–20
NEADL score		(n = 848)	(n = 799)
	Median	7	8
	Range	0–20	0–20
HAD: anxiety		(n = 720)	(n = 461)
	Median	5	6
	Range	0–21	0–19
HAD: depression		(n = 720)	(n = 461)
	Median	5	5
	Range	0–20	0–21

NEADL, Nottingham Activities of Daily Living score; HAD, Hospital Anxiety and Depression score.

Table 2. The mean differences (standard deviation) of the Nottingham Extended Activities of Daily Living (NEADL), Barthel Index (BI), and Hospital Anxiety and Depression (HAD) scores[a]

	Intervention group (n = 848)	Control group (n = 800)	Difference of the means (95%CI)
NEADL	(n = 624)	(n = 589)	
3 months	–1.72 (3.49)	–1.36 (3.29)	–0.36 (–0.74 to 0.02)
6 months	(n = 597)	(n = 556)	
12 months	–2.01 (3.63)	–1.72 (3.26)	–0.29 (–0.69 to 0.11)
	(n = 483)	(n = 490)	
	–2.23 (3.69)	–2.51 (3.65)	0.28 (–0.18 to 0.74)
BI			
3 months	(n = 689)	(n = 613)	
	0.80 (3.57)	0.68 (3.40)	0.12 (–0.26 to 0.50)
6 months	(n = 621)	(n = 567)	
	0.43 (4.05)	0.52 (3.76)	–0.10 (–0.54 to 0.35)
12 months	(n = 491)	(n = 499)	
	0.34 (3.75)	0.04 (4.30)	0.30 (–0.21 to 0.80)
HAD: anxiety			
3 months	(n = 517)	(n = 345)	
	–0.20 (3.66)	–0.11 (3.83)	–0.08 (–0.59 to 0.43)
	'Cases' = 12%	'Cases' = 18%	
6 months	(n = 466)	(n = 304)	
	–0.07 (4.01)	–0.59 (3.92)	0.52 (–0.05 to 1.10)
	'Cases' = 14%	'Cases' = 15%	
12 months	(n = 372)	(n = 260)	
	–0.33 (4.10)	–0.57 (4.01)	0.23 (–0.41 to 0.87)
	'Cases' = 13%	'Cases' = 15%	
HAD: depression			
3 months	(n = 518)	(n = 344)	
	0.57 (4.01)	1.03 (3.83)	–0.46 (–0.99 to 0.08)
	'Cases' = 10%	'Cases' = 16%	
6 months	(n = 466)	(n = 303)	
	0.49 (4.61)	0.91 (3.70)	–0.42 (–1.04 to 0.20)
	'Cases' = 12%	'Cases' = 16%	
12 months	(n = 372)	(n = 259)	
	0.62 (4.16)	0.10 (4.04)	0.52 (–0.14 to 1.17)
	'Cases' = 10%	'Cases' = 16%	
Mortality	(n = 848)	(n = 800)	
3 months	156 (18.4%)	20.8%	–2.4% (–6.2 to 1.5)
6 months	225 (26.5%)	29.0%	–2.5% (–6.8 to 1.9)
12 months	333 (39.3%)	37.6%	1.6% (–3.1 to 6.3)
Hospital use: readmissions per patient (SD)			
3 months	0.26 (0.56)	0.28 (0.66)	–0.03 (–0.09 to – 0.04)
6 months	0.44 (0.85)	0.41 (0.79)	0.03 (–0.05 to 0.11)
12 months	0.98 (1.45)	0.81 (1.12)	0.18 (0.02 to 0.34)
Hospital use: no. of days (SD)			
3 months	4.7 (14.1)	3.8 (11.6)	0.9 (–0.5 to 2.4)
6 months	7.6 (18.4)	5.8 (15.6)	1.77 (0.12 to 3.42)
12 months	14.9 (28.1)	12.3 (24.9)	2.6 (–0.7 to 5.9)
New institutional care placements			
3 months	142/482 (29.5%)	137/459 (29.8%)	–0.4% (–6.2 to 5.5)
6 months	137/437 (31.4%)	131/421 (31.1%)	0.2% (–6.0 to 6.5)
12 months	109/347 (31.4%)	138/373 (37.0%)	–5.6% (–12.5 to 1.4)

[a]Scores are between baseline and 3, 6 and 12 month reassessments for the intervention and control groups with between-group comparisons by the difference of the means (95% CIs). Mortality is number (percentage) between baseline and each reassessment point. Hospital use is number of episodes, and days, per patient with group means (SD) between baseline and each reassessment point. New institutional placement is number and percentage (denominator is number of patients living at home) between each reassessment point.

compared with the controls at all assessment times (Table 3), though statistical non-inferiority was demonstrated when adjustment for deaths was undertaken (Wilcoxon matched pairs signed rank sum test P = 0.008). Mortality and new institutional care placements were similar but hospital use over the 12 months of the study was greater for the IC group (+8 days; 95% CIs 3.1–13.0).

Discussion

This study was designed to assess the clinical consequences of a new city-wide policy of care closer to home for older people delivered through sector-based, multi-disciplinary, multi-agency IC teams. The service was established following considerable joint health and social care planning, and was well resourced [8]. Our target study population was frail older people—the principal recipient group proposed for IC services [4]. Our definition of frailty was a pragmatic one based on the non-specific ill-health syndromes (falls, confusion, incontinence and immobility) through which frail older people commonly present to health and social care services [17]. Patients were recruited only from specialist elderly care wards for which there is strong evidence that medium-term outcomes are optimised [7]. Patients who had

Table 3. The results of the embedded case–control study with the mean differences (standard deviation) of the Nottingham Extended Activities of Daily Living (NEADL), Barthel Index (BI) and Hospital Anxiety and Depression (HAD) scores[a]

	Intermediate care group (n = 246)	Control group (n = 246)	Difference of the means (95%CI)
NEADL	(n = 206)	(n = 188)	(n = 156)
3 months	–2.44 (3.88)	–1.39 (3.40)	–0.95 (–1.72 to –0.18)
6 months	(n = 190)	(n = 178)	(n = 140)
12 months	–2.63 (3.69)	–1.92 (3.27)	–0.51(–1.30 to 0.29)
	(n = 155)	(n = 157)	(n = 99)
	–3.26 (3.83)	–2.79 (3.72)	–0.18 (–1.16 to 0.80)
BI			
3 months	(n = 221)	(n = 195)	(n = 174)
	0.66 (4.17)	0.79 (3.27)	–0.34 (–1.04 to 0.35)
6 months	(n = 196)	(n = 181)	(n = 145)
	0.50 (4.48)	0.66 (3.68)	–0.35 (–1.25 to 0.54)
12 months	(n = 156)	(n = 160)	(n = 101)
	0.38 (4.44)	0.14 (4.23)	0.10 (–1.00 to 1.20)
HAD: anxiety			
3 months	(n = 176)	(n = 112)	(n = 83)
	–0.93 (3.60)	0.27 (3.59)	–0.98 (–2.26 to 0.31)
	'Cases' = 9%	'Cases' = 12%	
6 months	(n = 156)	(n = 98)	(n = 69)
	–0.24 (4.45)	–0.74 (3.78)	0.30 (–1.18 to 1.79)
	'Cases' = 13%	'Cases' = 17%	
12 months	(n = 121)	(n = 82)	(n = 46)
	–0.67 (4.29)	–0.56 (3.22)	0.48 (–1.17 to 2.13)
	'Cases' = 15%	'Cases' = 17%	
HAD: depression			
3 months	(n = 177)	(n = 111)	(n = 84)
	0.54 (3.72)	1.95 (4.12)	–0.56 (–0.04 to 0.13)
	'Cases' = 9%	'Cases' = 18%	
6 months	(n = 156)	(n = 97)	(n = 68)
	0.68 (4.55)	1.03 (3.36)	0.01 (–1.45 to 1.48)
	'Cases' = 12%	'Cases' = 19%	
12 months	(n = 121)	(n = 81)	(n = 46)
	0.42 (3.81)	0.43 (3.71)	0.48 (–1.06 to 2.02)
	'Cases' = 9%	'Cases' = 19%	
Mortality	(n = 246)	(n = 246)	
3 months	24 (9.8%)	44 (17.9%)	–8.1% (–14.3 to –1.9)
6 months	49 (19.9%)	65 (26.4%)	–6.5% (–13.9 to 0.9)
12 months	86 (35.0%)	86 (35.0%)	0.0% (–8.4 to 8.4)
Hospital use: readmissions per patient (SD)			
3 months	0.25 (0.45)	0.21 (0.48)	0.04 (–0.04 to 0.13)
6 months	0.54 (0.87)	0.41 (0.73)	0.13 (–0.01 to 0.26)
12 months	0.92 (1.28)	0.63 (0.99)	0.29 (0.09 to 0.49)
Hospital use: no. of days (SD)			
3 months	5.3 (15.8)	2.5 (9.0)	2.7 (0.4 to 5.1)
6 months	10.2 (21.1)	6.2 (16.1)	4.0 (0.6 to 7.5)
12 months	17.8 (31.8)	9.8 (22.3)	8.0 (3.1 to 13.0)
New institutional care placements			
3 months	53/164 (32.3%)	43/147 (29.3%)	2.4% (–8.9 to 13.6)
6 months	50/146 (34.2%)	42/134 (31.3%)	1.9% (–10.1 to 14.0)
12 months	44/119 (37.0%)	41/117 (35.0%)	2.8% (–12.6 to 18.2)

[a]Scores are between baseline and 3, 6 and 12 month reassessments for the intermediate care and matched control groups with between-group comparisons by the difference of the means (95% CIs). Mortality is number (percentage) between baseline and each reassessment point. Hospital use is number of episodes, and days, per patient with group means (SD) between baseline and each reassessment point. New institutional placement is number and percentage (denominator is number of patients living at home) between each reassessment point.

recovered rapidly and were discharged within 7 days of admission were excluded from the study (unlikely to be frail), and also those patients considered by their clinicians to have advanced disease with a poor short-term prognosis. The resulting study population was largely community dwelling, but disabled, and a high proportion had mental impairment.

Important strengths of the study were the successful recruitment of a substantial population of frail older people (n = 1,648) and the near complete (97%) follow-up of the patients. The new city-wide IC service was associated with similar clinical and resource use outcomes over the 12 months of follow-up. However, these findings might have been affected by the lower than anticipated uptake of IC in the intervention group. An embedded case–control study was therefore constructed by matching the 246 intervention patients receiving IC with patients randomly selected from the control group. In this analysis there was evidence that the NEADL change scores were statistically worse in the IC group, though this effect was lost when adjustment for deaths was made. Additionally, the IC group used more hospital bed days over the 12 months (+8 days). The case–control study

may have been underpowered to demonstrate changes in independence associated with the IC service but the upper limit for the 95% CIs for the between-group NEADL score differences were less than one score point, suggesting a clinically meaningful difference is unlikely to have been missed. Also, the NEADL measure may have lacked sensitivity to change. However, it has successfully discriminated between groups in an evaluation of an early discharge rehabilitation service—a service similar to the one in our study [18].

The confounding of intervention introduction and time is well recognised as an important threat to internal validity in quasi-experimental studies [19]. In our study, the introduction of IC coincided with the implementation of PCTs but there were no major changes in community service delivery other than the implementation of IC. The impact of seasonality was controlled for by the patient groups being recruited during similar 6-month periods before, and after, the introduction of the IC service.

The predominant form of IC received by the patients in the intervention group was a hospital-at-home service in which daily supportive care is augmented by a process of rehabilitation. A summary of the randomised controlled trial evidence (16 trials) has demonstrated reduced hospital bed use associated with hospital-at-home care [20]. Our study, investigating IC in a context in which patient selection and management are less influenced by research processes, indicates that this outcome may not be realised in clinical practice. Within the methodological constraints of our quasi-experimental study design, the new IC service was clinically safe (similar independence, mood state and mortality outcomes), but had no impact on institutional care placements and may have been associated with an increase in hospital use. The lower than anticipated contact of the IC services with our group of frail older people, compounded by the apparent delay in service engagement (44% of patients receiving IC did so more than 10 days after discharge), are also important findings. They suggest that close integration of IC with other older peoples services, a factor considered important to successful IC [21], has not been adequately achieved.

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Appendix 1

Some details of one of the primary care trust-based intermediate care (IC) teams are given below. There were three such teams involved in this evaluation. Each team serves a population of approximately 115,000 people, of whom about 7% are over 75 years.

Staffing structure

a) Nurses: five (one G grade; one F grade; three E grades)
b) Occupational therapists: two (Senior II)
c) Physiotherapists: two (Senior II)
d) Care assistants: 15 (B grade) as generic helpers for nurses and therapists
e) Dietician: 0.5 WTE
f) Access to community psychiatric nurses on a direct referral basis

Process of care

Patients in hospital considered by the ward team as candidates for IC are referred to a joint care manager who

assesses the patient and commissions IC from the above team if it is agreed that the patient has potential to benefit from further rehabilitation. Patients are also referred to the joint care manager by the primary health care team. Patients accepted for IC are then assessed by each discipline in the IC team and a care plan developed with delivery by the care assistants. Patients receive input for up to 6 weeks, according to need.

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Renal transplantation in the elderly: does patient age determine the results?

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Abstract

Background: transplantation is the best treatment for patients with chronic renal failure, including the elderly. However, the patient's age was traditionally considered as a relative contraindication for it.
Objective: to compare the results of renal transplantation in patients over and under 60 years of age.
Methods: analysis of 621 transplant recipients in Galicia (Spain) between 1996 and 2000, divided into two groups, according to age over 60 years (484) or under 60 years (137). The actuarial method, Kaplan–Meier curves, log-rank test and Cox proportional hazard model were used to study survival.
Results: graft survival for those aged under 60 years was 82% and 70% at 1 and 5 years, while it was 73% and 56% for those over 60 years. However, censuring the deceased patients with a functioning graft, it was 84% and 76% for those aged under 60 years and 83% and 77% for those over 60 years. A total of 47% of the graft losses in the group over 60 years were due to the patient's death. Overall graft survival for all the patients was greater ($P < 0.0001$) when the donor was under 60 years of age.
Conclusions: recipient age alone cannot be a criterion to exclude patients over 60 years from transplantation, since their lower survival is influenced by comorbidity and the donor's age.

Keywords: *elderly patients, renal transplantation, graft survival, mortality*

Introduction

Life expectancy has increased in recent decades, so that those over 60 years represent an important segment of the general population. Thus, more than a quarter of the citizens in North-West Spain are older than this age [1]. Due to the characteristics of chronic renal disease, which increases with age, these demographic changes are clearly reflected in the population affected. Thus, this disease's incidence and prevalence have doubled in those over 60 in the United States during the last decade, representing more than 60% of the patients who initiated renal substitutive treatment in the year 2002 [2]. This percentage is similar to that of European countries [3] and there is even a significant proportion of those over 80, for whom renal replacement therapy is still an effective treatment [4].

Traditionally, the patient's age was considered as a relative contraindication for renal transplantation. This is fundamentally due to the elevated comorbidity of the elderly undergoing renal replacement therapy and because the scarcity of donors encouraged the selection of those recipients who presumably