Using geographical information systems to plan dialysis facility provision

Sir,

We read Toubiana et al.’s article on geographical information systems (GIS) with interest [1]. They suggest that GIS may be used to plan healthcare delivery, and we can confirm that. In Scotland, the government provides funding for universal healthcare to 15 National Health Service (NHS) Boards, with the level of funding based on population, deprivation and rurality. These Boards are responsible both for the strategic planning and the delivery of all healthcare. The Scottish government has set a target that all patients should be able to access a haemodialysis unit within 30 minutes of their home, ‘within the constraints of population density and geography’ [2]. Previous research has confirmed that travelling times in excess of 37 minutes impact on take-on rates and thus presumably patient survival [3]. Furthermore, a Scottish Renal Association patient survey identified travelling time as the single greatest concern for patients (B.J.R. Junor, personal communication). Scotland has one of the most challenging geographical situations in Europe for the provision of dialysis, with a low population density of 65 people/km² (ranging from 8 to 1560 people/km² in the fifteen NHS Boards), and 99,638 people (2% of the population) living on 55 islands [4], with frequently difficult weather conditions.

NHS Dumfries and Galloway is one of the more rural NHS Boards with a population of 147,210 and a population density of 23 people/km² [4]. Currently, there is only one dialysis unit, in the main town of Dumfries. As a result the Board fails the government target badly, with 45% of renal replacement therapy (RRT) patients living >30 minutes from a dialysis facility (compared to a Scottish average of 15,000 miles per year) solely for the purpose of dialysis, with 45% of renal replacement therapy (RRT) patients living >30 minutes from a dialysis facility (compared to a Scottish average of 15,000 miles per year) solely for the purpose of dialysis, with 2% of the population living on 55 islands [4], with frequently difficult weather conditions.


Table 1. Patient travelling time to the closest dialysis facility: impact of two proposed sites for a new satellite dialysis unit

<table>
<thead>
<tr>
<th></th>
<th>Current situation</th>
<th>Option 1 (Garrick)</th>
<th>Option 2 (Newton Stewart)</th>
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</thead>
<tbody>
<tr>
<td>Median travel-time</td>
<td>28 (1–113) min</td>
<td>22 (1–63) min</td>
<td>26 (1–57) min</td>
</tr>
<tr>
<td>Patients exceeding 30 min target</td>
<td>44.8%</td>
<td>25.6%</td>
<td>33.9%</td>
</tr>
<tr>
<td>D&amp;G patients closer to A&amp;A dialysis unit</td>
<td>17.3%</td>
<td>1.1%</td>
<td>1.1%</td>
</tr>
<tr>
<td>A&amp;A patients closer to D&amp;G dialysis unit</td>
<td>0%</td>
<td>3.5%</td>
<td>3.5%</td>
</tr>
</tbody>
</table>

We believe this approach allows evidence-based planning of the provision of healthcare facilities, and is also useful in identifying gaps in provision. It is likely that such an approach would still be of value in countries with other funding and organizational structures, as long as complete data on the location of dialysis patients and facilities were freely available. We are currently applying the same approach on a whole-country basis, and our preliminary data are available on the same website (http://www.show.scot.nhs.uk/srr/Publications/Travelling_Time_Preliminary_Report.pdf). Areas of under-provision are clearly identified, according to government targets. Our experience suggests that this approach should be used routinely in healthcare planning.
Fig. 1. Patient travelling time to the dialysis unit. Shaded areas represent 30 min isochrones around existing and proposed dialysis units. Bars represent the number of patients exceeding 30 minutes travelling time in each postcode sector (postcode unit data are amalgamated into sectors in the map to protect patient anonymity). (A) Impact of opening unit at Newton Stewart Hospital. (B) Impact of opening unit at Garrick Hospital.
Geographical Information Systems (GIS) may contribute to the assurance of ongoing evaluation and critical review of dialysis or transplantation programmes based on analysis of health status and service utilization data. GIS permits the elaboration of scenarios supporting more effective planning for dialysis as well as for transplantation services. For governance assessment, GIS may contribute to improving efficiency, effectiveness and quality. GIS permits the elaboration of scenarios supporting more effective planning for dialysis as well as for transplantation services. For governance assessment, GIS may contribute to the assurance of ongoing evaluation and critical review of dialysis or transplantation programmes based on analysis of health status and service utilization data. For governance assessment, GIS may contribute to the assurance of ongoing evaluation and critical review of dialysis or transplantation programmes based on analysis of health status and service utilization data.


doi:10.1093/ndt/gfh869

Advance Access publication 3 May 2005

**Reply**

Sir,

MacGregor et al. give an interesting example of the utility of Geographical Information Systems (GIS) in the planning of dialysis facility provisions. In effect, GIS permits decision-making for health programmes at local, state and governance assessment levels [United States National Public Health Performance Standards Program http://www.phppo.cdc.gov/nphpsp/EssentialPublicHealthServices.asp]. For local assessment, GIS demonstrates accessibility and quality of services delivered and the effectiveness of personal and population-based programmes provided. This level provides information necessary for allocating resources and reshaping programmes. For state assessment, GIS may contribute to the evaluation of patients’ health status and service utilization data, helping to assess programme effectiveness and to provide information necessary for allocating resources and reshaping dialysis and renal transplantation programmes to improve efficiency, effectiveness and quality. GIS permits the elaboration of scenarios supporting more effective planning for dialysis as well as for transplantation services. For governance assessment, GIS may contribute to the assurance of ongoing evaluation and critical review of dialysis or transplantation programmes based on analysis of health status and service utilization data.

Sir,

We read with great interest the article by Voytovich et al. [1], demonstrating the beneficial effect of a new insulin sensitizer, rosiglitazone, in renal transplant recipients. They concluded that short-term treatment with rosiglitazone improves glucose tolerance, insulin sensitivity and endothelial function in this group of patients.

The treatment modalities for diabetes mellitus and glucose intolerance include lifestyle modification, diet, exercise and pharmacologic intervention [2]. In this study, the authors did not give any information on dietary intervention, which is the mean predictor of the blood glucose level in diabetic and glucose-intolerant patients. Although this was not a crossover study, as the authors reported in the limitations section of the study, it might have been better to give a 4 week study period with a standard diet for all patients, in order to exclude the effect of nutritional factors. Also, seven patients were determined as post-transplant diabetes mellitus (PTDM) according to oral glucose tolerance test (two of them were previously known PTDM), but the authors did not give any information on the patients’ glycohaemoglobin or fructosamine levels, which could be more valuable parameters (not influenced by acute changes in blood glucose) before and after the rosiglitazone, even in a 4 week period. Fructosamine seems to be a more suitable measure in this study design, because it is a more sensitive marker for abnormal glucose tolerance and it reflects 3-4 weeks’ blood glucose control [3].

The main immunosuppressive agents responsible for PTDM are calcineurin inhibitors and steroids. Current evidence shows greater diabetogenity of tacrolimus in multicentre studies [4]. Therefore, it would be interesting to see if there is any correlation in insulin resistance and the response to the rosiglitazone between the patients on cyclosporin or tacrolimus.