Kidney disease: peritoneal dialysis

Costing report
Implementing NICE guidance

July 2011

NICE clinical guideline 125
This costing report accompanies the clinical guideline: ‘Kidney disease: peritoneal dialysis in the treatment of stage 5 chronic kidney disease’ (available online at www.nice.org.uk/guidance/CG125).

**Issue date:** July 2011

This guidance is written in the following context

This report represents the view of the Institute, which was arrived at after careful consideration of the available data and through consulting healthcare professionals. It should be read in conjunction with the NICE guideline. The report and templates are implementation tools and focus on those areas that were considered to have significant impact on resource utilisation.

The cost and activity assessments in the reports are estimates based on a number of assumptions. They provide an indication of the likely impact of the principal recommendations and are not absolute figures. Assumptions used in the report are based on assessment of the national average. Local practice may be different from this, and the template can be amended to reflect local practice to estimate local impact.

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Executive summary

This costing report looks at the resource impact of implementing the NICE guideline ‘Kidney disease: peritoneal dialysis in the treatment of stage 5 chronic kidney disease’ in England.

The costing method adopted is outlined in appendix A; it uses the most accurate data available, was produced in conjunction with key clinicians, and reviewed by clinical and financial professionals.

Supporting implementation

The NICE clinical guideline on peritoneal dialysis is supported by a range of implementation tools available on our website www.nice.org.uk/guidance/CG125 and detailed in the main body of this report.

Significant resource-impact recommendations

This report focuses on the recommendation that is considered to have the greatest resource impact and that will therefore require the most additional resources to implement or can potentially generate savings. This is:

- Consider peritoneal dialysis as the first choice of treatment modality for adults without significant associated comorbidities.

Total cost impact

The annual changes in revenue costs arising from fully implementing the guideline are summarised in the table below.
### Recurrent annual saving at optimal uptake

<table>
<thead>
<tr>
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<td>Unit cost</td>
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<td>1553</td>
<td>32,718</td>
</tr>
<tr>
<td>Totals</td>
<td>21,544</td>
<td>481,290</td>
<td>21,544</td>
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</tbody>
</table>

Abbreviations: APD, automated peritoneal dialysis; CAPD, continuous ambulatory peritoneal dialysis; HD, haemodialysis.

This is an estimate of the recurrent annual cost after uptake of peritoneal dialysis has reached the optimal level, that is, when the population on dialysis consists entirely of people who have been offered peritoneal dialysis as a first choice where appropriate. It is estimated that it could take approximately 20 years to reach optimal uptake.

As NHS organisations budget for the next 3–5 years, we have also estimated the savings that could be realised after 5 years with a conservative increase in the number of people on peritoneal dialysis of 1% each year.

Increased uptake of peritoneal dialysis may be delayed initially if additional staff training is needed to enable patients to be supported in carrying out peritoneal dialysis.
### Potential annual saving after 5 years

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Abbreviations: APD, automated peritoneal dialysis; CAPD, continuous ambulatory peritoneal dialysis; HD, haemodialysis.

### Benefits and savings

Implementing the clinical guideline will bring the following benefits:

- Being on dialysis has a substantial effect on patient’s lives. Offering peritoneal dialysis, if it is suitable, gives patients more choice and flexibility.
- Implementing the guideline may increase the number of adults starting on peritoneal dialysis each year. If more patients start on peritoneal dialysis this will result in savings. The level of savings will depend on the number of patients who start on peritoneal dialysis.
- If the number of adults on peritoneal dialysis in England increases from current levels of approximately 15% (Renal Registry 2010) to the optimal level of 39% (NHS Kidney Care 2009 and expert clinical opinion), there may be annual savings of approximately £20 million nationally.

### Local costing template

The costing template produced to support this guideline enables organisations in England, Wales and Northern Ireland to estimate the impact locally and replace variables with ones that depict the current local position. A sample
calculation using this template showed that additional savings of £38,000 could be made for a population of 100,000.
1 Introduction

1.1 Supporting implementation

1.1.1 The NICE clinical guideline on peritoneal dialysis for people with stage 5 chronic kidney disease is supported by the following implementation tools available on our website www.nice.org.uk/guidance/CG125:

- costing tools
  - a national costing report; this document
  - a local costing template; a simple spreadsheet that can be used to estimate the local cost of implementation.
- baseline assessment tool; assess your baseline against the recommendations in the guidance to prioritise implementation activity, including clinical audit
- podcasts; an expert view on implementing the guidance
- slide set; a framework for discussing the NICE guidance that can assist in local dissemination of the guidance
- clinical case scenarios; example cases designed to improve and assess users' knowledge of the guidance.

1.1.2 A practical guide to implementation, ‘How to put NICE guidance into practice: a guide to implementation for organisations’, is also available to download from the NICE website. It includes advice on establishing organisational level implementation processes as well as detailed steps for people working to implement different types of guidance on the ground.

1.2 What is the aim of this report?

1.2.1 This report provides estimates of the national cost impact arising from implementing guidance on peritoneal dialysis in England. These estimates are based on assumptions about current practice
and predictions of how current practice might change following implementation.

1.2.2 This report aims to help organisations plan for the financial implications of implementing NICE guidance.

1.2.3 This report does not reproduce the NICE guideline on peritoneal dialysis and should be read in conjunction with it (see www.nice.org.uk/guidance/CG125).

1.2.4 The costing template that accompanies this report is designed to help those assessing the resource impact at a local level in England, Wales or Northern Ireland. The costing template may help inform local action plans demonstrating how implementation of the guideline will be achieved.

1.3 Epidemiology of stage 5 chronic kidney disease

1.3.1 In the UK, 400–800 per million of the population at any one time need renal replacement in the form of dialysis. The prevalence of dialysis in the UK is highly age dependent – for people aged 70–80 years it is between 1600 and 2000 people per million.

1.3.2 More than 2% of the NHS budget is spent on renal replacement therapy (dialysis and transplants) for people with established renal failure.

1.4 Models of care

1.4.1 Two main types of dialysis are available, haemodialysis and peritoneal dialysis. The main factors that determine what type of dialysis people choose are lifestyle preferences and feasibility. Factors to take into account include whether the person would prefer to have treatment at home; whether treatment can be delivered at home (not all areas offer home-based options and not all homes are suitable or can be converted to support home
dialysis); access for dialysis; travelling distance to the dialysis centre and availability of places in the centre.

1.4.2 Peritoneal dialysis is administered by the patient, or helper, at home, either overnight while they are asleep (automated peritoneal dialysis [APD] and assisted automated peritoneal dialysis [aAPD]) or continuously (continuous ambulatory peritoneal dialysis [CAPD]).

1.4.3 Haemodialysis is usually administered in a hospital or satellite unit and takes about 4 hours (perhaps more), three times a week. In some cases, haemodialysis is administered at home.

1.4.4 The proportion of people with chronic kidney disease (CKD) starting treatment on home- or hospital-based dialysis, and peritoneal or haemodialysis treatment, varies considerably. The proportion of people with chronic kidney disease using in-centre haemodialysis ranges from 60–100%. It is likely that this variability represents variation in local practice, resources, and in particular the development of aAPD and home haemodialysis programmes.

1.4.5 There is currently no national guidance in England and Wales on supporting people in making informed decisions about renal replacement therapy.

2 Costing methodology

2.1 Process

2.1.1 We use a structured approach for costing clinical guidelines (see appendix A).

2.1.2 We had to make assumptions in the costing model. We developed these assumptions and tested them for reasonableness with members of the Guideline Development Group (GDG) and key clinical practitioners in the NHS.
2.1.3 Because it is estimated that it may take 20 years to reach optimal uptake and the NHS budgets for the next 3–5 years, the costing template estimates both the potential national savings on full implementation and the potential savings after 5 years if the number of people on peritoneal dialysis were to increase by 1% each year.

2.2 Scope of the cost-impact analysis

2.2.1 The guideline offers best practice advice on the care of people with a diagnosis of stage 5 chronic kidney disease who need or who are receiving renal replacement therapy (specifically peritoneal dialysis).

2.2.2 The guidance does not cover people who need or are receiving renal replacement therapy for conditions other than stage 5 chronic kidney disease. Therefore, these issues are outside the scope of the costing work.

2.2.3 We worked with the GDG and other professionals to identify the recommendations that would have the most significant resource impact (see table 1). Costing work has focused on these recommendations.

Table 1 Recommendations with a significant resource impact

<table>
<thead>
<tr>
<th>High-cost recommendation</th>
<th>Recommendation number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offer all people with stage 5 chronic kidney disease a choice of peritoneal dialysis or haemodialysis, if appropriate, but consider peritoneal dialysis as the first choice of treatment modality for:</td>
<td>1.1.9</td>
</tr>
<tr>
<td>- children 2 years old or younger</td>
<td></td>
</tr>
<tr>
<td>- people with residual renal function</td>
<td></td>
</tr>
<tr>
<td>- adults without significant associated comorbidities.</td>
<td></td>
</tr>
</tbody>
</table>

2.2.4 We have limited the consideration of costs and savings to direct costs to the NHS that will arise from implementation. We have not included consequences for the individual, the private sector or the

National costing report: Kidney disease – peritoneal dialysis (July 2011)
not-for-profit sector. Where applicable, any realisable cost savings arising from a change in practice have been offset against the cost of implementing the change.

2.3 Basis of unit costs

2.3.1 The way the NHS is funded has undergone reform with the introduction of ‘Payment by results’, based on a national tariff. The national tariff will be applied to all activity for which Healthcare Resource Groups (HRGs) or other appropriate case-mix measures are available. If a national tariff price or indicative price exists for an activity this has been used as the unit cost; this has then been inflated by the national average market forces factor.

2.3.2 Using these prices ensures that the costs in the report are the cost to the primary care trust (PCT) of commissioning predicted changes in activity at the tariff price, but may not represent the actual cost to individual trusts of delivering the activity.

2.3.3 For new or developing services, for which there is no national average unit cost, organisations already undertaking this activity have been asked their current unit cost.

3 Cost of significant resource-impact recommendation

Recommendation

Offer all people with stage 5 chronic kidney disease a choice of peritoneal dialysis or haemodialysis, if appropriate, but consider peritoneal dialysis as the first choice of treatment modality for:

- children 2 years old or younger
- people with residual renal function
- adults without significant associated comorbidities.
Background

3.1.1 The previously strong presence of peritoneal dialysis in the UK has fallen in the last decade (first modality peritoneal dialysis reduced from 40% to 21%). There is wide variation around the country both in the number of patients on peritoneal dialysis and in the types of dialysis available. It has been shown that 50% of patients given free choice will choose peritoneal dialysis, but the percentage on peritoneal dialysis at 90 days ranges from 0–60% (NHS Kidney Care 2009).

3.1.2 Implementation of the recommendation to consider peritoneal dialysis as a first choice for new patients, if it is appropriate, may result in an increase in the number of new dialysis patients starting on peritoneal dialysis each year. Because peritoneal dialysis is estimated to be less expensive than haemodialysis this is likely to result in savings.

Assumptions made

3.1.3 It is assumed that peritoneal dialysis is already well established as an option for children, so calculations focus on adults older than 18 years.

3.1.4 The proportion of people currently on renal dialysis in England is estimated to be 0.0535% using the adult acceptance rate for 2009 (Renal Registry 2010). The percentage of patients on each modality is also given for each renal centre. The current number of dialysis patients on peritoneal dialysis in England is estimated to be approximately 15%.

3.1.5 According to expert opinion, 10–15% of people will not be suitable for peritoneal dialysis. A mid-point of 12.5% has been used.
3.1.6 NHS Kidney Care (2009) suggests that given informed choice, 50% of new patients (for whom peritoneal dialysis is suitable) would opt for peritoneal dialysis.

3.1.7 Some patients who choose peritoneal dialysis will have to move on to haemodialysis after the procedure to create access fails. In addition to the patients who are unable to start on peritoneal dialysis due to access failure, there may also be a small number of patients who change each year due to infection and adequacy failure. A conservative estimate of 90% has been used to estimate the number of patients who will stay on peritoneal dialysis, based on expert clinical opinion.

3.1.8 It has been assumed that additional patients starting on peritoneal dialysis would have ordinarily started on hospital/satellite haemodialysis and that the number of patients who change from each will be proportional to the current modality split.

3.1.9 Data from the Renal Registry Report 2010 shows that the median remaining life years for patients who currently receive renal replacement therapy is up to 23 years, depending on age. Therefore, by year 23 the prevalent population should consist entirely of patients who have been offered peritoneal dialysis as a first choice and uptake should be at the optimal level (estimated as 39% above). Therefore future practice represents the estimated recurrent annual saving from year 23 onwards.

3.1.10 As NHS organisations budget for the next 3–5 years, we have also estimated the savings that could be realised after 5 years with a conservative increase in the number of people on peritoneal dialysis of 1% each year.

3.1.11 Table 2 summarises the estimated annual unit cost for each modality, and the assumptions used are listed below.
3.1.12 According to expert clinical opinion, access costs are likely to be similar for all modalities; therefore these costs have been excluded from the template. Where the procedure to create access fails, an additional charge may be incurred to create access for a second time. Expert clinical opinion suggests that for 15% of people who choose peritoneal dialysis access fails on the first attempt. This equates to an additional cost of £1.5 million for patients who begin treatment.

3.1.13 Training costs for patients are covered by the tariff paid for the dialysis activity.

3.1.14 The weighted average unit costs for dialysis have been calculated using the best practice tariffs from Payment by Results 2011/12 and activity levels from Reference Costs 2010. It has been assumed that peritoneal dialysis is performed daily, with each instance attracting the best practice tariff.

3.1.15 For home haemodialysis it has been assumed that the non-mandatory tariff will be applied 3 times per week. The Payment by Results Guidance for 2011-12 states that ‘The price and structure of these non-mandatory home haemodialysis HRGs reflect the general principle that tariff prices should ordinarily apply independently of setting, but also provides scope for locally agreed prices, particularly where patients are receiving more than three sessions per week. As a rule of thumb, it is recommended that the costs of a week of home haemodialysis should not exceed the cost of three sessions of hospital or satellite haemodialysis. Commissioners and providers should always encourage increased sessions of home haemodialysis where these are more appropriate and beneficial for the patient. When home haemodialysis exceeds three sessions per week, the non-mandatory prices may not be appropriate and organisations may wish to agree a more appropriate price’.
3.1.16 People on hospital haemodialysis are assumed to visit a hospital three times per week for dialysis.

3.1.17 Based on expert clinical opinion, we have assumed that on average people on home haemodialysis and peritoneal dialysis will visit a hospital as an outpatient every 3 months. An outpatient appointment has been costed using Payment by Results tariff (2011/12): 361 Nephrology WF01A Follow-up Attendance – Single Professional.

3.1.18 We have assumed that the main complication from peritoneal dialysis is peritonitis, and estimated that most cases of peritonitis (approximately 80%) are not serious and can be treated through antibiotics on an outpatient basis. Serious infections will need hospital admission. The health economic modelling estimates that 70% of people on peritoneal dialysis have a complication within 5 years, which equates to 14% per year.

3.1.19 The main adverse event for haemodialysis is assumed to be infections. Infections are assumed to be associated with dialysis catheters rather than fistulas (although fistulas do get infected). Some infections will be treated with antibiotics on an outpatient basis but many (estimated as 80% in the costing template) go on to cause a septicaemia episode and result in hospital admission. The health economic modelling estimates that 6% of patients on haemodialysis experience adverse events each year.

3.1.20 It is assumed that a non-serious infection would require one outpatient appointment with a renal consultant. The cost has been estimated using the Payment by Results tariff (2011/12): 361 Nephrology WF01A Follow-up Attendance – Single Professional. It is assumed this would include the cost of the antibiotics.
3.1.21 It is assumed that a serious case of peritonitis falls within HRG code FZ47 in the Payment by Results tariff (2011/12) for admitted patient care and outpatient procedures.

3.1.22 It is assumed that a serious infection related to haemodialysis falls within HRG code WA12 in the Payment by Results tariff (2011/12) for admitted patient care and outpatient procedures.

Cost summary

3.1.23 The unit cost for each modality is summarised in table 2.

Table 2 Annual unit cost by modality

<table>
<thead>
<tr>
<th>Type of dialysis</th>
<th>HD – home</th>
<th>HD – hospital</th>
<th>HD – satellite</th>
<th>CAPD</th>
<th>APD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit cost (£)</td>
<td>144</td>
<td>145</td>
<td>145</td>
<td>46</td>
<td>56</td>
</tr>
<tr>
<td>Annual cost of dialysis (£)</td>
<td>22,976</td>
<td>22,620</td>
<td>22,620</td>
<td>17,302</td>
<td>20,952</td>
</tr>
<tr>
<td>Adverse events cost (£)</td>
<td>151</td>
<td>151</td>
<td>151</td>
<td>63</td>
<td>63</td>
</tr>
<tr>
<td>Total annual cost (£)</td>
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Abbreviations: APD, automated peritoneal dialysis; CAPD, continuous ambulatory peritoneal dialysis; HD, haemodialysis; PD, peritoneal dialysis.

3.1.24 The net saving at optimal uptake is summarised in table 3.
### Table 3 Estimated resource impact at optimal uptake

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Abbreviations: APD, automated peritoneal dialysis; CAPD, continuous ambulatory peritoneal dialysis; HD, haemodialysis.

3.1.25 The potential saving after 5 years, assuming an increase in the number of people on peritoneal dialysis of 1% each year, is summarised in table 4.

### Table 4 Estimated resource impact after 5 years

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Abbreviations: APD, automated peritoneal dialysis; CAPD, continuous ambulatory peritoneal dialysis; HD, haemodialysis.
Other considerations

3.1.26 Best practice tariffs have been used to calculate the cost of dialysis. These are new for 2011/12 and it is likely that their use is not yet widespread. If dialysis services are being commissioned outside the tariff using local agreements, the estimated saving may be different. The costing template that accompanies this report can be amended to reflect local circumstances.

3.1.27 Increased uptake of peritoneal dialysis may be delayed initially if additional staff training is needed to enable patients to be supported in carrying out peritoneal dialysis. Renal services should have the capacity to alter service delivery with current staff working in haemodialysis units being retrained to work with patients on peritoneal dialysis.

3.1.28 The template focuses on the main adverse event of dialysis, which is infection. Other adverse events may apply and this should be assessed at a local level.

3.1.29 In some circumstances there may be small non-recurrent set-up costs for patients starting on peritoneal dialysis. These are estimated to be minimal and should be assessed at a local level.

4 Sensitivity analysis

4.1 Methodology

4.1.1 There are a number of assumptions in the model for which no empirical evidence exists. Because of the limited data, the model developed is based mainly on discussions of typical values and predictions of how things might change as a result of implementing the guidance and is therefore subject to a degree of uncertainty.

4.1.2 As part of discussions with practitioners, we discussed possible minimum and maximum values of variables, and calculated their impact on costs across this range.
4.1.3 Wherever possible we have used the national tariff plus market forces factor to determine cost. We used the variation of costs for the 25th and 75th percentiles from reference costs compared with the reference cost national average as a guide to inform the maximum and minimum range of costs.

4.1.4 It is not possible to arrive at an overall range for total cost because the minimum or maximum of individual lines would not occur simultaneously. We undertook one-way simple sensitivity analysis, altering each variable independently to identify those that have greatest impact on the calculated total cost.

4.1.5 Appendix B contains a table detailing all variables modified and the key conclusions drawn are discussed below.

4.2  Impact of sensitivity analysis on costs

Number who chose peritoneal dialysis as a first choice
4.2.1 The sensitivity analysis suggests that the estimated number of people who would choose peritoneal dialysis, given informed choice, is likely to have a significant impact on the overall saving. As this number is likely to depend on local circumstances, such as the geographical distribution covered, the costing template should be updated to reflect local assumptions.

Number who stay on peritoneal dialysis
4.2.2 The sensitivity analysis suggests that the estimated number of people who would stay on peritoneal dialysis is likely to have a significant impact on the overall saving. Therefore the costing template should be updated to reflect local assumptions.

5  Impact of guidance for commissioners

5.1.1 Best practice tariffs for adult renal dialysis were introduced in 2011/12. Payment by Results guidance is that it is mandatory for all
organisations to move 50% towards the national tariff prices in 2011/12 and that in 2012/13, the national tariff price will be mandatory. This may cause a financial cost pressure for some commissioners and providers if locally agreed prices differ significantly from the tariff.

5.1.2 Commissioners may wish to incentivise providers to increase the number of people on peritoneal dialysis by including targets within their QIPP programme.

5.1.3 Costs are likely to fall under programme budgeting category 217B.

6 Conclusion

6.1 Total national cost for England

6.1.1 If the number of people starting on peritoneal dialysis increases this will result in savings. The level of savings realised will depend on how many additional patients start on peritoneal dialysis.

6.1.2 Using the significant resource-impact recommendation shown in table 3 and assumptions specified in section 3 we have estimated the annual saving from implementing the guideline in England to be £20 million.

6.1.3 This is an estimate of the recurrent annual cost after uptake of peritoneal dialysis has reached the optimal level; that is, when the population on dialysis consists entirely of people who have been offered peritoneal dialysis as a first choice where appropriate. It is estimated that it could take approximately 20 years to reach optimal uptake.

6.1.4 As NHS organisations budget for the next 3–5 years, we have also estimated that savings of £4 million could be realised after 5 years with a conservative increase in the number of people on peritoneal dialysis of 1% each year.
6.1.5 Increased uptake of peritoneal dialysis may be delayed initially if additional staff training is needed to enable patients to be supported in carrying out peritoneal dialysis.

6.1.6 We applied reality tests against existing data wherever possible, but this was limited by the availability of detailed data. We consider this assessment to be reasonable, given the limited detailed data regarding diagnosis and treatment paths and the time available. However, the costs presented are estimates and should not be taken as the full cost of implementing the guideline.

6.2 **Next steps**

6.2.1 The local costing template produced to support this guideline enables organisations such as primary care trusts (PCTs) or health boards in Wales and Northern Ireland to estimate the impact locally and replace variables with ones that depict the current local position. A sample calculation using this template showed that a population of 100,000 could expect savings of £38,000. Use this template to calculate the cost of implementing this guidance in your area.
Appendix A. Approach to costing guidelines

Guideline at first consultation stage

Identify significant recommendations and population cohorts affected through analysing the clinical pathway

Identify key cost drivers – gather information required and research cost behaviour

Develop costing model – incorporating sensitivity analysis

Draft national cost-impact report

Develop local cost template

Internal peer review by qualified accountant within NICE

Determine links between national cost and local implementation

Circulate report and template to cost-impact panel and GDG for comments

Update based on feedback and any changes following consultations

Cost-impact review meeting

Final sign off by NICE

Prepare for publication in conjunction with guideline
Appendix B. Results of sensitivity analysis

<table>
<thead>
<tr>
<th>Parameter varied</th>
<th>Baseline value</th>
<th>Minimum value</th>
<th>Maximum value</th>
<th>Baseline saving (£000s)</th>
<th>Minimum saving (£000s)</th>
<th>Maximum saving (£000s)</th>
<th>Change (£000s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of people on renal dialysis</td>
<td>0.0535%</td>
<td>0.0482%</td>
<td>0.0589%</td>
<td>-19,583</td>
<td>-17,625</td>
<td>-21,541</td>
<td>-3,916</td>
</tr>
<tr>
<td>Number of people for whom peritoneal dialysis is appropriate</td>
<td>88%</td>
<td>85%</td>
<td>90%</td>
<td>-19,583</td>
<td>-18,664</td>
<td>-20,503</td>
<td>-1,839</td>
</tr>
<tr>
<td>Number who choose peritoneal dialysis as a first choice</td>
<td>50%</td>
<td>40%</td>
<td>60%</td>
<td>-19,583</td>
<td>-13,147</td>
<td>-26,020</td>
<td>-12,873</td>
</tr>
<tr>
<td>Number who stay on peritoneal dialysis</td>
<td>90%</td>
<td>80%</td>
<td>95%</td>
<td>-19,583</td>
<td>-16,007</td>
<td>-21,371</td>
<td>-5,364</td>
</tr>
<tr>
<td>Number who get peritonitis as a result of peritoneal dialysis</td>
<td>14%</td>
<td>3%</td>
<td>14%</td>
<td>-19,583</td>
<td>-19,583</td>
<td>-19,839</td>
<td>-256</td>
</tr>
<tr>
<td>Number who get an infection as a result of haemodialysis</td>
<td>6%</td>
<td>3%</td>
<td>6%</td>
<td>-19,583</td>
<td>-19,193</td>
<td>-19,583</td>
<td>-390</td>
</tr>
</tbody>
</table>
Appendix C. References
