Cost-effectiveness and budget impact analyses of CareWell services for frail elderly patients in the Basque country

Stafylas P[1], Mar J[2], Chatzopoulos S[3], De Manuel E[4], Ruiz M[2], Vergara I[2], Fullaondo A[4], Hurtado M[5], Mateo M[2], Merino M[2], Larrañaga I[2], Azkargorta L[2], Giné A[4], Oates J[5], d'Angelantonio M[5], on behalf of CareWell project collaborators

[1]HIM SL, Barcelona, Spain, [2]Osakidetza, Spain, [3]Medical Research & Innovation LP, Thessaloniki, Greece, [4]Kronikgune, Barakaldo, Spain, [5]HIM SA, Brussels, Belgium,

Introduction

CareWell enables the delivery of integrated healthcare to frail elderly patients through comprehensive multidisciplinary programmes. Technology facilitates the coordination and communication of healthcare professionals and support patient centred delivery of care at home[1]. The MAST evaluation framework[2] has been used to assess the impact of integrated care (IC) on safety, clinical outcomes, resource use and cost of care, user / carer experience, and organisational changes. This framework has been complemented by novel health technology assessment techniques, including predictive modelling in order to support informed decision making. Predictive modelling techniques have been used by public organisations, insurance companies, and the pharma industry in order to support informed decision-making, mainly concerning the reimbursement of the service or product under evaluation[3]. Predictive modelling has been applied in the CareWell project using population data and in the SmartCare project using project data.

Objectives

The main objectives of the application of predictive modelling techniques in CareWell project are:

- Predict future clinical and economic outcomes based on the project results.
- Test alternative scenarios e.g. if project results are better or worse than actual population level results.
- Support the assessment of the sustainability if the CareWell services were deployed at large scale.
- Provide evidence about the transferability of the model from a specific project and a specific site to different ones.

Methods

A cost-utility and a budget impact analysis have been performed[3-5]. A Markov model (Figure 1) was developed in order to predict short and medium-term clinical and economic outcomes of integrated care services compared with the usual care in the same setting. The analysis has been conducted from the perspective of the budget holder (Basque Country) with 2016 as the reference year. All estimates are in Euros (€). Future costs and benefits have been discounted at 3.0%. The basic time horizon of the analysis was five years, in accordance with the regional strategy, but longer and shorter horizons have also been tested. We have adopted 3-months cycle lengths, to correspond to the short pathway duration, with half cycle correction. A hypothetical cohort of 5,000 patients has been simulated to receive integrated care, and 5,000 patients to receive usual care, in probabilistic sensitivity analysis. The primary outcome of the model was the incremental cost-utility ratio (incremental cost per quality adjusted year gained, ICUR €/QALYs).

A model was developed in Microsoft Excel 2016 in order to determine the budget impact of the introduction of ICT-enabled integrated care for the management of frail elderly patients in the Basque country. The model considered: regional population; the number of eligible patients; cost of development of new services and operational cost; cost of follow-up; predicted uptake of new type of care; frequency and cost of hospitalisation; and finally impact on mortality, hospital admissions and total number of days in hospital.

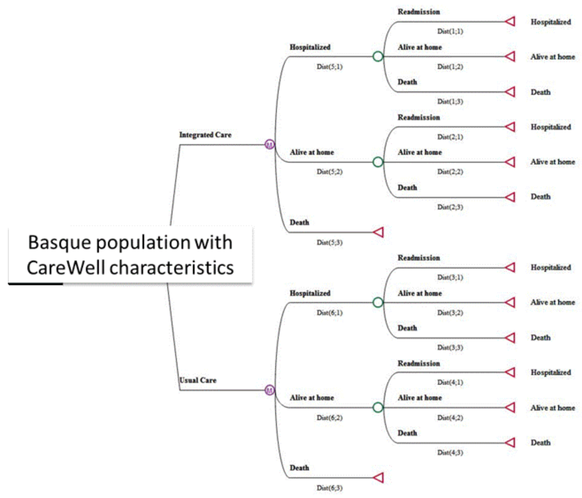


Figure 1. The Markov model

Results

In accordance with the project results, a significant reduction in mortality, hospital admissions and days-in-hospital have been seen in the IC group, but at increased cost (Figure 2). The incremental cost per QALY gained was 3.938 € and the incremental cost per life year gained was only 2.676 € (Table 1). Probabilistic analysis and scenario analyses supported the results of the basic scenario; all scenario analyses gave an ICUR <10.000 €/QALY.

Figure 2. Cost-effectiveness scatterplot

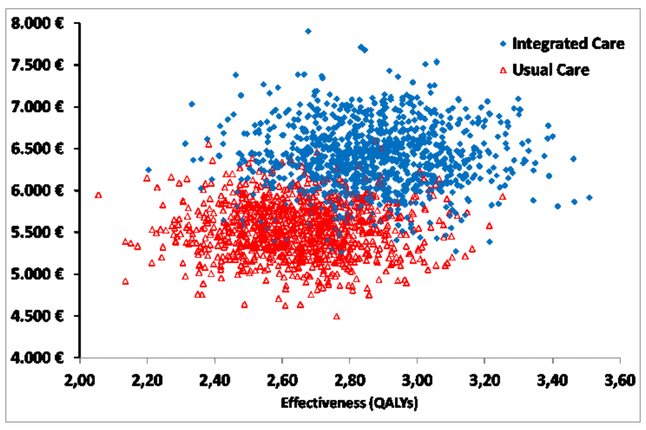


Table 1. Incremental cost-utility ratio and incremental cost-effectiveness ratio

	Total			Incremental			ICUR (€/QALY)	ICER (€/LY)
	Costs (€)	QALYs	LYs	Costs (€)	QALYs	LYs		
UC	5,528	2.65	3.77					
IC	6,395	2.87	4.09	867	0.22	0.32	**3,938**	**2,676**

The clinical and economic impact of the introduction of IC for frail elderly patients in the Basque country is presented in Table 2 and the predictions for cost in Figure 3.

Table 2. The clinical and economic impact in the Basque country

	Year 1	Year 2	Year 3	Year 4	Year 5
Eligible Basque population	8.986	9.127	9.275	9.544	9.680
Patients receiving IC services	1.797	2.738	3.710	4.772	5.324
% Patients receiving IC services	20,00%	30,00%	40,00%	50,00%	55,00%
Deaths Avoided	57	44	73	109	146
Hospital Admissions Avoided	28	114	159	205	240
Days In-Hospital Avoided	1.006	3.251	4.591	5.994	7.097
Net budget impact (€)	333,926	414,868	577.869	761.570	876.640

The analysis showed that the number of patients who could benefit from the CareWell services will increase more than the total Basque population, which means that additional resources will be necessary. It was estimated that if the CareWell services will be offered to eligible patients (gradual increase from 20% at year 1 to 55% at year 5 in accordance with Kronikgune's plan), there will be an additional cost of about 4,8%, but there will be a significant reduction of deaths (-8,7%), hospital admissions (-5,2%) and days-in-hospital (-10,8%) (Figure 4). Under current prices and probabilities, although the cost for hospitalisations has been reduced, this reduction does not outweigh the increased cost of follow-up in the IC group. A number of different scenarios tested supported the above predictions.

Figure 3. Forecasting the annual cost for the management of frail elderly patients

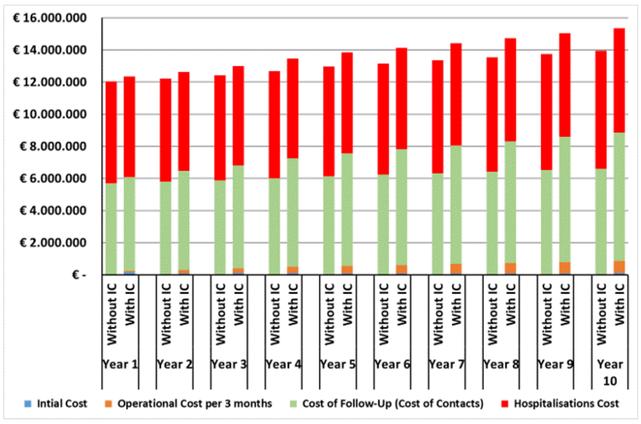
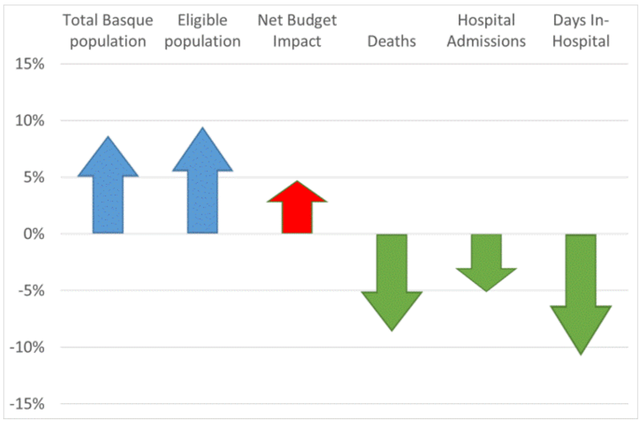


Figure 4. Synopsis of the 5-years impact of CareWell services on the Basque population



Conclusions

The analysis showed that the prevalence of the frail elderly patients will increase more than the total Basque population, and consequently the resources for the management of this population will have anyway to be increased.

Although the model shows that IC services in Basque country will further increase the cost of care, the clinical benefits are significantly higher.

CUA & CEA demonstrated that these services are cost-effective underthe different scenarios tested.

Despite the complexity of IC, the application of PM and BIA on IC projects is feasible, and could support informed decision-making predicting future outcomes and resources needed.

Funding

The CareWell project is co-funded by the European Commission within the ICT Policy Support Programme of the Competitiveness and Innovation Framework Programme (CIP). Grant Agreement No.: 620983.

References

1. Keijser W, de Manuel-Keenoy E et al. DG Connect Funded Projects on Information and Communication Technologies (ICT) for Old Age People: Beyond Silos, CareWell and SmartCare. J Nutr Health Aging 2016;20(10)1024-33

2. Kidholm K, Ekeland AG, et al. A model for assessment of telemedicine applications: mast. International journal of technology assessment in health care. 2012;28(1):44-51.

3. Caro JJ, Briggs AH, et al. Modeling good research practices--overview: a report of the ISPOR-SMDM Modeling Good Research Practices Task Force-1. Medical Dec Making 2012;32(5):667-77.

4. Drummond M, Sculpher M, et al. Methods for the Economic Evaluation of Health Care Programmes. Oxford, UK: Oxford University Press; 2005.

5. Husereau D, Drummond M, et al. Consolidated Health Economic Evaluation Reporting Standards (CHEERS) statement. Int J Tech As Health Care 2013;29(2):117-22.

6. Sullivan SD, Mauskopf JA, st al. Budget impact analysis-principles of good practice: report of the ISPOR 2012 Budget Impact Analysis Good Practice II Task Force. Value Health 2014;17(1):5-14.