Approaching 2014: Is Telemedicine Assessed from The Social Perspective?

A Brief 2013 Systematic Review

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***Abstract*—Recent reviews in Telemedicine (TM) detected methodological flaws in economic assessment. Our brief review addresses the perspective adoption problem, investigating to what extent adopting a broader point of view could have an impact on TM economic studies and consequential diffusion. Out of 486 articles found, 15 studies were selected for full-text assessment. Most of them showed an improvement in methodology if compared with the past TM economic evaluations. However, only 4 papers reported data from the social perspective and among them 3 presented productivity loss. Although some positive results in economic evaluation were observed, to date it is not clear to what extent TM is paid for by third parties or has to be paid by the patients.**

Keywords-economic evaluation perspective; cost-effectiveness; cost-utility; review;

I. INTRODUCTION

Telemedicine (TM) is a relative recently established field, nonetheless it is dominating the debate in the scientific community. Information and Communication Technologies (ICT) constant improvement resulted in various benefits for the users. In fact it should be considered the revolution in users' life when the ICT reached a wide diffusion. In less than 30 years, the average consumer passed from barely communicating with Total Access Communication System (TACS), to gathering lap-top duties in smart-phones. This overturn in everyday lifestyle, completely changed habits and therefore the time spent in different daily life tasks. While mobile communications and Internet diffusion have already shown to have a positive effect on GDP and productivity growth, [1,2] the same could not be stated for telemedicine. In the global financial crisis setting, resources allocated to the healthcare sector were significantly diminished; this scenario asks for cost-saving initiatives, but also for innovative and effective strategies able to make the healthcare system financially sustainable. Within this framework, Medicare and Medicaid provided reimbursement for many telemedicine programs for preserving high quality healthcare and pursuing a cost-saving strategy in those areas where specialized employees are not available (e.g., rural districts) [3]. The forecasted market value for telecare was predicted to double from $9.8 billion (2010) to $27.3 billion (2016); 18.6% being the compound annual growth rate, having not substantial hinders on its growth [4]. Nevertheless, effectiveness and cost-effectiveness of telemedicine and its related fields are not clear yet. Both early and the most recent literature reviews [5-10] report contradictory results on the actual impact of telemedicine in terms of costs and effectiveness. However, most of the reviewers observed a high prevalence of poor designed and developed studies, probably responsible for reluctance in adopting telemedicine. In addition, it is not clear to what extent telemedicine should be considered an only third-party payer's matter or not. There is a common agreement about cost-utility analysis to be performed adopting National Health Service (NHS) perspective. Nonetheless, estimating only third-party payer's costs could be responsible for partial cost assessment, and consequential partial benefit estimation. NHS perspective disregards all patients' related cost, excluding indirect and out-of-pocket costs. Productivity loss is a very controversial point in economic evaluation in healthcare. In health economics it was extensively discussed whether indirect costs (productivity loss) should be included in Cost-Effectiveness Analysis (CEA), without reaching a final and wide consensus [11,12]. The explanation for that could be found in the necessity for the NHS to optimize resource consumption as it is driven by spending cap issues. However, patients (and potential informal caregivers) perspective could consequentially report extra information able to influence society itself. Other issues frequently disregarded in economic evaluation are direct non-medical costs (i.e., travelling and accommodation expenditures), which account for a considerable amount of resources consumed if considering high prevalence diseases. The societal perspective is able to embrace all these costs, merging NHS costs (medical and not medical direct cost) to patient ones (out-of-pocket medical and non-medical direct cost; indirect and intangible costs). The object of our brief review is to investigate to what extent economic evaluations in telemedicine published up to 2013 were able to capture potential benefits considering the social perspective issue.

The article is composed by five sections. Introduction addresses state of art and the systematic review aim. Methods section describes the procedures used to select the included articles. Results section explores and highlights the main findings. Discussion reports issues and possible solution to assess properly telemedicine. Finally, conclusion accounts for authors considerations.

II. METHODS

In order to identify all published studies inherent to economic evaluation in telemedicine, a systematic review was conducted throughout the following databases: EBSCO host (Medline; Cinahl; EconLit; PsycInfo); Database of Abstracts of Reviews of Effectiveness (DARE); ISI Databases (Science Citation Index; Social Science Citation Index; Arts and Humanities Citation Index); Embase; NHS Economic Evaluation Database; Health Technology Assessment Database and the Cochrane Databases. The studies included in the review are full economic evaluations according to Drummond [11]; therefore, the following terms were included in the search strategy: Cost-Minimization Analysis (CMA), Cost-Consequences Analysis (CCA), Cost-Effectiveness Analysis (CEA), Cost-Utility Analysis (CUA), Cost-Benefit Analysis (CBA) of telemedicine and its explosion in mesh tree. Studies reporting only costs or only effectiveness were excluded. Other exclusion criteria were: email-only or telephone-only based studies and different languages than English. Results were limited to the period January 1st, 2013 to November, 2013, as previous reviews extensively reported and discussed data and methodological issues [8,10].

III. RESULTS

Once identifying the article titles, duplicates were deleted using MS excel 2013 (Microsoft Corporation). 486 articles were obtained from search strategy terms research. After titles revision 451 articles were excluded because they were not economic evaluation. Abstracts revision has led to exclude 20 articles: 6 considered only cost, 4 were reviews, 3 considered only effectiveness, 2 were study protocols and 5 were excluded for other reasons (telephone based, different language than English, patients preference, validation study). After the abstract assessment, 15 articles were included for full-text evaluation (Figure 1). NHS and Social perspective were the most adopted respectively 10 and 4 studies.

A. *NHS perspective*

Among the included trials (Table I), the majority adopted the NHS perspective. The whole set of studies was assessing performance of telemonitoring devices in chronic diseases (Heart failure, Chronic Obstructive Pulmonary Disease, Diabetes, Hypertension), reporting in most of the cases utility outcomes (e.g., Quality Adjusted Life Years - QALYs). Time horizon ranged from 6 months to 16 months. Out of 6 decision models (Table II), 4 of them were Markov model-based economic evaluation and 2 decision tree ones. Although most of them adopted a third-party payer point of view, QALY was chosen as effective outcome in 5 studies. The time horizon covered period ranging from 3 years up to lifetime. Beyond clinical trials and decision models, 2 out of 5 studies with various designs (Table III) assessed TM from the NHS perspective. The interventions were compared with results belonging to the same patients, but observed before telemedicine procedure started. No Health Related Quality of Life (HRQOL) outcomes were considered; authors chose monetary benefits or clinical outcomes.

B. *Social perspective*

Most of the studies assessing costs alongside clinical trials adopted NHS perspective. Nevertheless, Zanaboni et al. [13] showed costs experienced by patients for travelling and private visits in both study arms; however, patients' costs were excluded in CUA. No significant difference in cost for NHS was observed, on the other hand patients in TM arm experienced a lower expense of 100€ per patient/year ($p<0.05$). This difference was detectable in all the patients' related costs (Protocol-defined visits and Emergency Department visits) with exception of "Non-urgent in-office visits", where usual care was less expensive ($p>0.05$). The authors concluded that remote monitoring led to cost saving for patients of about 24% of their cost per year. However, limiting analysis to patients for whom QALY was available, it was considered only NHS costs and was observed a cost reduction of €888.10 per patient over 16 months. Only one Markov model assessed CEA from both the NHS and social perspective [14]. Once household costs were considered, the TM intervention cost increased. However, Rachapelle et al. [14] stated that most of TM costs are related to additional hospital fees rather than to travelling costs or productivity loss. Among studies adopting different design than clinical trials or decision models, 2 of them developed the study from the society point of view. No HRQOL outcomes were used in these studies. Levin et al. [15] performed an uncontrolled retrospective study, assessing cost reduction adopting telemedicine in diabetes teleconsulting in Denmark. In this case, results compared haemoglobin A1c (HbA1c) levels in diabetic patients using TM to Dansk Voksen diabetes database (DVDD) patients' levels [15]. Isetta et al. [16] results compared telemonitoring for low risk newborns with usual care in terms of Emergency Department (ED) accesses. Indirect costs concerning one of the newborn's parents were

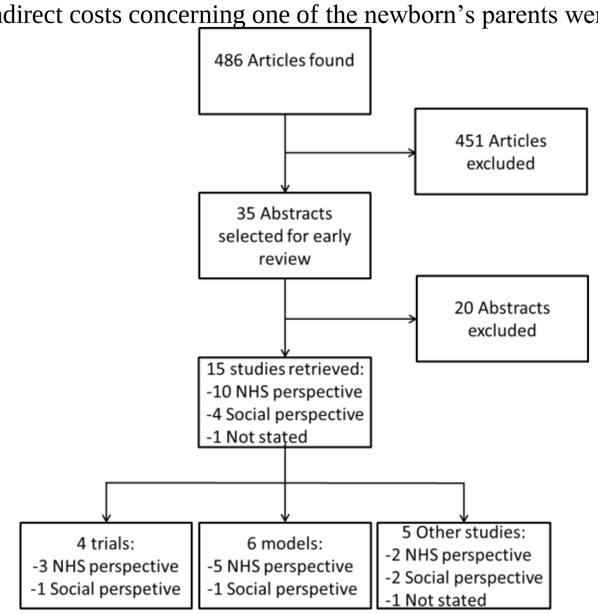

Figure 1. Study selection flow chart.

assumed to be €15 for missed hour of work, while €30 for travelling expenses to reach the hospital. Sensitivity analyses varied the following costs by ±75%: Emergency Department visit, hospital visit, nurses' salary per hour, travelling to hospital and parents' productivity loss. Even in these cases, the ICER was in favour of telemonitoring.

IV. DISCUSSION

In the last years, many authors questioned the methodological approach to capture costs and effectiveness of telemedicine [5-10]. The most important problems identified were: study design, small samples, limited time horizon, heterogeneous cost-related variables and proxies for effectiveness, control group absence and cost analysis perspective. In the papers published in 2013, we registered a somewhat improvement with regards to most of these elements. In particular, most of the studies retrieved have a sufficiently broad sample and used well-defined cost items and outcomes variables. However, the perspective of analysis remains an unsolved issue. In Italy, it is not clear if telemedicine should be reimbursed or not [13].

In this setting, a narrow perspective is not suitable to properly answer to this question. The societal point of view is by definition the broadest one, embracing NHS, patients and caregivers perspective. From the patients and the caregivers point of view, direct (medical and non-medical), indirect, and intangible costs (HRQOL) should be assessed [11]. In effect, telemedicine, theoretically, could sharply decrease all of these cost items. One of the focal points of telemedicine adoption is abridging distances and consequentially to reduce productivity loss, and delivering high quality healthcare outside the healthcare centre. This has of course an influence in patient's expenditure in terms of travelling and/or accommodation. Zanaboni et al. reported reduction in out-of-pocket costs for in-office and clinic visits. Even if the authors did not report non-medical direct and indirect costs, it is consequential that a reduction in the number of visits was reflected in a reduction in travelling costs and productivity loss for the telemonitoring arm. Likewise, Isetta et al. [16] reported positive results in their cost-effectiveness study including non-medical direct and indirect costs (estimated by assumption). On the other hand, Rachapelle et al. assessed TM intervention adopting the NHS and societal perspective. From the latter point of view, the intervention was no more cost effective in the same timeframe where it was for NHS. In all the cases the introduction or exclusion of productivity loss and travelling/accommodation costs was able to influence the study results.

The other 10 studies reported only the third-party payer's perspective. However, in comparison to the previous reviews, 2013 brought an improvement in terms of methodological reliability in telemedicine studies. Although the number of well-designed studies has somewhat increased, further methodological reliable studies have to be developed in order to confirm telemedicine cost-effectiveness. In addition, the adopted perspective and indirect cost assessment still represent a pivotal unsolved point. Introduction of indirect cost in CEA and CUA was extensively discussed; the main issues raised in the literature were equity, measurement, double counting in HRQOL benefits and opportunity cost [17]. Of course, to convert productivity loss in monetary terms, therefore, limiting it to employed patients, could influence the equity purpose in healthcare, giving priority to employed patients [18]. However, unpaid job could be involved in the analysis attempting to overcome this problem (e.g., considering the avert cost for the closest paid job) [17].

Another important issue to be considered is the measurement of indirect costs, as there is little agreement about what methods among human capital or friction approach is the best in capturing indirect cost. The first one estimating the productivity gain as an averted earning, while the latter depend on the productivity reduction of each patient during the condition and the amount of time (friction period) required to completely restore patient's productivity. Double counting point concerns about whether the observed monetarized outcome (productivity loss) has been fully incorporated in the non-monetarized effectiveness unit. Therefore, double counting could be avoidable considering clinical outcomes instead of HRQOL ones, as in this case outcomes would not express patient's preferences. However, it would lead to lose all the comparability and generalization advantages in using HRQOL outcomes like QALYs. Regarding to this topic Olsen et al. [19] stated that whether the preference based outcome did not report dimension clearly describing income changes related to health gain, it is not possible to know if the patient provided or not these data in his/her utility. In our review the productivity loss was included in 3 studies [14-16], two of them assess indirect cost by assumption, while Rachapelle and colleagues reported productivity loss only for those who had a paid job. On the other hand, Isetta et al. [16] included an estimation of indirect cost for only one of the newborn parents.

A constrained number of studies adopted a broad perspective, and even a smaller number introduced productivity loss. In a public healthcare setting, opportunity costs should be carefully assessed. Although NHS expenditure reduction is straightforward to assess, assessing productivity gain is more complex. Let us consider a hypothetic innovative procedure to be no more expensive than usual care from the NHS perspective, but less expensive from the societal one, the additional resources obtained could be invested directly or indirectly in healthcare again. This would be reflected in extended budget for every single activity able to influence QALYs in favour to the least expensive procedure from social perspective [17].

V. CONCLUSION

Although the controversial issue about including indirect costs in CUA, societal perspective should be adopted considering non-medical direct costs, while productivity loss could be assessed in terms of usual activities loss, but not included in CUA. This would report all the most remarkable items of cost and highlight indirect gains (included in QALY, but perhaps hidden in it), resulting in the best informing data for policymakers.

Further methodologically robust studies should be designed and conducted in order to drive both the adopters and the policy makers to more informed and reliable investment decisions.

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TABLE I. CLINICAL TRIAL BASED ECONOMIC ANALYSES.

Clinical-trial	Features				
	Population	**Study design**	**Intervention description**	**Data provided**	**Results**
Henderson et al. 2013[20]	1’573 patients with chronic diseases: Heart failure, chronic obstructive pulmonary disease or diabetes. Mean age: 71 years.	Economic evaluation based on a pragmatic, cluster randomized controlled trial. Perspective: NHS. Time horizon: 1 year.	Intervention: Telemonitoring in addition to the usual care. Control: Usual care (UC).	Costs: Telehealth cost, self-reported service use data. Effectiveness outcomes: QALY.	ICER: £92’000/QALY (£79’000/QALY project management costs excluded). From no capability to full capability: £98’000 (11% cost-effective probability with WTP: £30000). Sensitivity analyses: a) 80%, TM cost reduction: £539 (34%probability to be cost-effective). b) TM Cost reduction (80%) combined with higher utilization ICER: £12’000/QALY. (61% cost-effective probability with WTP: £30’000/QALY).
Boyne et al. 2013[21]	382 patients with congestive heart failure Mean age: 71 years.	Multicentre randomized controlled trial. Perspective: NHS. Time horizon: 1 year.	Intervention: Telemonitoring device connected to telephone line. Control: Usual Care.	Costs: direct medical costs, telephone consultation, telemonitoring, ambulance, caregiver-patient phone contact (paid by NHS). Effectiveness outcomes: QALY.	Costs: Total costs: €16’687 (TM) vs €16’561 (UC) (no significant difference). Physiotherapy costs TM costs €46 more than UC (significant difference). ICER (TM vs UC) €40’321/QALY (48% cost-effective probability WTP: €50’000). Subgroup analysis: HF duration ≤18 months probability TM to cost-effective is 75%. HF duration ≥18 months probability TM to cost-effective is 42%.
Stoddart et al. 2013[22]	401 patients with uncontrolled hypertension Mean age: 60.6 years.	Pragmatic randomized controlled trial. Perspective: NHS. Time horizon: 6 months.	Intervention: Telemonitoring based service for the management of uncontrolled hypertension. Control: Usual care.	Direct Costs: Outpatients, nurse consultations emergency telephone, ER visits; drugs. Effectiveness Outcomes: Mean daytime systolic ambulatory blood pressure (SABP).	Cost: Mean difference (TM vs UC) cost-patient per 6 months: +109.23. Effectiveness Outcome: SABP difference (6 months): -6,05 mm Hg (TM);-1.72 mm Hg (UC). Mean difference between TM-UC (6 months):-4.51 mm Hg (p<0.001).
Zanaboni et al. 2013 [13]	200 patients heart failure patients implanted. Mean age: not stated, TM median age: 66 years. UC median age: 69 years.	Prospective, randomized, open, multicentre clinical trial. Perspective: NHS/patient. Time horizon: 16 months.	Intervention: Wireless implantable defibrillator. Control: Usual care.	NHS costs: Direct medical costs, TM follow-up. Patient cost: Outpatient private visits; ED visits, out-of-pocket expenses. Effectiveness outcomes: QALY.	NHS cost: Mean cost per patient (1 year): €1’962.78 (TM) vs €2’130.01(UC);(p=0.80). Patient cost: Mean cost per patient (1 year): €381.34 (TM) vs €291.36 (UC);(p=0.01). Cost-utility analysis: Mean cost per patient (16 months) €2’074.70 (TM) vs €2’962.80 (UC);(p=0.33). QALYs gained (16 months):1.03 (TM) vs 0.97 (UC) ;(p=0.03) . Even if a €900 fee would be applied to TM, the cost-effectiveness ratio would be negative. (i.e., TM is cost-effective and dominant solution compared to usual care).

TABLE II. DECISION MODEL BASED ECONOMIC ANALYSES (PART I)

Decision model	**Features**				
	Population	**Study design**	**Intervention description**	**Data provided**	**Results**
Thokala et al. 2013 [23]	7'572 patients [24]: Discharged from Heart Failure related hospitalization at most 28 days. Mean age: 65.5 years.	Cost-effectiveness Markov model. Perspective: NHS. Time horizon: 38 months.	Intervention: Home TM. Control: Structured telephone support (human based); Structured telephone Support (Human-machine interface).	Costs: Telemonitoring costs (after initial discharge only) direct costs, repeat hospitalization cost. Effectiveness Outcomes: QALY, Death probability.	Base case analysis (House HF study included): ICER: £11'873 (40%cost-effective TM probability with WTP: £20'000/QALY). House HF study excluded: ICER:£ 6'942 (73% cost-effective TM probability with WTP: £20'000/QALY).
Kirkizlar et al. 2013 [25]	900 diabetic patients (type 1 and type 2) belonging to those enrolled in the medical centre before or after the teleretinal screening (2005) [26,27]. Mean age: not clearly stated.	Retrospective cohort study plus Markov model for cost-effectiveness analysis. Perspective: NHS. Time horizon: patient's death or at 99 years.	Intervention: Telemedicine screening program aimed to detect diabetic retinopathy. Control: No control group.	Costs: TM costs, UC costs (ophthalmologist visit, scatter photocoagulation and focal photocoagulation), Annual care for a blind person. Effectiveness outcomes: Macular edema, diabetic retinopathy, blindness and QALY.	Teleretinal screening showed to be cost-effectiveness for pool size ≥ 3'000patients. (WTP: $50'000).
Rachapelle et al. 2013[14]	Hypothetical cohort of 1'000 rural unscreened diabetic patients. Mean Age: 40.0 years.	Markov model to perform a cost–utility analysis. Perspective: Society. Time horizon: 25 years.	Intervention: Telemedicine screening program aimed to detect diabetic retinopathy. Control: No screening program.	NHS Costs: Telemedicine screening retinal examinations, laser photocoagulation. Patients perspective cost: Travel, food, accommodation, hospital fees, drugs and productivity loss. Effectiveness outcome: QALY.	ICERs : NHS perspective: Once in lifetime screening: $1'320/QALY. (Inside cost-effective range: $1'061 to $3'183/QALY). Annual screening: $4'029/QALY (outside cost-effective range). ICER for twice in lifetime, 1 every 5, 3 or 2 years options fall inside the cost-effective range. Social perspective: ICERs for once or twice in a lifetime and every 5 years options is cost-effective. (ICER range$1'061–3'183/QALY) ICER every 3 to 1 years options are no longer cost-effective in this setting.
Mistry et al. 2013 [28]	4'786 Standard risk women to deliver babies with congenital heart disease(CHD) [29]. Mean age: not clearly stated.	Decision tree model based cost-effectiveness analysis. Perspective: NHS. Time horizon: 15 months.	Intervention: Store-and-forward telemedicine first consultation for families with traditional CHD risk. Control: No telemedicine screening.	Cost: Telemedicine system costs, lifetime costs for children with and without CHD. Effectiveness outcomes: Lifetime outcomes for children with and without CHD, QALY.	ICERs: Base-case deterministic analysis: No woman receives TM: £12'906; QALY: 23.24. All women receive TM (50% replacement for terminated pregnancies): £12'876; QALY: 23.28 (Dominant). Base-case probabilistic analysis: No woman receives TM: £12'880; QALY 23.24. All women receive TM (50% replacement for terminated pregnancies): £12'850; QALY: 23.28 (Dominant). Almost 100%. cost-effective probability with TM with a WTP £20'000/QALY.

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TABLE II. DECISION MODEL BASED ECONOMIC ANALYSES (PART II)

Decision model	Features				
	Population	**Study design**	**Intervention description**	**Data provided**	**Results**
Kaambwa et al. 2013[30]	Patients with hypertension belonging to TASMINH2 trial.[31] Mean age: 66.0 years.	Markov model-based probabilistic cost-effectiveness analysis. Perspective: NHS. Time horizon: 35 years.	Intervention: Hypertension TM device. Control: Usual care.	Costs: Hospitalization, outpatient visits, primary care consultations, drugs, equipment, training and equipment replacement (five yearly). Effectiveness outcome: QALY.	ICERs: Self-management vs UC: €1'891/QALY(males); €5'733/QALY (females) 99% cost-effective probability for men and women with a WTP: €23'000/QALY. Sensitivity analysis: All ICERs remained below € 23'000 if effectiveness decreased of 20% or 36% (intervention applied 2, 5 and 15 years after intervention beginning, for male and female).The 26% reduction scenario maintained all ICERs below 23'000€, after 5 years(Intervention applied at 2, 3, 5, 6 and 15 years after the intervention start for Women).
Switzer et al. 2013 [32]	1'112 acute ischemic stroke (AIS) patients from Georgia Health Sciences University and the Mayo Clinic telestroke networks (unpublished data) Mean age: not stated.	Cost-effectiveness decision tree Perspective: NHS. Time horizon: 5 year.	Intervention: Hub and spoke telestroke network. Control: No network.	Costs: Telestroke costs, treatment costs for AIS and reimbursements. Effectiveness outcomes: Discharge (defined by treatment with intravenous thrombolysis), endovascular stroke therapy, and on set to treatment time.	Base case analysis: -$358'435 per year TM network vs without (first 5 years). Effectiveness outcomes: 114 fewer AIS hub-hospital admission per year with TM.

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TABLE III. OTHER STUDY DESIGN ECONOMIC ANALYSES

Other study design	**Features**				
	Population	**Study design**	**Interventions description**	**Data provided**	**Results**
Chen et al. 2013[33]	141 cardiovascular disease patients. Mean age: 68.5 years.	Non concurrent prospective study Perspective: NHS. Time horizon: 1 year.	Intervention: TM and Cardiologist consultation (24 hours). Control: TM patients observed for 6 months before TM start (usual care).	Direct costs: outpatient visits, hospitalization, total cost (all causes) Effectiveness outcomes: Admission rates, length of hospital stay.	Cost pre-post TM: Inpatient care: - US $511.52 patient/month. Emergency room (ER): +US $9.05 per patient/month. Outpatients: +US $56.76 per patient/month. Total cost (all-causes):-US $445.75 per patient/month (all differences p>0.05).
Levin et al. 2013 [15]	78 patients: 23 type 1 diabetes mellitus (T1DM) 55 type 2 diabetes mellitus (T2DM). Mean age: 66.4 years.	Uncontrolled retrospective study Perspective: Society. Time horizon: ≥6 months of Telemedicine.	Intervention: Telemedicine consultations to diabetes parameters. Control: intervention group compared to Danish database [34].	Direct non-medical cost: Travelling expenses Indirect cost: Productivity loss (assumption) Effectiveness Outcomes HbA1c level.	Cost reduction range: $9’430-$11’170 (TM vs UC). Effectiveness Outcomes: HbA1c level reduction: T2DM 7.4% (TM) vs 7.6% (DVDD) (p <0,05). T1DM 8.0 % (TM) vs 7.9% (p>0.05).
Paré et al. 2013 [35]	95 patients with heart failure or hypertension or diabetes, or COPD patients. Mean age: 70.0 years.	Ambispective cohort cost minimization study Perspective: NHS. Time horizon: 21 months (12 months before, 4 months home care; 4 months after TM).	Personalized TM to check various health parameters. Control: TM patients data before enrolment (usual care).	Direct Costs: ER Visits, Hospitalizations, Length of Stay, Nurse Home Visits, Home telemonitoring. Effectiveness Outcomes: Assumption of non-inferiority for TM respect to UC.	Total costs: Pre TM: $3’840 . During and after TM: $2’283. Effectiveness Outcomes: Assumed to be equal to UC.
Isetta et al. 2013[16]	230 low risk newborns discharged Mean age: N/A (newborns).	Retrospective cohort study. Perspective: Society. Time horizon: at most 2 months (the baby had to reach an appropriate weight condition).	Intervention: Web telemonitoring. Control: Usual care.	Direct costs: ED visits, hospital visits, and web monitoring nursing, travelling(assumption) Indirect costs: Productivity loss (assumption) Effectiveness Outcomes: ED accesses number.	Cost: Web TM follow-up cost: €86.1 per patient during the first month of life. Hospital-based follow-up cost: €182.1 per patient during the first month of life. Effectiveness Outcomes: ED return rate: UC follow-up: 15.8%; TM: 5.6% (P=.026). ICER: -941.2€. Sensitive analysis: One-way: Varying ±75% the cost, Internet-based follow-up ICER was still in favour of TM.
Akematsu et al. 2013[36]	208 patients with various diseases (Chronic and not chronic conditions). Mean age: 75.7 years.	Regression model to assess cost reduction adopting telecare. Perspective: not stated Time horizon: 7 years.	Intervention: Telemonitoring Control: Usual care.	Costs: Medical expenditures Effectiveness outcomes: Days of treatment.	All diseases: Telecare had a negative coefficient for number of treatment day (p<0.10) and medical expenditure (p<0.05). Author stated analysis could have small biases because autocorrelation under the 1% of significant level. Chronic condition: Coefficient for telecare use: medical expenditure (-6’494.41) (p<0.05) and days of treatment (-4.2) (p<0.05). Only hypertension had a positive significant coefficient for medical expenditure(+6885.39) and days of treatment (+9.06)(p<0.01).The author concluded observing a reduction in chronic diseases for treatment days (4.2 days) and medical expenditure (JPY 64’944).

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