ANNUAL THERAPY COST OF DIALYSIS IN THE UNITED KINGDOM WITH THE QUANTA SC+ PERSONAL HAEMODIALYSIS SYSTEM

Background
SC+ is a high performance and compact personal haemodialysis system, recently made available in the United Kingdom, for treating patients with kidney failure. The system has been shown to be safe and easy-to-use by patients and health care professionals through several rounds of human factors testing, whilst not compromising on clinical performance. SC+ provides standard high flux dialysis using bicarbonate-buffered dialysate and widely available, off-the-shelf consumables with dialysate flow rates of up to 500 mL/min.

The incidence and prevalence of kidney failure is increasing worldwide, with the majority of patients receiving their life sustaining haemodialysis treatment thrice weekly in clinic. Home haemodialysis (HHD) enables patients to dialyse more frequently, at a time convenient to them, freeing them from the often rigid schedules of in-centre treatments. Health care payers often receive excellent value for money when using conventional haemodialysis machines for HHD, as it achieves equivalent or improved outcomes as well as improving the quality of life for patients. Using SC+ can provide the same advantages due to its patient-centric, easy-to-use design and ability to reduce barriers to treat. Studies have shown that patients receiving thrice-weekly dialysis in-centre are at risk of the “interdialytic gap”, commonly associated with significant increases in hospitalisation and emergency department visits following the two-day gap experienced over the weekend. The primary aim of this study is to describe the associated costs of using SC+ for HHD, and in-centre on a 3x weekly and 3.5x weekly regimen in comparison to in-centre dialysis performed on a conventional dialysis machine.

Hypothesis
It is hypothesised that using SC+ for HHD or self-care in-centre will offer similar or improved costs when compared to traditional in-centre haemodialysis using conventional machines.

Method
This study is modelled from the perspective of the National Health Service England (NHS). All costs are presented in GBP (£) and inflated using the Consumer Price Index of Health for the UK. No discounting has been applied as data is limited to one year.

The total annual cost of maintenance dialysis for both 3x weekly and 3.5x weekly regimens for the following modalities was recorded:

- HHD with the Quanta SC+ Haemodialysis System
- Self-care in-centre with the Quanta SC+ Haemodialysis System
- Self-care in-centre with a conventional dialysis machine, used as a comparator

Cost estimates for NHS human resource and consumables were communicated by the device developer. Additional cost estimates were taken from available literature sources, and included dialysis-specific drugs, utilities, water, in-centre treatments for HHD patients and transportation.

Discussion
This analysis shows that lower costs are incurred when the SC+ Haemodialysis System is used on both a 3x weekly and 3.5x weekly regimen, for both self-care in-centre and HHD, when compared to the equivalent 3x weekly in-centre regimen using a conventional haemodialysis machine.

The evidence that HHD is safe and effective, offers equivalent or improved quality of life and is cost-effective when compared to traditional in-centre dialysis has been consistently demonstrated in the literature. HHD enables more frequent dialysis without the need to increase human resources, infrastructure or transport facilities. Its effect on the costs associated with reduced hospitalisation and emergency department visits should be explored in greater detail.

The perspective of the health payer is a limitation of this study. There is no heterogeneity as to what is covered by different health systems (e.g. transport and utilities). Consideration should be given to whether this burden is shifted to the patient or their caregivers.

Results
Quanta’s HHD offering is more cost-effective than that of traditional thrice-weekly, in-centre haemodialysis using conventional dialysis machines.

The annual cost of maintenance haemodialysis for a 3x weekly regimen performed at home using SC+ costs £34,981, increasing to £36,249 for a 3.5x weekly regimen. Self-care in-centre was marginally less expensive for a 3x weekly regimen, costing £34,866, and marginally more expensive for a 3.5x weekly regimen £38,573.

The biggest cost drivers were consumables, human resource and equipment expense. Despite higher clinic costs, and slightly higher human resource expense, the ability to amortise the machine over a greater number of patients doing self-care in-centre treatment produced only slightly higher costs to those patients doing HHD.

Transportation costs make up a significant portion of clinic-based dialysis costs (>10%) and should be factored into costing models that evaluate differing dialysis modalities.

Conclusion
Using the Quanta SC+ Haemodialysis System demonstrates improved cost savings when used for both 3x and 3.5x weekly self-care in-centre and HHD modalities, versus dialysis provided with conventional machines, in-centre, on a traditional 3x weekly regimen.

Future analyses incorporating the additional benefits of 3.5x weekly or longer dialysis regimens and their influence on rates of hospitalisations and emergency department visits are warranted for both the Quanta SC+ Haemodialysis System and conventional dialysis machines.

ANNUAL PER-PATIENT COST OF MAINTENANCE DIALYSIS BY MODALITY AND REGIMENT

<table>
<thead>
<tr>
<th>Modality</th>
<th>3x Weekly</th>
<th>3.5x Weekly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional In-Centre</td>
<td></td>
<td></td>
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<tr>
<td>SC+ HHD</td>
<td>9,534.72</td>
<td>2,753.40</td>
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<tr>
<td>SC+ Self-Care In-Centre</td>
<td>2,910.96</td>
<td>3,396.12</td>
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<tr>
<td>In-Centre Runs</td>
<td>2,507.30</td>
<td>6,875.26</td>
</tr>
<tr>
<td>TOTAL</td>
<td>2,507.30</td>
<td>6,875.26</td>
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