

SHORT REPORTS

Economic evaluation of the differential benefits of home visits with telephone calls and telephone calls only in transitional discharge support

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Abstract

Background: home visits and telephone calls are two often used approaches in transitional care, but their differential economic effects are unknown.

Objective: to examine the differential economic benefits of home visits with telephone calls and telephone calls only in transitional discharge support.

Design: cost-effectiveness analysis conducted alongside a randomised controlled trial (RCT).

Participants: patients discharged from medical units randomly assigned to control (control, $N = 210$), home visits with calls (home, $N = 196$) and calls only (call, $N = 204$).

Methods: cost-effectiveness analyses were conducted from the societal perspective comparing monetary benefits and quality-adjusted life years (QALYs) gained.

Results: the home arm was less costly but less effective at 28 days and was dominating (less costly and more effective) at 84 days. The call arm was dominating at both 28 and 84 days. The incremental QALY for the home arm was $-0.0002/0.0008$ (28/84 days), and the call arm was $0.0022/0.0104$ (28/84 days). When the three groups were compared, the call arm had a higher probability being cost-effective at 84 days but not at 28 days (home: 53%, call: 35% (28 days) versus home: 22%, call: 73% (84 days)) measuring against the NICE threshold of £20,000.

Conclusion: the original RCT showed that the bundled intervention involving home visits and calls was more effective than calls only in the reduction of hospital readmissions. This study adds a cost perspective to inform policymakers that both home visits and calls only are cost-effective for transitional care support, but calls only have a higher chance of being cost-effective for a sustained period after intervention.

Keywords: transitional discharge support, home visits, telephone calls, hospital readmissions, cost-effectiveness analysis, older people

Background

Transitional care programmes are proved to be effective in bringing positive outcomes to support post-discharge patients including reduced readmission rates [1, 2], enhanced quality of life [3], self-efficacy [1, 3] and satisfaction [2, 3]. Home visits and telephone calls are the two most common approaches used in transitional care programmes. Systematic reviews show

that effects of calls alone are inconclusive [4] while programmes with home visits seem to be more promising in reducing admissions to long-term care [5] and health-care costs [6]. Stuck and Kane [7] criticised that home visits can be costly. Some studies included cost as an outcome without the execution of a full economic evaluation. These studies usually reported expenditures saved such as hospitalisations prevented

[8], reduced length of stay in hospital [9] and less use of domiciliary care [10]. Wong *et al.* [11], one of the few studies that conducted a cost-effectiveness analysis of a transitional intervention, found that a 28-day transitional care programme (home visit and telephone calls combined) supporting general medical patients had an 89% chance of being cost-effective. A study using telephone support for community diabetes patients showed a 29% probability of being cost-effective [12]. There has been no study that reports the cost-effectiveness of home visits with calls compared with that of telephone calls alone. This study was done to fill this knowledge gap.

Methods

Randomised controlled trial study and population

This study was conducted as part of a randomised controlled trial (RCT) comparing home visits with calls and calls alone in a 4-week transitional care programme. Details of the study are described elsewhere [3] and below is a brief outline. Medical patients with chronic conditions discharged from a regional acute hospital in Hong Kong were recruited between August 2010 and June 2012. Consenting subjects were randomly allocated to home, call and control groups. Both home and call groups received a 4-week programme led by nurse case managers (NCM) assisted by volunteer nursing students. The NCM used the Omaha System, a validated assessment–intervention–evaluation framework to assess and execute care in environmental, psychosocial, physiological and health-related domains [3]. The home group received home visits the 1st and 3rd weeks and calls the 2nd and 4th weeks while call group received calls only every week. Mutual health goals were set between the providers and patients in each interaction. The control group received two placebo social calls within the programme period of 4 weeks.

Cost and health outcomes

Costs and outcomes were compared between intervention and control groups. The costing used a societal perspective including costs of pre-intervention, delivery of intervention and hospital use (Supplementary data, Appendix S1 available in *Age and Ageing* online). For the estimation of quality-adjusted life years (QALYs), we used the Hong Kong Chinese 36-item Short-Form Health Survey (SF-36) which has been locally validated [13] and for which a local algorithm has been developed to derive utility values [14]. National Institute for Health and Care Excellence (NICE) has recommended the use of EQ-5D for eliciting QALYs, but there is no Hong Kong algorithm available for this purpose.

Statistical analysis

Costs and QALYs gained at 28 and 84 days were compared between groups. Incremental cost-effectiveness ratios (ICER)

were calculated by dividing differences in cost between the groups by differences in QALYs. Missing QOL observations were imputed using multiple imputation by chained equation methods [15, 16] using variables related to QOL including age, gender and ADL score. Results are presented as cost-effectiveness planes and acceptability curves. Net monetary benefits (NMB) for each of the 1,000 replicates were calculated using the formula: QALYs gained \times value of a QALY – cost. The group with the highest NMB was considered most cost-effective. Costs are reported in HK\$ (£1 = 12HK\$, US \$1 = 7.8HK\$ approx).

Results

A total of 610 patients were involved (home = 196, call = 204, control = 210). The intervention groups had an apparently lower readmission rate than the control group but only the home arm achieved significance at 28 days (10.7 versus 17.6%, $P = 0.047$) (Table 1).

Intervention costs for home and call arms were \$997 and \$451, respectively, per subject. The average cost of readmission was lower in the intervention groups than in the control group (Supplementary data, Appendix S2 available in *Age and Ageing* online). Net incremental costs for the home and call arms compared with the control were $-\$1,398$ / $-\$2,374$ (28/84 days) and $-\$296$ / $-\$1,966$ (28/84 days), respectively. Net incremental QALYs for the home and call arms were -0.0002 / $+0.0008$ (28/84 days) and $+0.0022$ / $+0.0104$ (28/84 days), respectively. The call arm was more costly but also more effective than the home arm at both 28 and 84 days. The ICER of call versus home was \$42,465/QALY gained at 84 days (Supplementary data, Appendix S2 available in *Age and Ageing* online).

The cost-effectiveness planes (Supplementary data, Appendix S3 available in *Age and Ageing* online) show that the home intervention has a high chance of being cost-saving regardless of the value of a QALY gain. For the call arm, there is a high chance that it is more effective and cheaper than the control. Figure 1 shows that both home and call groups are cost-effective compared with NICE threshold (£20,000 (HK \$240,000)). When the three groups are compared simultaneously at 28 days (Figure 2), the home intervention has a greater probability of being cost-effective up to a value of \$420,000 per QALY. For a value of a QALY greater than this, the call intervention is most likely to be cost-effective. At the NICE threshold, the home and call interventions have a, respectively, 53 and 35% chance of cost-effectiveness at 28 days and 22 and 74% at 84 days (Figure 2).

Discussion

This study has provided a cost perspective in considering the effectiveness of a transitional care intervention. The original RCT showed that the bundled intervention involving home visits and calls was more effective than calls only in the

Table I. Comparison of effectiveness by groups

Health service utilisation	Control (N = 210)	Home visit arm (N = 196)	P value	Call arm (N = 204)	P value
Patient readmitted to emergency (n, %)					
28 days	44, 21.0%	30, 15.3%	0.141 ^a	32, 15.7%	0.166 ^a
84 days	71, 33.8%	57, 29.1%	0.306 ^a	60, 29.4%	0.336 ^a
Patient readmitted to hospital (n, %)					
28 days	37, 17.6%	21, 10.7%	0.047 ^a	24, 11.8%	0.093 ^a
84 days	54, 25.7%	42, 21.4%	0.310 ^a	42, 20.6%	0.217 ^a
Length of stay of readmissions (mean, 95% CI)					
28 days	6.4 (3.5, 9.4)	4.7 (2.4, 7.0)	0.601 ^b	8.0 (3.4, 12.7)	0.470 ^b
84 days	9.8 (6.6, 12.9)	7.7 (5.0, 10.4)	0.733 ^b	9.1 (5.7, 12.5)	0.917 ^b
Quality of life					
Control (N = 113)		Home visit arm (N = 118)		Call arm (N = 145)	
QOL score					
Baseline	0.737 (0.712, 0.763)	0.737 (0.714, 0.760)	0.982 ^c	0.719 (0.695, 0.742)	0.284 ^c
28 days	0.734 (0.708, 0.760)	0.729 (0.706, 0.752)	0.575 ^c	0.773 (0.752, 0.794)	0.003 ^c
84 days	0.731 (0.703, 0.759)	0.748 (0.725, 0.771)	0.719 ^c	0.762 (0.739, 0.785)	0.055 ^c
Within-group comparison	0.899 ^d	0.217 ^d		<0.001 ^d	
QALY gained from baseline					
28 days	-0.0001 (-0.0010, 0.0008)	-0.0003 (-0.0012, 0.0005)	0.911 ^b	0.0021 (0.0012, 0.0030)	<0.001 ^b
84 days	-0.0009 (-0.0052, 0.0036)	0.0001 (-0.0038, 0.0036)	0.792 ^b	0.0096 (0.0053, 0.0136)	<0.001 ^b

CI, confidence interval; ANCOVA, analysis of covariance; ANOVA, analysis of variance.

^aPearson's χ^2 test.

^bMann-Whitney U-test.

^cANCOVA test (28 and 84 days adjusted by baseline).

^dRepeated measures ANOVA.

reduction of hospital readmissions. However, when the cost factor is included, the complex intervention of using home visits and calls combined may not necessarily have the advantage over calls only.

Current research has provided evidence to suggest that transitional care is effective in supporting patients returning home. Nurse home visits and telephone calls are the two most common approaches in care delivery to achieve the goals of strengthening self-care ability and confidence through regular monitoring and education [3, 17, 18].

Comparing home visits with telephone calls, Sochalski [19] reviewed 10 RCTs and concluded that in-person communication had a better readmission outcome compared with telephone communication. Home care provides face-to-face communication but can be costly [7]. Jolly [20] compared a home-based programme with a centre-based programme for cardiac patients and found that the home arm cost significantly more than the centre-based arm, though when the patients' travel cost was included the significant difference disappeared. When in-hospital expenses were used for calculation, home visits resulted in less cost [3, 21]. Tele-support including telemonitoring and telephone support was found to reduce medical costs [22]. Wong *et al.* [11] have reported that a 4-week transitional care programme using a complex intervention of home visits and calls has an 89% chance of being cost-effective at the threshold of £20,000 (HK\$240,000)/QALY. Miller [23] also tested a 4-week early discharge and rehabilitation service for older people discharged home from hospital. The chance of cost-effectiveness was ~65% at the £20,000 (HK\$240,000)/QALY threshold.

Delisle [24] commented that currently available studies lack cost-effective analyses to provide evidence to guide transitional care programmes. This study has contributed to the knowledge gap by providing a cost-effectiveness analysis of home visits and telephone calls and describes the differential benefits. We have shown that telephone calls are more cost-effective particularly over a longer period. Given our results showing how effective the call intervention was in gaining QALYs, for values of a QALY around the NICE threshold the call intervention would be preferable. The home intervention is potentially more cost-saving and may be preferred if QALY gain is not a primary concern.

In general, the use of economic evaluation findings in decision-making is limited [25]. Peacock [26] pointed out that managers do not only consider cost in deciding on service priority but are more concerned whether the initiative is pragmatic and ethical. Telephone calls are probably more sustainable than home visits in these regards since they are easily organised and accessible involving low technology [4]. The time spent on calls in various studies ranged from 15 to 60 min [27] which concurs with our findings. The length of intervention is reasonable, and without the involvement of traveling time, which in turn saves cost.

Conclusions

The measurement of costs in health studies helps to provide important information not only on costs but cost-effectiveness of modes of care service delivery [28]. This study informs health-care managers that both home visits with telephone

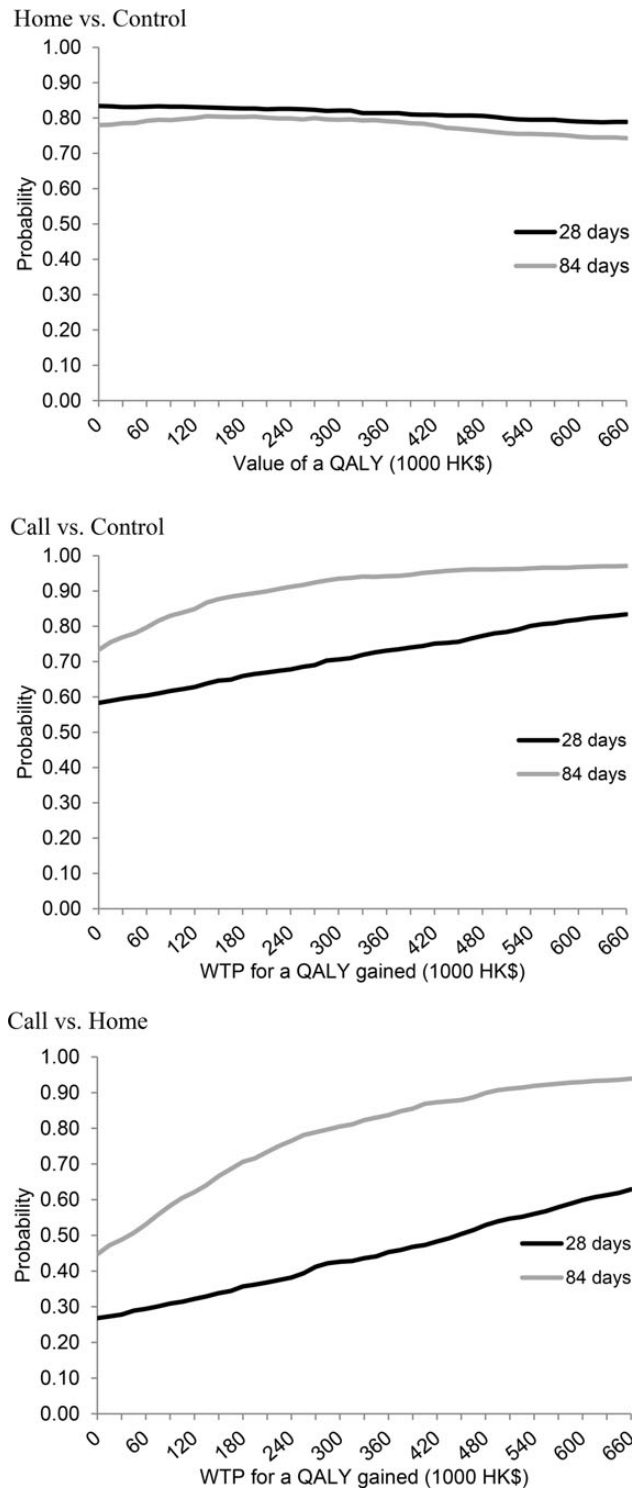


Figure 1. Cost-effectiveness acceptability curves for pairwise comparison.

follow-up calls and telephone calls only are cost-effective in transitional care support. However telephone calls alone had a higher probability of being cost-effective due to their greater gain in QALYs. For reasonable values of a QALY, this extra gain in the outcome outweighed the savings in net costs of the home intervention.

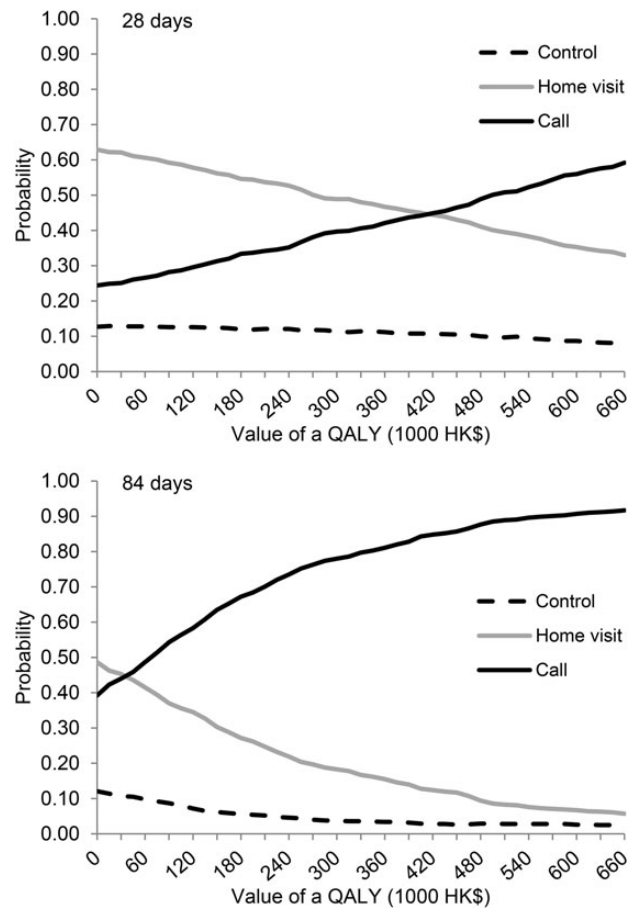


Figure 2. Cost-effectiveness acceptability curves for the choice of strategy.

Key points

- Both home visits with calls and calls alone are cost-effective for transitional care.
- Call interventions are effective in gaining QALYs and have a higher chance of being cost-effective for a sustained period.
- Telephone calls require low technology and are easily accessible to patients requiring transitional discharge support.

Conflicts of interest

None declared.

Supplementary data

Supplementary data mentioned in the text are available to subscribers in *Age and Ageing* online.

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