Stewardship or clinical freedom? Variations in dialysis decision making

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Abstract

Background. It is generally agreed that acceptance criteria for dialysis have varied and changed over time and that implicit rationing, to some extent forced on clinicians by limited capacity, has been widely practised. Our objective was to study the basis and extent of variation in dialysis decision making among nephrologists in one NHS region.

Design and methods. In a clinical judgement analysis, linear regression models were employed to reflect the impact of clinical and non-clinical cues on nephrologists’ decisions to offer dialysis to 60 ‘paper patients’ under current capacity constraints and under an assumption of no capacity limit. A short questionnaire was also completed by eight nephrologists to elicit their expressed decision drivers, which were subsequently compared with those tacitly derived from the appraisal of the 60 clinical vignettes.

Results. Doctors showed substantial variation in their propensity to offer dialysis and in their perceptions of the benefits of dialysis. Even for the five patients where the discordance in propensity to offer dialysis was least, the range in perceived gain in life expectancy was from 24 to 264 months (mean 91 months). The decision models had relatively good explanatory power with an average $r^2$ of 0.67 (0.39–0.90) and 0.70 (0.47–0.95) for decisions made under current capacity constraints and under an assumption of no capacity limit. A short questionnaire was also completed by eight nephrologists to elicit their expressed decision drivers, which were subsequently compared with those tacitly derived from the appraisal of the 60 clinical vignettes.

Conclusions. The extent to which doctors vary in their propensity to offer dialysis is substantial. Very few non-clinical cues appear to influence the decision to offer dialysis. The most important non-renal factor in determining dialysis decisions was the patient’s mental state.

Keywords: analysis; clinical; decision making; dialysis; judgement

Introduction

In 1993 the Department of Health, in its Health of the Nation strategy, accorded a relatively high priority to services for end-stage renal failure by setting a target acceptance rate for renal replacement therapy (RRT) of 80 new patients per million. Though the UK rate in the early 1980s was barely 30 per million, the challenge to achieve the new target varied across the country. It is generally agreed that acceptance criteria also varied and have changed over time and that implicit rationing [1,2], to some extent forced on clinicians by limited capacity, has been widely practised. This can only get worse, as RRT is expensive and the number of patients receiving such treatment in England is predicted to rise by 50–100% over the next 15 years [3]. However, despite the regional and international variation in the preferred treatment modality (haemodialysis (HD) vs continuous ambulatory peritoneal dialysis (CAPD)), a recent systematic review concluded that available data did not permit reliable conclusions to be drawn about their relative effectiveness or efficiency [4].

The Renal Association has recognized the dilemma and urged nephrologists to agree local guidelines to ensure that all patients are offered treatment appropriate to their needs. The Association has not specified
how local consensus might be secured, but a Health Technology Assessment report has recently examined the advantages and disadvantages of a number of options [5]. In it a call is made for more explicit methods of quantitative judgement analysis. As a first step in developing consensus in one region serving a population of 1.6 million, we have used clinical judgement analysis to better describe the basis of local dialysis decision making, to establish whether differences between clinicians arise out of differences in how they attend to non-renal and demographic factors and to highlight how the important determinants might be affected by the perceived resource constraints.

Subjects and methods

Patients and population

Northern Ireland is served by a team of six nephrologists based at the Regional centre in the Belfast City Hospital (with access to 34 stations providing three shifts per day) which networks closely with three other consultant-led sub-regional facilities (with access to a combined total of the equivalent of 19 stations operating three shifts per day) based in provincial towns between 20 and 60 miles away. Over a 10-year period between 1987/88 and 1997/98 the annual acceptance rate for renal replacement therapy in Northern Ireland rose from 40 per million to 109 per million. Over this period a detailed clinical database, which meets and surpasses all the requirements of the European Dialysis and Transplant Association, has been held by the regional unit on all patients entering the RRT programme. From this sampling frame we drew a random sample of 100 sets of case-notes from patients registered over the last 5 years. From those with sufficient information we devised a series of 60 ‘paper cases’ or clinical vignettes. Ten of these were duplicates. Two consultant nephrologists advised on the design of the vignettes. We deliberately included six cases who had been referred but not accepted onto the RRT programme. For each case, a short series of questions was posed on which eight doctors were to give a view, including their perception of the benefits of RRT for the quality and duration of life of that patient and the likelihood (on a visual analogue scale) of their offering dialysis to that individual under current capacity restraints and under an assumption of unlimited capacity. One of the nephrologists pre-piloted the exercise to assess the clarity of the task and the length of time required for its completion. An example of one of the ‘paper’ cases is given in Figure 1. Prior to their assessment of the vignettes, each nephrologist was asked, in a short questionnaire, to attempt to specify the relative impact that various clinical cues had on their decisions to offer dialysis.

Statistical methods

Multiple regression analysis was used to express the relationship between judgements about the likelihood of offering dialysis and the demographic and clinical cues describing the cases. Stepwise (backwards) elimination of variables was used to select these for the decision making model. To minimize the risk of rejecting cues inappropriately, we set a relatively conservative $P$ value of 0.10. The contribution of each cue to the model is represented by its contribution to $r^2$, which is assessed by dropping each variable in turn from the model (the change in the type II sum of squares, $cr^2$).

We also compared equations from different judges in terms of the $cr^2$ relative to that of all the other cues in the equation ($cr^2$)—a method that standardizes for variation in the models explanatory power. Though neither method overcomes entirely the problem of collinearity, the rank order of importance of the cues in the decision models was not changed. The regression coefficients represent the strength of the effect on the dependent variable. Categorical variables (with n categories) were fitted when appropriate, using $n$−1 dummy variables.

Results

There was a substantial variation in the doctors’ propensity to offer dialysis to these patients. Figure 2a illustrates this for the five patients where the discordance among the doctors was greatest. Figure 2b shows a similarly broad range in their perception of the capacity of dialysis to affect the patient’s quality of life. Interestingly, of the six patients included in the case series who had been referred for assessment but not actually offered dialysis, five would have been offered dialysis by at least one of the eight participating doctors. Despite the wide between-doctor variation, the intra-class correlation coefficients for the duplicate cases were all quite high (mean 0.87).

There was a similarly wide range in the perceptions of the benefits of dialysis for such patients. For example, even for the five patients where the discordance in propensity to offer dialysis was least, the range in perceived gain in life expectancy was from 24 to 264 months (mean 91 months). Two of our participants felt that they might have contributed disproportionately to the variation across doctors by being more inclined to interpret the judgement as the patients’ immediate need to commence dialysis on the same day. This impression was not borne out by comparing the distribution of their responses with those of the other six doctors (data not shown).

A model was then derived in respect of each nephrologist’s decisions to offer dialysis, firstly under current capacity constraints and then under an assumption of no capacity limit.

Table 1 provides the results for each of the eight doctors while Figure 3 shows the range in the magnitude of the beta coefficients for the clinical cues. While the range in coefficients is apparent from the Figure, comparing individual doctors under the two capacity assumptions is difficult. Table 2 thus shows how the change in assumed capacity affected individual doctors for the main non-renal patient cues (mental state, independence in daily living, distance from the dialysis centre and co-morbidity). What is immediately apparent from this table is that the impact of the patient’s mental state vastly outweighs that of the other non-renal factors. Also, for several doctors, for whom one of these non-renal factors had a significant bearing on the likelihood of offering dialysis, the effect disappeared under the ‘no capacity limit’ assumption.

Finally, in Figure 4 we have compared the doctors
Variations in dialysis decision making

Please examine the patient's details given below and respond to the questions at the bottom of the page.

<table>
<thead>
<tr>
<th>AGE</th>
<th>37</th>
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</table>
| INDEPENDENCE WITH RESPECT TO ACTIVITIES OF DAILY LIVING PRIOR TO ESRF PRESENTATION | HIGH |}
| MENTAL STATE | NORMAL                  |
| TRAVEL TIME FROM HOME TO TREATMENT CENTRE | 30–59 MINS |
| URAEMIC SYMPTOMATOLOGY | YES |
| HAEMOGLOBIN (g/dL) | 6.9 |
| SERUM CREATININE (umol/l) | 1398 |
| REFRACTORY HYPERTENSION / BP | NO – 180/120 |
| HISTORY OF DIABETES | NO |
| HISTORY OF HEART FAILURE/CORONARY ARTERY DISEASE/PVD | NO |
| HEPATITIS B STATUS | NEGATIVE |

Indicate your view on the following questions by drawing a short vertical line somewhere on the horizontal lines below.

1. (a) How much will adequate haemodialysis affect the quality of life of this patient?

Regain pre ESRF quality

Worse quality imaginable

No effect

1. (b) By undertaking adequate haemodialysis in this patient now, what do you estimate will be the gain in life expectancy?

Years   Months

Given the characteristics of this case, how likely are you to offer dialysis now?

2.(a) Assuming the current sessional capacity of your unit:

Definitely not

Definitely yes

2.(b) Assuming that capacity was not limited:

Definitely not

Definitely yes

Fig. 1. One of the 'paper' cases.
Fig. 2a. Most discordant cases concerning doctors’ propensity to offer dialysis under current capacity constraints.

**Case 3**
- Age: 60
- Independence = High (functions on own)
- Mental State = Normal for age
- Travel Time = <30 mins
- Uraemic Symptomatology = No
- Haemoglobin (g/dL) = 7.4
- Serum Creatinine (umol/L) = 1055
- Refractory Hypertension/BP = No - 156/80
- History of Diabetes = No
- History of Heart Failure/CAD/PVD = No
- Hepatitis B Status = Negative

**Case 13**
- Age: 55
- Independence = High (functions on own)
- Mental State = Normal for age
- Travel Time = 30-59 mins
- Uraemic Symptomatology = No
- Haemoglobin (g/dL) = 10.4
- Serum Creatinine (umol/L) = 620
- Refractory Hypertension/BP = No - 110/70
- History of Diabetes = Yes
- History of Heart Failure/CAD/PVD = Yes
- Hepatitis B Status = Negative

**Case 14**
- Age: 29
- Independence = High (functions on own)
- Mental State = Normal for age
- Travel Time = 30-59 mins
- Uraemic Symptomatology = No
- Haemoglobin (g/dL) = 10.3
- Serum Creatinine (umol/L) = 713
- Refractory Hypertension/BP = No - 110/80
- History of Diabetes = No
- History of Heart Failure/CAD/PVD = No
- Hepatitis B Status = Negative

**Case 25**
- Age: 27
- Independence = High (functions on own)
- Mental State = Normal for age
- Travel Time = 30-59 mins
- Uraemic Symptomatology = Yes
- Haemoglobin (g/dL) = 10.3
- Serum Creatinine (umol/L) = 713
- Refractory Hypertension/BP = No - 130/80
- History of Diabetes = No
- History of Heart Failure/CAD/PVD = No
- Hepatitis B Status = Negative

**Case 26**
- Age: 33
- Independence = High (functions on own)
- Mental State = Normal for age
- Travel Time = >60 mins
- Uraemic Symptomatology = No
- Haemoglobin (g/dL) = 10.9
- Serum Creatinine (umol/L) = 837
- Refractory Hypertension/BP = No - 130/80
- History of Diabetes = No
- History of Heart Failure/CAD/PVD = No
- Hepatitis B Status = Negative
Fig. 2b. Doctors’ perception of enhanced quality of life for five cases with least discordance concerning doctors’ propensity to offer dialysis.
stated or expressed decision drivers, under current capacity constraints, with those tacitly derived from their decision model. Ranking the cues in order of importance (in terms of their contribution to that doctor’s decisions), we then calculated the Spearman’s rank order correlation coefficient between the stated and tacit models. In this latter case we felt it more logical to use a fully saturated model (and the respective contribution to the total sum of squares) as the questionnaire to obtain the expressed weights had asked the doctors to ensure summation to 100. As the figure and the coefficients in Table 3 show, the degree of concordance is modest.

### Discussion

We have shown that even in a single region (where weekly team meetings and postgraduate seminars are the norm) the degree of variation in dialysis decision making is considerable. A reduction in interpersonal variation in judgement is an essential pre-requisite to co-operative decision making and the use of clinical decision analysis to reveal the systematic element of these variations, as described in the recent HTA report [5], seems to provide an avenue for reaching agreed policies. While some might criticize the ostensibly ‘artificial’ method of appraising paper patients, several studies have demonstrated that judgements made in response to paper cases resemble those made with actual patients and that ‘process’ or ‘cognitive’ feedback (i.e. revealing cue weights) can surpass the agreement between clinicians that mere discussion and exchange of ideas might achieve [6].

It might be argued that a shortcoming of our study is that we have only investigated clinical behaviour among consultant nephrologists in one region but it would be very difficult to argue that the variation in decision making is likely to be less in a larger national sample. All but one of the consultants in this study had undertaken some of their postgraduate training in centres outside Northern Ireland, both in Britain and North America and this is not uncharacteristic of many of today’s specialists.

Several previous attempts have been made to describe and explain variations in decisions to initiate or withdraw dialysis. One recent study has described the area-level variations in uptake across England for 1991/92 and related this to the characteristics of the populations served [7]. The authors showed that females and particularly elderly females were significantly under-represented and that rates of uptake were lower among populations living further from dialysis centres. The methodology adopted, however, was not designed to study the nephrologists’ decision making for individual cases and it is possible that some of the variation observed reflects on referral practice rather than decision making in the dialysis centres.

In one form or another many other studies have used written case scenarios to assess differences in decision making. Most have surveyed large numbers

<table>
<thead>
<tr>
<th>Judge</th>
<th>Age</th>
<th>Independence</th>
<th>Mental state</th>
<th>History of heart disease</th>
<th>Refractory hypertension</th>
<th>History of diabetes</th>
<th>Serum creatinine</th>
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Fig. 3. Beta-coefficients for clinical cues in decision models. Age per decade of age; Indep: independence, Needs outside help or assistance from family vs functioning on own; Mental, mental state, temporarily on permanently confused vs normal for age; Travel, travel time >60 vs ≤60 min; Uraem, uraemic symptomatology yes vs no; Haemgl, haemoglobin, per g/dl; Creatin, serum creatinine, per 100 μmol/l; Refractn, refractory hypertension, yes vs no; Diabetes, history of diabetes, yes vs no; Heartdis, history of heart disease/coronary artery disease/PVD, yes vs no; Hepb, hepatitis B and HIV, yes vs no.

No capacity limit

Current capacity constraints
Table 2. Unstandardized beta-coefficients for non-renal cues

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<th>Doctor</th>
<th>Age</th>
<th>Indep</th>
<th>Mental</th>
<th>Travel</th>
<th>Ref hyp</th>
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Offer 1, current capacity constraints; Offer 2, no capacity limit.
Age, per decade of age; Indep, independence, needs outside help or assistance from family vs functions on own; Mental, mental state, temporarily or permanently confused vs normal for age; Travel, travel time, >60 vs ≤60 min; Ref hyp, refractory hypertension, yes vs no; Diabetes, history of diabetes, yes vs no; Heart dis, history of heart disease/coronary artery disease/PVD, yes vs no; Hep B, hepatitis B and HIV, yes vs no.

For the cases where discordance among the doctors was substantial, the situation was quite different. The cases where there was substantial variation in the estimations of the patients' future life span or the need for further treatment were mostly those where the patients were in the early stages of their disease or where the patients had comorbidities. In these cases, the doctors' perceptions of the patients' quality of life seemed to play a significant role in their decision-making. The doctors' views on the extent of or the need for dialysis were the result of the doctors' own perception of the patients' quality-of-life, as well as the perception of the patients' perceived quality-adjusted survival.

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Fig. 4.
Fig. 4. Comparison of doctors’ expressed and derived decision drivers under current capacity constraints.
cancer therapy, would be either feasible or effective in renal medicine.

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**References**


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