

## Research

### The Health Economics of Palliative Care: an Indian Perspective

Arunangshu Ghoshal<sup>1\*</sup>

<sup>1</sup>Department of Palliative Medicine, Tata Memorial Centre, Dr. Borges' Road, Parel, Mumbai 400012, India

#### Abstract

Only a few studies have assessed the economic outcomes of palliative therapy. The major areas of interest include hospice care, the process and structure of care, symptom management, and palliative chemotherapy compared to best supportive care. At present, there is no definite healthcare system followed in India. Medical bankruptcy is a common phenomenon in India, as in other resource-challenged countries, where patients have to pay from pocket. In such situations medical decision making might have significant implications on health economics. Game theory might help in deciphering the underlying complexities. In game theory, the case of investment in palliative and end of life care can be considered as a two person non-zero sum game. Overall, interdisciplinary communication and cooperation between health economists and palliative care team is necessary. This will lead to enhanced understanding of the challenges faced by each other and hopefully help develop ways to create meaningful, accurate, reliable health economic data. These results can then be used as powerful advocacy tools to convince governments to allocate more funds for the cause of palliative care. In the long run, this will save overall costs and avoid unnecessary health care spending.

**Keywords:** Decision making; Economics India; Logic traps; Palliative medicine

**Classification Codes (JEL codes):** I110; I130; I140; I180

#### Introduction

In the context of limited resources, evidence on costs and cost-effectiveness of delivering health-care services is increasingly important to facilitate appropriate resource allocation decisions. Care at the end of life is known to account for a large proportion of health-care resources. Palliative care services have been expanding worldwide with the aim of improving the experience of patients with terminal illness at the end of life through better symptom control, coordination of care and improved communication between professionals and the patient and family [1, 2]. However, the application of economic evaluation to palliative care has been slow to develop, and the evidence base remains small. While available studies indicate that palliative care is cost-saving, the results should be treated with caution (e.g. heterogeneous methods, poor quality of evaluation) [3]. There are challenges in applying standard economic evaluation techniques to palliative care, some of which relate to difficulties in capturing all relevant data (e.g. informal care costs), while others refer to conceptual issues of valuing benefits. There are concerns that the full impacts of the interventions are not being captured. For example, the appropriateness of applying standard

economic evaluation techniques (e.g. the Quality Adjusted Life Year (QALY)) to measuring outcomes in palliative care has been questioned [3]. The duration of effect is inevitably limited in many palliative interventions, but a short good experience may be given a high value and this is not captured in the standard approach of adding up QALYs [2, 4]. Thus, there are reasons why studies in this area do not undertake formal cost-effectiveness analyses, but rather assess implications of palliative care interventions on costs separately from outcomes. As a result, methodological approaches are varied and often rely on relatively small observational studies [1]. It is important to keep these challenges in mind when reviewing economic studies in this field.

#### Health Care System in India

At present, there is no definite healthcare system followed in India like developed countries; there is no nationalized prescription service as well. Health Insurance system either in Government or private sector is still in its infancy [5]. Out of pocket expenditure is a burden on majority of the population. There are differences in costs due to varied local clinical practices. Only 3% to 5% of Indians are covered under any form of health insurance. Only 4 million beneficiaries covered under the Central Government Health Scheme (CGHS), 1.2 million Railway Health Scheme and 0.3 million the Employees State Insurance Scheme, all examples of social health insurance. About 11.2 million private insurance covers individuals. But, private insurance is not the answer for India's objective of equity, efficiency and quality in health because it tends to cater to the affluent classes, covering the healthiest and the wealthiest thereby resulting in limited social gain. An initiative was taken by the Indian government in 2003 to implement a Universal Health Insurance Scheme. The initiative failed because of its failure to cover the poor population. Then in April 2008, the Union Ministry of Labor and Employment in India launched a Rashtriya Swasthya Bima Yojna (RSBY) smart card to combat the so-called

**\*Corresponding author:** Arunangshu Ghoshal, Department of Palliative Medicine, Tata Memorial Centre, Dr. Borges' Road, Parel, Mumbai 400012, India, Tel: +919434890160; Email: arun.bata@yahoo.com

**Sub Date:** July 1, 2016, **Acc Date:** August 2, 2016, **Pub Date:** August 2, 2016

**Citation:** Arunangshu Ghoshal (2016) The Health Economics of Palliative Care: an Indian Perspective. BAOJ Pall Medicine 2: 018.

**Copyright:** © 2016 Arunangshu Ghoshal. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

'health-based poverty trap' in the country. The RSBY initiative provides health insurance coverage for below poverty line (BPL). Presently there are 28.6 million RSBY card holders and their 115 million family members across India. This initiative has proved to be beneficial for the poor in India [6]. The social and economic development of the people is a major concern for policy-makers. Proper utilization of the economics tools the existing health care could be more efficient and at the same time can provide quality palliative care to majority of the population in need. In a market economy, where global competition is intense, pharmaceutical researchers, manufacturers and marketers will have to explore the need for evaluating resources vis-a-vis outcomes in drugs used in palliative care. This could indeed be a valuable instrument in designing and implementing business strategies in the current business world. The knowledge thus developed can be utilized by government organizations for the reimbursement of pharmaceutical drugs and services to ensure the continuity of care. In 2015, the Economist Intelligence Unit of Lien foundation report adds some valuable insight to this [7] (Table I).

Medical bankruptcy is a common phenomenon in India, as in other resource-challenged countries, [8, 9] as well as to examine the changing trends of costs in the urban setting from 1998 to 2005. RESEARCH DESIGN AND METHODS: A total of 556 diabetic subjects from various urban and rural regions of seven Indian states were enrolled. A brief uniform coded questionnaire (24 items) where patients have to pay from pocket. While usually linked with acute illness, catastrophic health care spending is clearly prevalent in chronic conditions and more so in life limiting illnesses. In fact, the palliative care physician might have to handle both an acute and a chronic illness, to be managed in a dynamic manner, as per requirement. The high incidence of acute complications in the disease trajectory of chronic illnesses creates dual challenges.

### Inter-Specialty Exchange

As we work towards strengthening the scope of palliative care as a medical specialty in India, we often find the distinctions between clinical medicine along with its sub-specialties blurring as in converging for the care of those suffering from incurable diseases. Examples of clinical disciplines which interface palliative medicine

**Table I:** Economist Intelligence Unit of Lien foundation report (2015)

Domains	Rank/ 80	Score/ 100	Unit
<b>SUPPLY ENVIRONMENT</b>	<b>=60</b>	<b>27.5</b>	<b>0 - 100 where 100= best and 0=worst</b>
<b>1) PALLIATIVE AND HEALTHCARE ENVIRONMENT</b>	<b>54</b>	<b>24.6</b>	<b>0 - 100 where 100= best and 0=worst</b>
1.1) Healthcare spending	70	22.6	% of GDP
1.2) Presence and effectiveness of government-led national palliative care strategy	=25	50.0	EIU rating
1.3) Availability of research-based policy evaluation	=39	25.0	EIU rating
1.4) Capacity to deliver palliative care	=60	0.6	%
<b>2) HUMAN RESOURCES</b>	<b>=53</b>	<b>29.7</b>	<b>0 - 100 where 100= best and 0=worst</b>
2.1) Availability of specialized palliative care workers	=45	25.0	EIU rating
2.2) General medical knowledge of palliative care	=77	0.0	EIU rating
2.3) Certification for palliative care workers	=1	100.0	EIU rating
2.4) Number of doctors per 1,000 PC-related deaths	61	16.1	Doctors per 1,000 non-accidental deaths
2.5) Number of nurses per 1,000 PC-related deaths	=64	7.3	Nurses per 1,000 non-accidental deaths
<b>3) AFFORDABILITY OF CARE</b>	<b>=65</b>	<b>33.3</b>	<b>0 - 100 where 100= best and 0=worst</b>
3.1) Availability of public funding for palliative care	=49	25.0	EIU rating
3.2) Financial burden to patients for available palliative care	=71	25.0	EIU rating
3.3) National pension scheme coverage of palliative care services	=32	50.0	EIU rating
<b>4) QUALITY OF CARE</b>	<b>=60</b>	<b>25.0</b>	<b>0 - 100 where 100= best and 0=worst</b>
4.1) Presence of monitoring standards for organizations	=1	100.0	EIU rating
4.2) Availability of painkillers	=64	0.0	EIU rating
4.3) Availability of psycho-socio support for patient and families	=62	0.0	EIU rating
4.4) Presence of Do not resuscitate (DNR) policy	=29	0.0	EIU rating
4.5) Shared decision making	=52	25.0	EIU rating
4.6) Use of patient satisfaction surveys	=42	25.0	EIU rating
<b>5) COMMUNITY ENGAGEMENT</b>	<b>=44</b>	<b>25.0</b>	<b>0 - 100 where 100= best and 0=worst</b>
5.1) Public awareness of palliative care	=34	25.0	EIU rating
5.2) Availability of volunteer workers for palliative care	=38	25.0	EIU rating

include nephrology, cardiology, geriatrics, pediatrics, neurology and so on; many of them care for patients suffering from incurable illnesses [10, 13]. The para clinical subjects also contribute to the growth of palliative medicine as a science: Public health, pharmacology, occupational therapy, physical therapy, nursing and psychology are but a few examples [14, 16]. Yet other, classically non-medical, ways of thinking, however, are enriching clinical science as well. These specialties bring with them the strength to expand its impact far beyond the walls of the outdoor patient clinic, the laboratory, the indoor ward, the community home care. They allow contributing toward influencing policy decisions and resource allocation, at national and regional levels. Thus, these sciences help to raise voice for the benefit of persons suffering from incurable illnesses. In this way, we as palliative care physicians live up to the promise made in the Hippocratic Oath: To work “for the benefit of the sick” [17].

### Health Economics

One such specialty is health economics. Though not a component of traditional learning or teaching in medicine, health economics is gradually making inroads as an integral part of the pedagogy and praxis of palliative care. Faced with an ever-growing multitude of investigations for consultation and follow-up; therapeutic drugs and devices, counseling and holistic care of the whole person, we need to know which most cost-effective approach is. This information is necessary at the individual, as well as community and national level. Respected as a source of updated knowledge by peers in the medical profession, our words (and actions) have an impact beyond practice. Thus we need to be conversant with all laterally related fields of science. The specialty of health economics is a relatively young one. Its growth in developing countries, including India, is hindered by a lack of trained manpower, and by suboptimal collaboration between endocrinologists and economists. The ever-increasing burden of non-communicable diseases with many of them having a protracted course in the long run straining on individual as well as national economy, however, are adequate stimulus to drive change. But there is little consolidated published economic data related to this specialty.

### Overview of Economics of Palliative Medicine

Estimates from the United States indicate that 25% of health-care expenditure is related to patients in their last year of life [18]. In the United Kingdom, it is estimated that approximately 20% of hospital bed days are taken up by end-of-life care. The focus of cost analysis varies among studies [1, 2, 19]. Study findings on cost data suggest that the costs of palliative care intervention can be significantly lower [20, 21] can be indifferent [22- 24]. or even higher [25]. In these studies, costs were computed for all health services used within 6 months following index hospitalization discharge (e.g. hospital outpatient, home health visits, hospital readmissions and skilled nursing facility admissions). Cost savings were largely driven by a significant difference in hospital readmission costs [26- 57]. Case studies, before-and-after, other studies have found both evidence of significantly lower costs related to the palliative care intervention [58- 61]. And also evidence of higher charges

for palliative care relative to a national average charge [62]. The study findings on health-care utilization found out that the impact of palliative care on resource utilization is mixed [63]. Studies evaluating use of hospital services also had mixed findings. Some found evidence of lower use of hospital services, (20,21,24) clinical outcomes, and subsequent health care costs. \n\nOBJECTIVE: Measure the impact of an interdisciplinary palliative care service (IPCS while three found no significant differences [20,24,65]. Of the cohort studies that report specific results on health-care utilization, the same mixed pattern is observed, [27–29,33,38,40,42,43,45,48,49,52,54,55,65,66] while detailed analysis by two studies [42,63]. illustrate the varied impacts of palliative care on utilization (e.g. depending on time period studied, length of enrolment). A study on cost-effectiveness indicates that the intervention is cost-saving with equivalent outcomes on the POS-8 scale and improved outcomes on the ZBI [22].

### Medical Ethics, Logic Traps, and Game Theory: Is It Relevant In Economics of Palliative Care

A frequent theme in medical ethics of palliative care is that of making decisions and choices. Game theory is based upon modeled decision making. The goal of game theory rather is to describe frames of reference from which problems, issues, or dilemmas can be better understood or appreciated [67,68].

As such, game theory may have relevance to medical ethics. As per game theory, the case of investment in palliative and end of life care can be considered as a two person non-zero sum game. Here, a gain for one participant does not necessarily reflect a loss for the other participant. In clinical practice, there are actually many two person games going on simultaneously; for example, patient–physician, physician–family, physician–hospital, and physician–insurance carrier. In reality, few decisions are made with fore knowledge of the actual benefits and risks associated with those decisions. Typically, decisions are made with only estimates of the benefits and risks associated with those decisions. In game theory, the pay-offs in decision making are best thought of as “utility functions” [67]. In practice, situations of dilemma are typically constructed or framed in a manner that encourages a limited perspective on the part of the participants.

### A Proposed Model For Cost Of Investment Analysis Can Stand As Follows [69]

1. Identify the intervention’s economic costs:
  - a. Cost of materials
  - b. Cost of personnel
  - c. Value of time of patients participating in the intervention
  - d. Other overhead
2. Identify the intervention’s intended outcomes and benefits. Divide these into different categories that can be converted into a monetary benefit:
  - a. Health gains (e.g. cases of a disease, death rates, life expectancy, DALYs averted)

- b. Medical care savings (costs of diagnosis, treatment and care)
- c. Productivity savings (lost wages due to missed work)
3. Establish the time frame needed to achieve/see these outcomes.
4. Identify other indicators to measure along the way to the desired outcome (e.g. hypertension, prediabetes, cervical lesions), and the activities needed to achieve them (e.g. screening, education, distribution of testing strips). This will help in crafting program activities that will lead to the desired outcome.
5. Identify a control group. If this is not possible, conduct a before-after study in the same group.
6. Collect baseline data to measure outcomes, pre-intervention.
7. Collect outcome data to measure those benefits attributable to the program
8. Exercise caution in generalizing results.

### Return on Investment [RoI]: Equations

ROI can be calculated as equal to the present value of benefits assumed to be realized in the future (BPV) minus initial costs (C), divided by initial costs. The benefits are assumed to result from the initial costs, and we assume no other additional benefits:

$$ROI = \frac{B_{PV} - C}{C}$$

To find the present value of benefits, the future value of the benefits is calculated first. This is done by multiplying the number of DALYs averted (D) by per-capita GDP (GDPPC). Then, a chosen discount rate (r) is applied by dividing this value by (1+r) raised to t, where t equals the number of time periods over which these benefits will accrue (in this case,

30 years). Cost is not discounted in this case because the assumption is that the money is spent today, all at once. This is a conservative estimate of the present value of the future

Benefits it is assumed that all benefits will appear at the end of the 30th year after intervention, not during the 30-year period after intervention or beyond:

$$B_{PV} = \frac{D * GDP_{PC}}{(1+r)^t}$$

To find the number of DALYs that will achieve a specific ROI, solution for D:

$$ROI = \frac{\frac{D * GDP_{PC}}{(1+r)^t} - C}{C}$$

$$D = \frac{(ROI * C + C)(1+r)^t}{GDP_{PC}}$$

### Discussion

Health economics should focus upon the case of palliative care in

India. Interdisciplinary communication and cooperation between health economists and palliative care team is necessary. This will lead to enhanced understanding of the challenges faced by each other and hopefully help develop ways to create meaningful, accurate, reliable health economic data. These results can then be used as powerful advocacy tools to convince governments to allocate more funds for the cause of palliative care. In the long run, this will save overall costs and avoid unnecessary health care spending leading to medical bankruptcies. In this context, it is also important to discuss that some proponents of hospital-based palliative care have suggested that palliative care consultations reduce length of stay in ICUs or in the hospital in general. This adds to the operational/financial incentive for hospitals, a justification for them to invest in palliative care programs, similar to the incentive of lower costs per day [70, 71, 72].

Better data are needed to reduce the uncertainty about the true impact of palliative care, both economic and otherwise [73]. Also, more data are needed on the impact of palliative care programs on the whole health system, not on individual silos. The field would benefit from more research designs that assess inputs and outputs at a patient level or population level (rather than at an admission level) [74,75], from prospective and longitudinal studies that can determine at which point and for which patients palliative care is presented as an option and actually implemented, from multicenter and comparative studies that can assess whether consultative services have the same kind and degree of clinical and financial impact (or for the same kinds of patients) as dedicated units; or whether other aspects of program design are important, such as the degree of clinical control that the palliative care team has after its initial consultation. These kinds of research designs are especially important as palliative care begins to address care from diagnosis forward and not just a few hours or days before death.

### Acknowledgments

Patients and their relatives for their kind participation, supporting staff of the Department of Palliative Medicine

### References

1. Higginson IJ, Finlay IG, Goodwin DM, Hood K, Edwards AGK, et al. (2015) Is there evidence that palliative care teams alter end-of-life experiences of patients and their caregivers?. *J Pain Symptom Manage* 25(2): 150-68.
2. Zimmermann C, Riechelmann R, Krzyzanowska M, Rodin G, Tannock I, et al. (2015) Effectiveness of specialized palliative care: a systematic review. *JAMA* 299(14): 1698-709.
3. Gomes B, Harding R, Foley KM, Higginson IJ (2009) Optimal approaches to the health economics of palliative care: report of an international think tank. *J Pain Symptom Manage* 38(1) :4-10.
4. Normand C (2012) Setting priorities in and for end-of-life care: challenges in the application of economic evaluation. *Health Econ Policy Law* 7(4): 431-439.
5. Prinja S, Kaur M, Kumar R (2012) Universal health insurance in India: ensuring equity, efficiency, and quality. *Indian J Community Med* 37(3):142-149.

6. Mandal SC (2013) Pharmacoeconomics- Regulatory perspective and its relevance in Indian Context. *Pharma Times* 45(5): 18-20.
7. (2015) The Economist Intelligence Unit. The 2015 Quality of Death Index Ranking palliative care across the world.
8. Ramachandran A, Ramachandran S, Snehalatha C, Augustine C, Murugesan N, et al. (2007) Increasing expenditure on health care incurred by diabetic subjects in a developing country: a study from India. *Diabetes Care* 30(2): 252-256.
9. Xu K, Evans DB, Kawabata K, Zeramdini R, Klavus J, et al. (2003) Household catastrophic health expenditure: a multicountry analysis. *Lancet (London, England)* 362(9378): 111-117.
10. Sahay M, Kalra S, Bandgar T (2012) Renal endocrinology: The new frontier. *Indian J Endocrinol Metab* 16(2): 154-5.
11. Owens D, Kalra S, Sahay R. (2011) Geriatric endocrinology. *Indian J Endocrinol Metab* 15(2): 71-72.
12. Ramprasad M, Bhattacharyya SS, Bhattacharyya A (2012) Thyroid disorders in pregnancy. *Indian J Endocrinol Metab* 16(Suppl 2): S167-70.
13. Chopra S, Peter S (2012) Screening for coronary artery disease in patients with type 2 diabetes mellitus: An evidence-based review. *Indian J Endocrinol Metab* 16(1): 94-101.
14. Kalra S, Unnikrishnan AG, Sahay R (2011) Thyroidology and public health: The challenges ahead. *Indian J Endocrinol Metab* 15(Suppl 2): S73-5.
15. Kalra S, Sridhar GR, Balhara YPS, Sahay RK, Bantwal G, et al. (2013) National recommendations: Psychosocial management of diabetes in India. *Indian J Endocrinol Metab*. May 17(3): 376-95.
16. Kalra S, Bantwal G, John M (2012) The exaptation of endocrine pharmacology. *Indian J Endocrinol Metab* 16(3): 329-30.
17. (2011) Greek Medicine - The Hippocratic Oath [Internet]. U.S. National Library of Medicine.
18. Riley GF, Lubitz JD (2010) Long-term trends in Medicare payments in the last year of life. *Health Serv Res* 45(2): 565-76.
19. Simoens S, Kutten B, Keirse E, Berghe P, Vanden, et al. The costs of treating terminal patients. *J Pain Symptom Manage* 40(3): 436-48.
20. Gade G, Venohr I, Conner D, McGrady K, Beane J, et al. (2008) Impact of an inpatient palliative care team: a randomized control trial. *J Palliat Med* 11(2): 180-190.
21. Brumley R, Enguidanos S, Jamison P, Seitz R, Morgenstern N, et al. (2007) Increased satisfaction with care and lower costs: results of a randomized trial of in-home palliative care. *J Am Geriatr Soc* 55(7): 993-1000.
22. Higginson IJ, McCrone P, Hart SR, Burman R, Silber E, et al. (2009) Is short-term palliative care cost-effective in multiple sclerosis? A randomized phase II trial. *J Pain Symptom Manage*. United States 38(6): 816-826.
23. Engelhardt JB, McClive-Reed KP, Toseland RW, Smith TL, Larson DG, et al. (2006) Effects of a program for coordinated care of advanced illness on patients, surrogates, and healthcare costs: a randomized trial. *Am J Manag Care* (2): 93-100.
24. Brumley RD, Enguidanos S, Cherin DA (2003) Effectiveness of a home-based palliative care program for end-of-life. *J Palliat Med* 6(5): 715-724.
25. Rabow MW, Dibble SL, Pantilat SZ, McPhee SJ (2004) The comprehensive care team: a controlled trial of outpatient palliative medicine consultation. *Arch Intern Med* 164(1): 83-91.
26. Higginson IJ, McCrone P, Hart SR, Burman R, Silber E, et al. (2009) Is short-term palliative care cost-effective in multiple sclerosis? A randomized phase II trial. *J Pain Symptom Manage* 38(6): 816-826.
27. Ciemins EL, Blum L, Nunley M, Lasher A, Newman JM, et al. (2007) The economic and clinical impact of an inpatient palliative care consultation service: a multifaceted approach. *J Palliat Med* 10(6): 1347-1355.
28. Penrod JD, Deb P, Dellenbaugh C, Burgess JF, Zhu CW, et al. (2010) Hospital-based palliative care consultation: effects on hospital cost. *J Palliat Med* 13(8): 973-979.
29. Bendaly EA, Groves J, Juliar B, Gramelspacher GP (2008) Financial impact of palliative care consultation in a public hospital. *J Palliat Med* 11(10): 1304-1308.
30. Morrison RS, Penrod JD, Cassel JB, Caust-Ellenbogen M, Litke A, et al. (2008) Cost savings associated with US hospital palliative care consultation programs. *Arch Intern Med* 168(16): 1783-1790.
31. Shnoor Y, Szlaifer M, Aoberman AS, Bentur N (2007) The cost of home hospice care for terminal patients in Israel. *Am J Hosp Palliat Care* 24(4): 284-290.
32. Taylor DH, Ostermann J, Van Houtven CH, Tulskey JA, Steinhauer K, et al. (2007) What length of hospice use maximizes reduction in medical expenditures near death in the US Medicare program? *Soc Sci Med* 65(7): 1466-1478.
33. Penrod JD, Deb P, Luhrs C, Dellenbaugh C, Zhu CW, et al. (2006) Cost and utilization outcomes of patients receiving hospital-based palliative care consultation. *J Palliat Med* (4): 855-60.
34. Lo JC (2002) The impact of hospices on health care expenditures--the case of Taiwan. *Soc Sci Med* [Internet]. 2002 Mar 54(6): 981-991.
35. Enguidanos SM, Cherin D, Brumley R (2005) Home-based palliative care study: site of death, and costs of medical care for patients with congestive heart failure, chronic obstructive pulmonary disease, and cancer. *J Soc Work End Life Palliat Care* 1(3): 37-56.
36. Campbell DE, Lynn J, Louis TA, Shugarman LR (2004) Medicare program expenditures associated with hospice use. *Ann Intern Med* 140(4): 269-77.
37. Gozalo PL, Miller SC, Intrator O, Barber JP, Mor V, et al (2008) Hospice effect on government expenditures among nursing home residents. *Health Serv Res* 43(1 Pt 1): 134-53.
38. Morrison RS, Dietrich J, Ladwig S, Quill T, Sacco J, et al. (2011) Palliative care consultation teams cut hospital costs for Medicaid beneficiaries. *Health Aff (Millwood)* 30(3): 454-63.
39. Tamir O, Singer Y, Shvartzman P (2007) Taking care of terminally-ill patients at home - the economic perspective revisited. *Palliat Med* Sep 1 21(6): 537-541.
40. Lewin SN, Buttin BM, Powell MA, Gibb RK, Rader JS, (2005) et al. Resource utilization for ovarian cancer patients at the end of life: how much is too much? *Gynecol Oncol* 99(2): 261-266.
41. Smith TJ, Coyne P, Cassel B, Penberthy L, Hopson A, Hager MA (2003) A high-volume specialist palliative care unit and team may reduce in-hospital end-of-life care costs. *J Palliat Med* 6(5): 699-705.

42. Miccinesi G, Crocetti E, Morino P, Fallai M, Piazza M, et al. (2003) Palliative home care reduces time spent in hospital wards: a population-based study in the Tuscany Region, Italy. *Cancer Causes Control* 14(10): 971-977.
43. Gomez-Batiste X, Tuca A, Corrales E, Porta-Sales J, Amor M, (2006) et al. Resource consumption and costs of palliative care services in Spain: a multicenter prospective study. *J Pain Symptom Manage* 31(6): 522-532.
44. Simoens S, Kutten B, Keirse E, Berghe P Vanden, Beguin C, et al. (2010) Costs of terminal patients who receive palliative care or usual care in different hospital wards. *J Palliat Med* 13(11): 1365-1369.
45. Hanson LC, Usher B, Spragens L, Bernard S (2008) Clinical and economic impact of palliative care consultation. *J Pain Symptom Manage* 35(4): 340-346.
46. Pyenson B, Connor S, Fitch K, Kinzbrunner B (2004) Medicare cost in matched hospice and non-hospice cohorts. *J Pain Symptom Manage* 28(3): 200-210.
47. Miller SC, Intrator O, Gozalo P, Roy J, Barber J, et al. (2004) Government expenditures at the end of life for short- and long-stay nursing home residents: differences by hospice enrollment status. *J Am Geriatr Soc [Internet]*. 52(8): 1284-1292.
48. Cowan JD (2004) Hospital charges for a community inpatient palliative care program. *Am J Hosp Palliat Med* 21(3): 177-90.
49. Tzala S, Lord J, Ziras N, Repousis P, Potamianou A, et al. (2005) Cost of home palliative care compared with conventional hospital care for patients with haematological cancers in Greece. *Eur J Health Econ* 6(2): 102-106.
50. Taylor DH (2009) The effect of hospice on Medicare and informal care costs: the U.S. Experience. *J Pain Symptom Manage* 38(1): 110-114.
51. Emanuel EJ, Ash A, Yu W, Gazelle G, Levinsky NG, Saynina O, et al. Managed care, hospice use, site of death, and medical expenditures in the last year of life. *Arch Intern Med* 162(15): 1722-1728.
52. Fassbender K, Fainsinger R, Brenneis C, Brown P, Braun T, Jacobs P. Utilization and costs of the introduction of system-wide palliative care in Alberta, 1993-2000. *Palliat Med* 19(7): 513-520.
53. White KR, Stover KG, Cassel JB, Smith TJ (2006) Nonclinical outcomes of hospital-based palliative care. *J Healthc Manag* 51(4): 260-273
54. Cassel JB, Webb-Wright J, Holmes J, Lyckholm L, Smith TJ, et al. (2010) Clinical and financial impact of a palliative care program at a small rural hospital. *J Palliat Med* 13(11): 1339-1343.
55. Ward-Smith P, Korphage RM, Hutto CJ (2008) Where health care dollars are spent when pediatric palliative care is provided. *Nurs Econ* 26(3): 175-178.
56. Stevenson DG, Huskamp HA, Grabowski DC, Keating NL (2007) Differences in hospice care between home and institutional settings. *J Palliat Med* 10(5): 1040-1047.
57. Tibi-Lévy Y, Le Vaillant M, de Pouvourville G (2006) Determinants of resource utilization in four palliative care units. *Palliat Med* 20(2): 95-106.
58. O'Mahony S, Blank AE, Zallman L, Selwyn PA (2005) The benefits of a hospital-based inpatient palliative care consultation service: preliminary outcome data. *J Palliat Med* 8(5): 1033-1039.
59. Raphaël R, Yves D, Giselle C, Magali M, Odile CM, et al. (2005) Cancer treatment at home or in the hospital: what are the costs for French public health insurance? Findings of a comprehensive-cancer centre. *Health Policy* 72(2): 141-148.
60. Seow H, Barbera L, Howell D, Dy SM (2010) Using more end-of-life homecare services is associated with using fewer acute care services: a population-based cohort study. *Med Care* 48(2): 118-124.
61. Pascuet E, Cowin L, Vaillancourt R, Splinter W, Vadeboncoeur C, et al. (2010) A comparative cost-minimization analysis of providing paediatric palliative respite care before and after the opening of services at a paediatric hospice. *Healthc Manage Forum* 23(2): 63-66.
62. Davis MP, Walsh D, LeGrand SB, Lagman RL, Harrison B, et al. (2005) The financial benefits of acute inpatient palliative medicine: an inter-institutional comparative analysis by all patient refined-diagnosis related group and case mix index. *J Support Oncol* 3(4): 313-316.
63. Back AL, Li Y-F, Sales AE (2005) Impact of palliative care case management on resource use by patients dying of cancer at a Veterans Affairs medical center. *J Palliat Med* 8(1): 26-35.
64. Bakitas M, Lyons KD, Hegel MT, Balan S, Brokaw FC, (2009) et al. Effects of a palliative care intervention on clinical outcomes in patients with advanced cancer: the Project ENABLE II randomized controlled trial. *JAMA* 302(7): 741-749.
65. Costantini M, Higginson IJ, Boni L, Orengo MA, Garrone E, et al. (2015) Effect of a palliative home care team on hospital admissions among patients with advanced cancer. *Palliat Med* 17(4): 315-321.
66. Douglas H-R, Normand CE, Higginson IJ, Goodwin DM, Myers K (2003) Palliative day care: what does it cost to run a centre and does attendance affect use of other services? *Palliat Med* 17(7): 628-637.
67. MD D (1970) *Game Theory: A Nontechnical Introduction*. Mineola: Dover Publications.
68. RD LHR. (1989) *Games and decisions, introduction and critical survey*. Mineola: Dover Publications.
69. Bloom DE, Cafiero-Fonseca ET, Candeias V, Adashi E, Bloom L, et al. (2014). *Economics of Non-Communicable Diseases in India: The Costs and Returns on Investment of Interventions 2014*. *Economics of Non-Communicable Diseases in India*. Public Health.
70. Davis MP, Walsh D, LeGrand SB, Lagman RL, Harrison B, et al. (2005) The financial benefits of acute inpatient palliative medicine: an inter-institutional comparative analysis by all patient refined-diagnosis related group and case mix index. *J Support Oncol* 3(4): 313-316.
71. Engelberg RA (2006) Measuring the quality of dying and death: methodological considerations and recent findings. *Curr Opin Crit Care* 12(5): 381-387.
72. Smith TJ, Cassel JB. *Cost and Non-Clinical Outcomes of Palliative Care*. *J Pain Symptom Manage Elsevier* 2009 Jul 38(1): 32-44.
73. Van den Heuvel WJA, Olăroiu M (2015) Is palliative care cost-effective? *PALIAȚIA* 9(1).
74. Brumley R, Enguidanos S, Jamison P, Seitz R, Morgenstern N, (2007) et al. Increased satisfaction with care and lower costs: results of a randomized trial of in-home palliative care. *J Am Geriatr Soc* 55(7): 993-1000.
75. Gade G, Venohr I, Conner D, McGrady K, Beane J, et al. (2008) Impact of an inpatient palliative care team: a randomized control trial. *J Palliat Med* 11(2): 180-190.