

# Can peer support be cost saving? An economic evaluation of RAPSID: a randomized controlled trial of peer support in diabetes compared to usual care alone in East of England communities

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#### ABSTRACT

**Background** Diabetes peer support, where one person with diabetes helps others, may improve diabetes management. The objective of this study was to perform a cost analysis of peer support strategies used in RANdomized controlled trial of Peer Support in type 2 Diabetes.

**Methods** We performed a 2×2 factorial randomized cluster controlled trial in England. People with type 2 diabetes were invited to participate as either 'peer' or 'peer support facilitator' (PSF) through postal invitation predominantly from general practice. Clusters, based on local communities, were each randomly assigned to one arm of group, 1:1, both group and 1:1 or control interventions. The intervention was delivered over 8–12 months by trained PSFs, supported by monthly meetings with a diabetes nurse. Out-of-pocket expenses/service utilization were self-reported at baseline, midpoint and on trial completion. Intervention costs were collated. Non-hospital costs used National Health Service (NHS) reference costs. Hospital payments were obtained from one local commissioning group and mean payments calculated. The analysis employed a societal perspective. Costs were evaluated at the conclusion of the trial.

**Results** Participants (n=1299) were recruited across 130 clusters. The four arms were well balanced and matched (60% male, mean diabetes duration 9.5 years, mean glycated haemoglobin (HbA1c) 7.4+/-1.3%, 17% insulin treated). Implementation costs at 2013 rates were £13.84/participant/annum, participant out-of-pocket expenses for any intervention were £11.41/participant/annum and the NHS-incurred costs were reduced by £138.38/participant/annum. Savings for the 1:1, group and any intervention were £233.65, £90.52 and £113.13/participant/annum, respectively.

**Conclusions** We conclude that both 1:1 and group diabetes peer support over 8–12 months are cost saving in this setting, although much of the benefit is largely derived by differences in self-reported healthcare utilization. Long-term benefits should be investigated.

**Trial registration number** ISRCTN66963621

#### Significance of this study

##### What is already known about this subject?

▶ The clinical impact of peer support in type 2 diabetes varies in different populations. Few health economic analyses of diabetes peer support have been undertaken and those that have been are contradictory.

##### What are the new findings?

▶ Based on data from RANdomized controlled trial of Peer Support in type 2 Diabetes, the largest randomized controlled trial of diabetes peer support undertaken, diabetes peer support, whether delivered through 1:1 and/or group interactions, was cost effective.

##### How might these results change the focus of research or clinical practice?

▶ Health services should consider embedding diabetes peer support into their care pathways. Long-term studies of the effects of diabetes peer support are needed to assess the sustainability of these results.

#### INTRODUCTION

Diabetes imposes a substantial economic burden in the UK with estimated costs that account for nearly 10% of the National Health Service (NHS) resource expenditure.<sup>1</sup> In order to achieve sufficient control of their disease, people with diabetes must engage in a number of self-care activities such as planning meals, exercising on a regular basis, monitoring of blood glucose levels/taking medication for some, and checking their feet on a routine basis.<sup>2,3</sup> While these behavioral and lifestyle changes are indispensable for proper diabetes management, they pose significant lifestyle and behavioral changes for people with diabetes and can be difficult

to implement. Accordingly, a multifaceted approach is essential in empowering patients to manage the self-care activities associated with proper diabetes management.<sup>2</sup>

One strategy that has been endorsed by the WHO to assist people with diabetes with managing their diabetes is peer support.<sup>4</sup> Peer supporters also have diabetes, and lend assistance to other patients in several areas such as providing social and emotional support, linking peers to clinical care, and providing encouragement in managing the day-to-day activities of living with diabetes.<sup>5</sup> Peer support can take on either individual or group approaches and can involve in person, telephone or internet modalities of communication.<sup>6-8</sup>

Several randomized controlled trials (RCTs) have been conducted in order to evaluate the impact of peer support on clinical outcomes<sup>7,8</sup>; however, there have been less data on the economic outcomes of peer support in diabetes as a recent review noted that more research needs to be done in this area.<sup>9</sup> One study that assessed the cost-effectiveness of group-based peer support compared with standard of care in a cluster randomized trial was among patients with diabetes in Ireland. Using both in trial and beyond trial data, the investigators demonstrated that group-based peer support was associated with a gain of 0.09 quality-adjusted life years (QALYs) over the course of a patient's life with a corresponding decrease in cost of over €637.<sup>10</sup> A separate analysis regarding the cost-effectiveness of group-based peer support in a RCT setting was conducted for patients with impaired fasting glucose or newly diagnosed type 2 diabetes in the UK. Group-based peer support was associated with nearly £226 in incremental cost and a mean QALY gain of 0.003 so that over £67 000 was spent for each additional QALY gained.<sup>11</sup> A different type of cost-effectiveness evaluation evaluating peer support in diabetes was conducted among Hispanic populations in the USA. In this evaluation, peers were in the form of community health workers (CHW) and group-based classes were delivered at medical facilities by the CHW. However, the CHW also visited the homes of patients where they had one-on-one interaction. This programme was determined to be cost-effective with a cost of just over \$33 300 per QALY gained when compared with usual care.<sup>12</sup>

Additional studies have been conducted regarding the economic outcomes of peer support in diabetes without adopting a cost-effectiveness approach but rather a cost analysis. A secondary analysis of a controlled trial demonstrated that group-based peer support was able to reduce the number of days spent in the hospital for patients with diabetes in the city of Salzburg, Austria when compared with control group patients. Although no significant impact was seen in prescription drug use, the annual savings associated with the group-based peer support amounted to over €1660 per patient.<sup>13</sup> A randomized trial conducted in the USA indicated that group-based peer support was associated with a significant decrease in emergency room utilization and specialty visits when compared with usual care. However, there was also a

significant increase in primary care visits and no change in the proportion of people admitted to the hospital so that there was no change in total costs.<sup>14</sup> In contrast, a retrospective study conducted in the USA found that education sessions with peers had no significant impact on total costs or use of emergency department visits or inpatient hospital stays.<sup>15</sup> Research has also been conducted that examines the implementation cost of peer support programme without providing data on the resulting impact on healthcare utilization or total healthcare costs.<sup>16</sup>

Although previous studies have examined the economic value of various forms of peer support, there is a scarcity of literature providing an economic evaluation of the comparative benefits of both individual and group-based peer support. In this study, we present an economic evaluation of the RAndomized controlled trial of Peer Support in type 2 Diabetes (RAPSID). The RAPSID trial was designed to compare the efficacy of individual or group peer support,<sup>17,18</sup> and the economic evaluation provides decision makers with data regarding the impact on health-related costs when implementing either or both forms of peer support.

## METHODS

### Overview

An economic evaluation was performed to evaluate the impact of peer support on costs in the RAPSID trial, a cluster RCT with a 2×2 factorial design (Trial registration number: ISRCTN66963621). Peer support was delivered via 1:1, group, or both group and 1:1 peer support (combined) and compared with a control group receiving standard diabetes care. Participants were recruited primarily by written invitation from their general practice, augmented by posters in the community and 1299 patients were randomized to 130 clusters with up to 15 participants in each cluster. Approximately 60% of the participants were male and they had been diagnosed with diabetes an average of 9.5 years earlier. The mean HbA1c of participants at baseline was 7.4% (SD=1.3%) and nearly 17% reported taking insulin at baseline.<sup>17,18</sup>

The intervention had two distinct phases. The first phase was delivered within the first 6 months and focused on three essential elements of diabetes management, namely overcoming practical obstacles encountered while dealing with diabetes, coping with the social and emotional aspects of diabetes and the type of medical therapy used in caring for diabetes. Just over 60% (61.4%) were able to attend a session where they had face-to-face contact with a peer support facilitator (PSF),<sup>17,18</sup> but most participants (92.6%) were at least in contact by telephone.

At trial conclusion, allocation to peer support was associated with a decrease of 2.3 mm Hg (95% CI 0.6 to 4.0,  $p=0.008$ ) in systolic blood pressure. No statistically significant effect was demonstrated on HbA1c or other relevant psychosocial or behavioral variables measured during

the trial.<sup>17 18</sup> A cost analysis was deemed appropriate as opposed to a cost-effectiveness analysis as no statistically significant difference was demonstrated on HbA1c or quality of life in the clinical trial.

### Costs overview

All costs were expressed in 2013 pounds (£) and the UK retail price index was used to inflate costs from previous years to the base year values.<sup>19 20</sup> Three broad categories of costs were included: the implementation costs of the intervention, costs incurred by the patient, and costs incurred by the NHS. The analysis employed a societal perspective, including the perspective of the patient's and the NHS. Costs were analyzed over a 1-year period in accordance with the intervention being delivered over a period of up to 1 year. Discounting was not used as the study period did not exceed 1 year.

### Intervention implementation costs

The costs of the intervention included providing a physical facility for peer support meetings included those for the venue, refreshments, and mobile telephone top up vouchers for each cluster of patients. These costs amounted to £10.95 monthly for each cluster or £131.40 pounds annually. The costs for the RAPSID nurse to participate in and travel to PSF meetings amounted to £36.2 pounds annually per cluster. The facilitator meeting costs included the costs for the nurse's time and travel to the meetings. The costs required to train PSFs included costs for a booklet, venue, catering, and costs for the trainer. The training costs for PSFs costs was £39.98 per cluster annually. In total, the annual cost required for implementing the intervention amounted to £207.58 pounds per cluster. Because a cluster could have up to 15 participants, the implementation cost of the intervention amounted to £13.84 per participant annually. Further detail on these costs is available elsewhere.<sup>18</sup>

### Patient incurred costs

Patients provided self-reported information regarding their annual out-of-pocket expenditures for healthcare in surveys administered to them during the trial. Surveys were administered face to face at baseline, at 4–6 months via mail, and face to face at 8–12 months.<sup>18</sup> This self-reported data were used to estimate the out-of-pocket costs incurred by patients in several areas over the previous 12 months: medications, glucose monitoring, visits to healthcare professionals (practice nurse, general practitioner, dietician, or podiatrists), travel to and from meetings, participation in weight loss groups, additional costs related to diabetes expenditures, and any other health services. Because it is rare for patients in the UK to pay for visits to health professionals and diabetes medications out of pocket, we performed an analysis where these costs were set to zero.

### NHS incurred costs

Usual care in both intervention and control communities was based in primary care, with regular reviews conducted

**Table 1** Unit costs used to estimate cost incurred during the RAPSID trial

Type of cost	Value (2013 £)	Reference
Accident and emergency room visit	941.53	*
Overnight hospital stay	2696.24	*
Practice nurse	13.43	13
General practitioner	66	13
Diabetes specialist nurse	19.5	13
Healthcare assistant	8.4	13
Dietician	11.9	13
Consultant	39.9	13

\*Emergency department and inpatient stay costs were obtained from the Cambridgeshire and Peterborough Clinical Commissioning Group for 90% of patients within their catchment area.  
RAPSID, RAnomized controlled trial of Peer Support in type 2 Diabetes.

by general practitioners or practice nurses, either annually or more frequently if needed. Care was organized at a practice level, drawing on local guidelines, and incentivized through the National Quality and Outcomes Framework. Patients were referred for specialist care at the discretion of the general practitioner. At the time they were surveyed, patients were also able to self-report the number of times they used various healthcare resources during the previous 6 months. These included accident and emergency visits, overnight hospital stays related to diabetes, and visits to various healthcare professionals (practice nurse, general practitioner, diabetes specialist nurse, healthcare assistant, dietician, or consultant). Following the example of a previous study, we multiplied the self-reported utilization by the unit cost to determine the total cost incurred during the year.<sup>21</sup>

The NHS incurred unit costs for each visit to a health professionals was derived from the Unit Costs of Health and Social Care data (table 1).<sup>22</sup> Actual NHS hospital emergency department and inpatient stay costs were obtained from the Cambridgeshire and Peterborough Clinical Commissioning Group (which 'pays' for the hospital costs) which included 90% of study patients. The mean cost of the accident and emergency department visit and inpatient stay were calculated from this database and used as the mean cost of an accident and emergency department visit and inpatient stay in this study (table 1).

### Analysis

All analyses were conducted in SPSS V.22. During the analysis, the 2×2 factorial design was taken into account so that the analyses evaluated the main effects of one-to-one peer support and group peer support on costs. As in another economic evaluation in diabetes, multiple imputation was used in order to impute missing cost values conditional on gender, age, duration of diabetes, and the patient's self-reported baseline HbA1c level.<sup>21</sup> For each

**Table 2** Costs during RAPSID at baseline and study end\*

	Baseline				Study end			
	Control	1:1	Group	Combined	Control	1:1	Group	Combined
Out-of-pocket costs for participants	Mean Value				Mean Value			
Medications	8.99	7.53	6.65	12.47	4.37	4.78	5.62	5.97
Glucose monitoring	2.21	3.12	6.47	3.81	6.27	9.12	13.64	11.22
Costs for medical visits†	74.57	86.13	151.15	112.71	49.69	51.65	86.40	64.40
Travel to appointments	16.95	15.25	23.06	17.69	36.10	39.70	43.49	48.65
Additional expenses‡	136.99	131.51	176.26	148.26	181.91	182.24	207.66	208.83
Total excluding covered services§	156.15	149.87	205.79	169.76	224.29	231.06	264.79	268.71
Total including all costs¶	239.70	243.52	363.59	294.94	278.34	287.49	356.80	339.08
NHS incurred costs								
Accident and emergency visits	274.63	321.32	329.84	303.17	389.66	365.66	408.04	471.12
Overnight hospital stay	329.73	516.66	341.82	962.86	796.63	948.68	902.03	991.14
Nurse and General Practitioner costs	166.60	160.86	166.82	156.99	100.18	93.78	101.77	100.45
Other health professionals	52.94	56.50	65.13	59.63	41.54	45.51	53.02	52.47
Total NHS incurred costs	823.90	1055.34	903.62	1482.66	1328.01	1453.63	1464.86	1615.19

\*All costs reported in 2013 £.

†Includes visits to general practitioner, practice nurse, dietician, and podiatrists.

‡Includes travel to appointments, expenses for weight loss group, additional healthcare-related costs for diabetes expenses, and costs for other health services.

§Excludes medication costs and payments for medical visits traditionally covered by the NHS.

¶Includes sum of all reported out of pocket costs.

NHS, National Health Service; RAPSID, RANdomized controlled trial of Peer Support in type 2 Diabetes.

type of cost incurred by participants or the NHS during the trial, we determined the change in costs from baseline to the conclusion of the trial. The mean change in costs after adjusting for baseline values was compared across the groups that patients were randomly assigned to for out-of-pocket costs, NHS incurred costs and total costs (combined out-of-pocket and NHS incurred costs). For the patients assigned to peer support, we also added the implementation costs of the peer support intervention. Ethics approval was received from the Cambridgeshire REC2 Committee (10/H0308/72), and signed consent included agreement for access to hospital data.

## RESULTS

**Table 2** shows the out-of-pocket expenses as reported by participants in the questionnaire. The data set included some participants who had reported drug and GP/practice nurse visit costs. However, in the UK, these costs are covered by the taxpayer and are free to the user (with rare exceptions). At baseline, when assuming that patients incurred no costs for medications or medical visits, the mean reported out-of-pocket costs ranged from £149.87 to £205.79 depending on the group the patient was assigned to. At the conclusion of the trial, the mean reported out-of-pocket costs for the groups ranged from £224.29 to £268.71 pounds when excluding the costs for medications and medical visits. When including all costs, the mean total out-of-pocket costs varied from £239.70 to

£363.59 depending on the group patients were randomized to. At the end of the study, the average reported out of pocket costs varied from £278.34 to £356.80 pounds depending on the group the patient was assigned to.

**Table 2** also presents the NHS incurred costs at baseline and study end. During the baseline study period, the mean estimated NHS incurred costs for the groups were between £823.90 to £1482.66. At the conclusion of the study, the average estimated NHS incurred costs for the groups varied from £1328.01 to £1615.19.

**Table 3** depicts the impact of the intervention on the patient's out-of-pocket costs and the NHS incurred costs. Overall, the interventions had relatively little impact on the patient's out-of-pocket costs, ranging from approximately £23 pounds saved per patient to an additional £28.40 per patient on an annual basis depending on the intervention and whether or not medications were included. However, when looking at NHS incurred costs, the intervention saved money in all situations, with the total savings ranging from £101.44 with the group intervention to £267.00 with the one-on-one intervention. These savings were largely due to savings in overnight hospital stays where the intervention was associated with mean savings between £124.64 to £283.04 pounds depending on which intervention patients received.

**Table 4** demonstrates that the peer support intervention was cost saving when looking at the combined patient and NHS perspective. The savings ranged from £90.52

**Table 3** Intervention impact on costs incurred in RAPSID\*

	Study group		
	One to one	Group	Any intervention
Out-of-pocket costs	Mean, 95% CI		
Change in medications	-1.81 (-7.02 to 3.41)	-0.06 (-5.25 to 5.13)	1.21 (-4.72 to 3.03)
Change in glucose monitoring	1.06 (-3.12 to 5.25)	2.26 (-1.80 to 6.31)	2.80 (-1.81 to 7.41)
Change in costs for medical visits†	7.90 (-3.39 to 19.19)	3.81 (-5.76 to 13.38)	6.09 (-6.20 to 18.37)
Change in travel costs	3.69 (-28.91 to 36.30)	-26.92 (-67.03 to 13.18)	-24.39 (-63.62 to 14.86)
Change in additional out-of-pocket expenses‡	17.55 (-31.78 to 66.88)	-2.03 (-53.14 to 49.07)	2.52 (-48.73 to 53.77)
Intervention impact on total out-of-pocket costs (medications and patient visits included)§	28.40 (-39.81 to 96.61)	-22.95 (-96.45 to 50.56)	-11.76 (-85.84 to 62.31)
Intervention impact on total out-of-pocket costs (No medications or patient visits)¶	26.51 (-19.40 to 72.42)	4.04 (-47.99 to 56.06)	11.41 (-37.94 to 60.76)
NHS incurred costs			
Accident and emergency visits	9.46 (-109.50 to 128.43)	43.00 (-77.50 to 163.50)	-18.52 (-161.39 to 124.34)
Overnight hospital stay	-283.04 (-726.36 to 160.29)	-151.87 (-625.06 to 321.31)	-124.64 (-639.92 to 390.64)
Nurse and General Practitioner costs	3.89 (-22.31 to 30.11)	5.91 (-19.83 to 31.64)	3.50 (-27.54 to 34.55)
Other health professionals	2.68 (-6.93 to 12.29)	1.53 (-7.74 to 10.78)	1.29 (-9.43 to 12.01)
Intervention impact on NHS incurred costs during trial	-267.00 (-758.02 to 224.01)	-101.44 (-600.75 to 397.86)	-138.38 (-706.68 to 429.92)

\*All costs reported in 2013 £.

†Includes visits to general practitioner, practice nurse, dietician, and podiatrists.

‡Includes travel to appointments, expenses for weight loss group, additional healthcare-related costs for diabetes expenses, and costs for other health services.

§Includes sum of all reported costs.

¶Excludes medication costs and payments for medical visits traditionally covered by the NHS.

NHS, National Health Service; RAPSID, Randomized controlled trial of Peer Support in type 2 Diabetes.

with group peer support to £233.65 with one-to-one peer support. Although there were additional costs due to implementation of the intervention and modest additional out-of-pocket costs imposed on the patient, these were more than offset by the NHS incurred savings.

## DISCUSSION

We found that peer support, in either a group format or one-to-one delivery, is associated with lower overall total healthcare costs during the time period the intervention is being delivered. The cost savings are largely due to decreased hospitalization expenses which are incurred by the NHS, but the intervention is associated with a modest increase in out-of-pocket costs for participants and implementation costs. The increase in out-of-pocket

**Table 4** Net costs or savings for interventions during the RAPSID trial\*

	Study group		
	One to one	Group	Any intervention
Impact on participants out-of-pocket costs	26.51 (-19.40 to 72.42)	4.04 (-47.99 to 56.06)	11.41 (-37.94 to 60.76)
Impact on NHS incurred costs	-267.00 (-758.02 to 224.01)	-101.44 (-600.75 to 397.86)	-138.38 (-706.68 to 429.92)
Net cost or savings incurred with implementation cost of 13.84£ for those receiving peer support	Savings of £233.65 (-734.06 to 267.52)	Savings of £90.52 (-598.87 to 417.83)	Savings of £113.13 (-616.82 to 390.55)

\*All costs reported in 2013 £.

NHS, National Health Service.

costs associated with the intervention may be at least partially due to patients engaging in self-care activities. For example, intervention patients tended to have a greater increase in glucose monitoring over the trial period when compared with control patients. If intervention patients were able to engage in more intensive self-management of their diabetes, then this should lead to fewer complications and hospitalizations with their diabetes.

The results from this study are in agreement with those from a previously reported cost analysis of peer support in diabetes indicating that group-based peer support was associated with a decrease in inpatient hospital utilization and total healthcare costs among patients in Austria.<sup>13</sup> However, a randomized study conducted within the USA found no differences in total cost or hospital utilization when conducting a cost analysis.<sup>14</sup> This may be due to the fact that the study was conducted in a different healthcare system in the USA and the fact that median value was used to quantify differences in healthcare costs. Another retrospective study conducted in the USA also failed to demonstrate an appreciable difference in healthcare costs when comparing peer support to standard of care.<sup>15</sup>

One strength of this study is that it is an economic evaluation of the only RCT including one-to-one and group peer support.<sup>18</sup> There is sparse data comparing group and one-to-one peer support in terms of their impact on costs in diabetes. However, the currently available data suggest that one-to-one interventions may be more costly to implement than comparable interventions delivered in a group setting.<sup>23</sup> Yet, data from a recent review suggest that peer support delivered in a one-to-one format may be more effective for glycemic control than group-based peer support in many cases which may lead to lower utilization of health services over time.<sup>8</sup> More research needs to be done in this area to elucidate the comparative impact of group and one-to-one peer support on costs among people with diabetes.

Another strength, although potentially a weakness as well, is that our study was also able to incorporate estimated costs from both the patient perspective as well as that of the NHS. In addition, we were able to obtain actual data in regards to hospitalization costs which provide a more accurate assessment of the costs than the unit costs data. However, we had to rely on patient's self-reported responses to determine the utilization of healthcare services, and this had a substantial impact on our results. This may be subject to recall bias, although this methodology has been used in previous studies evaluating costs related to peer support in diabetes patients.<sup>11</sup> In addition, patients reported out-of-pocket costs for services and items such as medications, glucose test strips and visits to the general practitioner that are typically paid for by the NHS. It should be noted, however, that recent reports indicate that the provision of test strips may be limited for certain patients or excluded all together due to supply issues or budgetary concerns.<sup>24–26</sup> We accounted for this by including an analysis with these out-of-pocket

costs included as well as an analysis where these costs were excluded. The use of self-reported data may also be responsible for some of the relatively large variation seen in some of the data.

A further weakness of the study is the short period of follow-up and the actual limitations of the hospital data. While we report that peer support is associated with a decrease in hospitalization costs during the short term for patients with diabetes, the specific types of hospitalization that were prevented are not fully understood as of yet. Future studies should address this issue. Moreover, we have explored the short-term impact of the RAPSID intervention on healthcare costs, but the impact on long-term costs is uncertain. However, it is possible that the intervention could produce a favorable impact on long-term healthcare costs due to the positive effect on blood pressure.<sup>27</sup>

In conclusion, we have shown that both 1:1 and group diabetes peer support are cost saving over 8–12 months in this setting. Long-term benefits should be investigated.

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**Contributors** DS (Principal investigator) developed the initial study design in discussion with JPG (Co-principal investigator). Study delivery was led by DS and JPG, data analyses were undertaken by LTW and DH, the initial paper draft was written by LTW and all authors interpreted the data and contributed to the final manuscript.

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**Patient consent** Obtained.

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**Data sharing statement** Data sharing already exists with other Peers for Progress projects. Further data sharing may be available on discussion with the group through Professor David Simmons [Da.simmons@westernsydney.edu.au](mailto:Da.simmons@westernsydney.edu.au).

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# Can peer support be cost saving? An economic evaluation of RAPSID: a randomized controlled trial of peer support in diabetes compared to usual care alone in East of England communities

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