CHAPTER 3

LITERATURE REVIEW

3.1 Break-even Analysis

Logical expansion of a dental practice typically involves the addition of equipment and personnel. However, an analytic assessment of practice needs is necessary before embarking upon any expansion. Caplan (1989)[1] describes the use of break-even analysis to estimate the potential level of profitability derived from the addition of a hygienist and associated profit centers to a dental practice.

Break-even analysis was used to study home-and community-based long-term care services offered in more than two dozen controlled experiments conducted over the last 30 years (Weissert & Cready, 1989)[2]. The authors found that health care costs for the treatment group averaged only 14 percent more than the control group across all studies. Because patient benefits were found to be so minimal, they would have to be valued at an exceedingly high rate to break even from a social perspective. However, improved operating efficiency might make cost-accounting break-even an achievable goal. Needed improvements included better targeting of high-risk patients and better utilization controls on home and community care services.

Break-even analysis was used to determine the most financially feasible method of implementing stress thallium cardiac imaging services without sacrificing the quality of services. The hospital involved had three alternatives from which to choose in order to provide the office with an imaging camera: (1) purchasing a new camera, (2) purchasing used equipment, or (3) leasing a new camera. Budgeted income statements, net present value, and the internal rate of return methods has been used to determine the method of choice, without sacrificing quality of service delivery. It was found that purchase a used camera is the best methods (Owens and Neubecker, 1992)[3].

[1,2, and 3] Cited by Austin and Boxerman 1995

Break-even analysis has been employed to examine the adequacy of Medicare reimbursement in covering hospice costs. Hospice costs are high during the first few days after enrollment; therefore, a long period of enrollment is required for Diem reimbursement to cover costs. It was determined that the length of stay for the hospice to break-even is greater than median length of stay. Generally, the length of stay of time prior to break-even is longer for Medicare recipients than for the total patient population. The authors proposed two changes to alleviate this problem: supplement the per diem rate with the additional fixed amount of reimbursement for each hospice enrollee, or seek higher reimbursement for the first few days of hospice care (Carnery et al. 1989)[1].

A break-even analysis has been employed to determine the profitability of three scenarios: (1) expand the clinics marketing program, (2) extend the clinics service hours, or (3) extend the clinic service hours and expand the clinics marketing program. Analysis of patient revenue per visit, variable costs, and fixed costs reveals the expanded marketing plan offers the lowest fixed costs and takes the most advantage of excess capacity. Thus, it is the most profitable at any given level of incremental visits (Gapenski, 1989)[2].

Principles of break-even analysis were used to justify the costs of the program with pharmacy participation in the R.E. Thompson general hospital in El Paso, Texas. The new service would break-even when sales equal expenses, or when there is no-profit, no-loss operation. When determining the fixed costs of the model, the existing facilities such as building space, clinic fixtures, and examining rooms were excluded. It was assumed that personnel and equipment costs incurred by the academic medical center would have been required regardless of the involvement of the pharmacy department, thus, they too were excluded as fixed costs. Only the fixed and variable costs associated with providing pharmaceutical services were included in the break-even analysis. Because the pharmacy department used existing facilities, expenses for fixed costs were reduced. Bid prices and invoices were used to determine supply costs.

[1,2]Cited by Austin and Boxerman 1995

Break-even analysis showed that the pharmaceutical services in the outpatient oncology clinic would break even at 1153 patient visit. Annual revenue of $46,308 would have generated to break even. The clinic treated 1162 oncology patients during the one year trial period. The pharmacy generated annual revenue of $64,793 and profit of $485. The program would remain an integral part of R.E. Thompson's pharmaceutical services (Caselnova et al. 1985)[1].

The Sooner Nursing Home is a 100-bed, long-term care facility operating in the southwest region of the United States. At the time of this study (1981), the facility operated at 100 percent occupancy. The patient mix was 80 percent Medicaid and 20 percent private pay with a $24.66 per day revenue per patients. Accordingly, there was a "lid" on the revenue per patient, and the organization was limited to increasing net income through either reducing costs or increasing the number of patients served in the facility.

Break-even analysis was employed to determine the profitability of the facility at different occupancy levels and to examine the financial feasibility of expanding the institution. Most out-of-pocket costs, such as professional salaries, food, and linen, were considered variable since they are a function of activity or patient census. Fixed costs included salaries and wages for full-time personnel, taxes, rent, interest, and depreciation.

The model suggested that the facility needed to generate $720,000 gross revenue to break even. This could be achieved at an 80 percent occupancy rate. If the owners expanded the facility by 50 percent (to 150 bed), fixed expenses would increase by approximately 40 percent. Variable expenses would decrease about 5 percent as a percentage of revenue, because of economics of scale due to increased capacity. At this level, the facility would need to generate revenue of $ 896,000 at a 66 percent occupancy rate to break even. A net income of $204,000 would be achieved if the nursing home operated at 100 percent occupancy (Goggans, 1981)[2].

[1,2] Cited by Austin and Boxerman 1995

The formal description of break-even point is the unit sales volumes that a company needs so that its revenues equal its operating expenses resulting in a zero profit-loss. The analysis calculates a break-even point based on fixed costs, variable costs per patient, and savings per patient. Corresponding to the three key assumptions of a formal break-even analysis we assumed that 1) the APS (acute pain service) provide a one in-hospital day decrease in LOS for a saving of $1,000 per patient; 2) Average per-patient variable cost extracted from the APS budget; 3) monthly fixed costs = (all APS expenses – APS variable cost). Physician reimbursement cost calculations not included in this your model since it is not a part of the APS budget. Consulting only 16 patients per month would be the break-even for the APS budget structure. Currently the APS is consulting 278 patients per month. Increasing APS staffing by one acute care nurse practitioner (ACNP) will increase the break-even point for the APS to 33 patients per month. Therefore, it would be still economically beneficial for our health care institution if a third ACNP were hired, while the other desired institutional goals of improving patient satisfaction and meeting accreditation standards in pain management would also be achieved. Break-even analysis can be a useful tool in the economic evaluation of an APS (Souzdalnitski et al.2004).

Break-even point is one of a managerial tool which help a hospital survive under market competition and forced it to reply to flexible market circumstances. The analysis of the hospital in J.Hradec is primarily concerned with cost analysis for 1996 and 1997. We counted the real patient population of the hospital, which is 60,000 inhabitants, although the administrative area has 100,000 inhabitants. We analyzed in detail only the ward part of the hospital; we evaluated the complementary departments (i.e., microbiology, biochemistry, hematology, pathology, and radio diagnosis) only within the framework of the whole hospital. The complementary departments create 46% of the whole financial turnover of the hospital. After a break-even point method analysis, they realized that out of all ward departments only the ophthalmology department- using a fee-for-service system- made a profit. The OBG and the UNK department were not profitable because the profit was lower than the fixed expenses of the department for the whole year (Stritecky and Pubal, 2000).

Unit costs of laboratory tests at the outpatient department of Chulalongkorn hospital in the fiscal year 1991, Thailand have been studied. A few studies in Thailand focusing on the unit costs of the laboratory services and they analyzed only some parts of the cost or, on the contrary, the overall cost. In addition, this study also aimed to determine the break-even point of each laboratory test, and compare the calculated unit costs to the actual laboratory service charges.

All sections of the OPD were classified into three cost centre categories: patient services, revenue producing services (radiology, laboratory and pharmacy sections) and non-revenue producing services (administrative and supportive sections). The total direct cost (TDC) of the laboratory section was calculated from the labor cost (LC), material cost (MC) and capital cost (CC) in each unit. The total cost from the non-revenue producing cost centre was then allocated by the simultaneous equation method, using appropriate allocation criteria, to the laboratory section. Thus, the full cost of each laboratory unit is the sum of the total direct costs in its section and the indirect allocated from the non-revenue producing cost centre. The unit cost of each laboratory test was then calculated by dividing the full cost by the total number of types of test requested during the 12 months of observation.

They found that the material cost was determined to be the highest portion (44%) of both the direct and total cost of the laboratory services at the outpatient department of Chulalongkorn Hospital, followed by the labor cost and capital cost respectively.

Table 3.1: The direct cost, total cost, capital cost, labor cost, and material cost of the laboratory unit at the outpatient department of Chulalongkorn hospital, 1991

Cost categories	**Direct Cost**		**Total Cost**	
	Amount (Baht)	**%**	**Amount (Baht)**	**%**
Capital cost	1,924,380	21.96	2,399,916	24.40
Labor cost	2,898,523	33.07	3,091,513	31.43
Material cost	3,941,869	44.97	4,344,243	44.17
Total cost	8,764,772	100.00	9,835,674	100.00

Source: Chotiwan et al. 1996

In an analysis of the material cost, they found that the chemical cost contributed the greatest part (76.4%) followed by the medical inventories cost (14.2%). For the capital cost, analysis revealed that the medical instruments cost was the highest portion (76%), followed by construction cost (19.5%) and the office inventories cost respectively.

Break-even point for each laboratory test is determined. They found that number of tests requested for most of the types were higher that break-even except for CBC, Malaria, LE Cell, ESR, reticulocyte, Stool group, and CPK, and they found that charges for most of the types of tests requested were higher that break-even point except for CBC, malaria, LE cell, ESR, reticulocyte count and stool examination (Chotiwan et al. 1996).

Unit costs of diagnostic imaging tests at the outpatient department of Chulalongkorn Hospital have been studied. A radiologic service is one of the most important medical services in diagnosis, follow-up of the progression of diseases and evaluation of management outcome. This study includes both general and special diagnostic imaging tests and determines the break-even point of each imaging tests service.

The total direct cost (TDC) of the radiologic section was calculated from a labor cost, material cost, and capital cost in each unit, the total cost from the non-revenue producing cost centers was then allocated to the radiology section by the simultaneous equation method using appropriate allocation criteria.

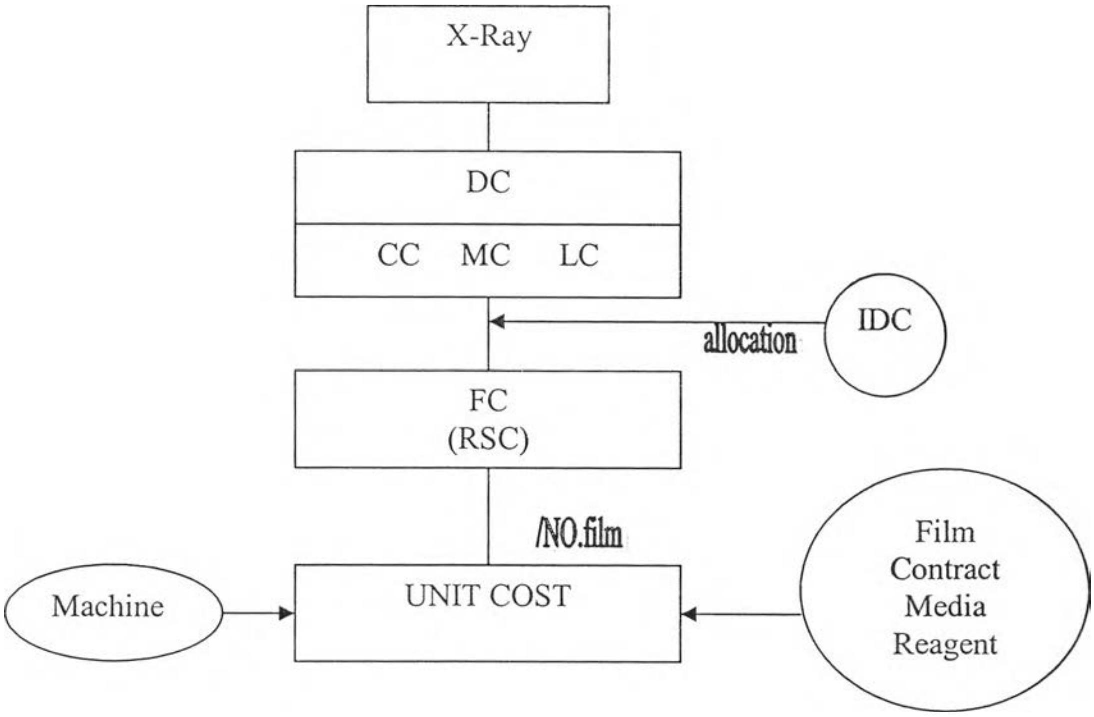

Figure 3.1: Costing Process of X-Ray

The fixed costs do not change with the volume of services provided, e.g. the costs of the X-Ray machines, but the variable costs increase with the increasing volume of services.

They found that the maximum component was the capital cost, followed in order by the labor costs and the materials costs. Regarding the capital cost, it was found that the greatest cost (88%) was the medical instruments, while in the materials cost, X-Ray films were the highest cost (62%) followed by the contrast media (17%). A comparison between the number of special diagnostic imaging tests and the number of break-even explain was shown in the following table (Dhanamun B et al. 1996).

Table 3.2: The number of test requested and the break-even point for the special diagnostic tests at outpatient department of Chulalongkorn hospital, 1991

Special Diagnostic Imaging	Break-even point (No. tests)	No. tests requested
Barium enema	936	557
T-tube cholangiography	28	15
E.R.C.P	2	10
Hysterosalpingography	84	216
Fistulography	14	11
Venography	2	2
Cryptography	14	5
Small bowel study	138	44
Upper GI study	4,457	1,426
Barium swallow	63	17
Myelography	61	119
Oral Cholecystography	99	38
Voiding cystourethrography	113	39
I.V.P	3,264	2,035
Dacryocystography	24	85
Arthrography	13	4
Mammography	619	198
Ultrasound	1,030	2,208
Mandible (panoramic view)	721	196
Teeth	109	123
Temporomandibular Joint	99	48

Source: Dhanamun B et al. 1996

3.2 Willingness to pay (WTP)

The relationship between education and WTP has been studied. Household willingness to pay for treatment provides important information for programmed planning, and the household willingness to pay for future mass treatment with azithromycin. The method used surveyed 394 households in 6 villages located in central

United Republic of Tanzania regarding their willingness to pay for future azithromycin treatment. A random sample of households with children under 8 years of age was selected and interviewed following an initial treatment programmed in each village. He fined that 38% of responding households stated that they would not be willing to pay anything for future azithromycin treatment. The relationship between education and willingness to pay may result from more-educated women paying more attention to preventing negative health outcomes (Frick, 2003).

Income and Willingness to Pay

Data from 615 depressed primary care patients has been analyzed to determine their willingness to pay for depression treatment. A sample of 615 adult patients from four primary care clinics participated in a randomized controlled trial of a disease management program for depression in primary care. Multiple regression analysis was used to estimate the association between demographic and clinical factors and willingness to pay for depression treatment and examine changes. This study found that the mean amount that participants were willing to pay for depression treatment at baseline was $270±187 per month, or about 9 percent of the participants household income participants with higher incomes and those with more severe depression symptoms at baseline were willing to pay significantly more (Unutzer et al. 2003).

The willingness of the community (willingness to pay) to participate in cost sharing mechanisms for provision of primary health care in fee for service and payment mechanisms was determined. A cross sectional stratified household interview survey of 600 households was carried out in urban and rural areas of district Jehlum, to address the financial sustainability of government health care interventions at the community level and to explore the question of willingness to pay for health care. 437 (72.7%) of the households expressed their willingness to pay for health care. Low income groups exhibit a slight decrease in the willingness to pay. The willingness to pay is marginally affected by income, place of residence and/or cost of treatment incurred (Masued et al. 2003).

The development of methods to measure willingness to pay (WTP) has renewed interest in cost-benefit analysis (CBA) for economic evaluation of health care programs.

O'Brien and Viramontes (1994) studied the construct validity and test-retest reliability of WTP as a measure of health state preferences in a survey of 102 persons (mean age 62 years; 54% male) who had chronic lung disease. They found that All health status and preference measurements except WTP (controlling for income) showed significant ($p<0.05$) difference between disease-severity groups (mid/moderate/severe). WTP was significantly ($p=0.01$) associated with household income.

This research aims to fill gaps in the literature that estimates the value of a statistical life (VSL) by designing and implementing a contingent valuation study for persons 40 to75 years of age, and eliciting WTP for reductions in current and future risks of death. Targeting this age range also allows us to examine the impact of age on WTP and, by asking respondents to complete a detailed health questionnaire, to examine the impact of health status on WTP. Krupnick et al. (2000) found that WTP does not vary much by age. Persons 40 to 49 years old do have slightly lower WTP than persons 50 years of age and older.

Regardless of the measure of physical health status used (with one exception), WTP does not vary appreciably with physical health status either—an important result for environmental policy, because older people and people with chronic conditions often benefit from improvements in environmental quality. However, this study found that individuals with cancer and those in better mental health have a larger WTP than those without cancer and those scoring lower on tests of their mental health, respectively.

The economic theory suggests that the following characteristics of the persons whose risks are reduced may affect their willingness to pay (WTP) for mortality risk reductions. (1) Age, (2) income, and (3) health status. (Lee et al.)[1] Suggest that WTP at age 60 is about 70% of WTP at age 40, the age at which WTP peaks. (Alberini et al.)[2], using a sample of 40-75 years olds, find that WTP at age 70 is about 1/3 of WTP at age 40.

[1,2] Cited by Cropper 2000

Coronary atherosclerosis is the major cause of death and disability in Western countries. Consequently, coronary revascularization procedures are among the most frequent and costly procedures performed within the united states health care system today. In recent years, the use of percutaneous coronary interventions (PCI) has increased to approximately 700,000 procedures per year in the United States alone. Economic evaluations of such therapies have been performed, but have been hindered by the need to assess the disutility of short-term health care events and repeat coronary revascularization as well as the lack of benchmark standards for intermediate health outcomes.

The standard approach is cost utility analysis, in which the benefit is measured in terms of quality – adjusted life years (QALYs), although the use of QALYs as an outcome measure is theoretically valid, several pragmatic issues limit the attractiveness of this endpoint for valuing treatments aimed at avoiding restenosis and repeat revascularization after PCI. To examine patients willingness to pay (WTP) for treatments that may reduce the risk of restenosis and repeat revascularization after PCI. They used a contingent valuation approach to evaluate WTP among participants in two large clinical trials evaluating new PCI devices. The baseline scenario described a 30 % probability of repeat revascularization following the initial procedure. Patients were asked to indicate, using a close-ended (referendum) question, their out-of-pocket WTP for an improved treatment the world reduce this risk. Three different price ($ 500, $1,000, and $1,500) and three levels of absolute risk reduction (10, 20 and 30%) were randomly varied creating nine sub-samples of patients. Patients' responses were analyzed using both parametric and non parametric methods. They found that 1642 patients (95%) completed WTP question. The WTP medians for the 10 and 20 % risk reduction were $273 and $366, respectively, the median WTP for the 30% risk reduction was significantly higher at $1,162 ($P$<0.001). Higher household income was independently associated with a higher WTP (Greenberg et al. 2004).

Willingness to pay method addresses both the physical and psychological burden of disease was studied. This approach, also referred to as a money trade-off approach, was used by Johansson and associates to estimate how much patients in Sweden with urge or mixed incontinence would pay for a treatment the number of mictturitions and urinary leakages. Patients answered question about WTP per month for the drug. The price of the new drug was varied from $15 to $400, and the size of the reduction in micturitions and leakages was varied between 25% and 50%.the survey found that patients were willing to pay a median of $31 per month for a 25% reduction in micturitions and leakage and $62 per month for a 50% reduction. A recent study demonstrated that the incremental cost of treating a patient with tolterodine was $50 per month (Hu and Wagner, 2000).

This paper introduces a new method to calculate the extent to which individuals are willing to trade money for improvements in their health status. An individual welfare function of income (WFI) is applied to calculate the compensating income variation of health impairments. Groot et al. (2005) believe that this approach avoids various drawbacks of alternative willingness-to-pay methods. The WFI is used to calculate the compensating variation of cardiovascular diseases. It is found that for a 25-year old male the compensating variation of a heart disease ranges from 160,000 Euro to 430,000 Euro depending on the welfare level. This is about 8,000 to 32,000 Euros for an additional life year, depending on the quality of life. The compensating variation declines with age and is lower for women than for men. The estimates further vary by the discount rate chosen. The estimates of the compensating variation are generally higher than the money spent on heart related medical interventions per QALY.

The consideration of avoidance behavior is a crucial distinction between willingness to pay (WTP) and cost-of-illness (COI) analysis. In the case of pollution, COI measures the loss in income and medical expenditures that results from a change in health, but does not include actions taken to reduce the impact of pollution. A major difference between WTP and COI is that WTP accounts for these behavioral adjustments in response to pollution. For example, if people respond to pollution by staying indoors instead of outdoors, then this action has direct cost on well-being that are included in WTP but not in COI. In general, COI is viewed as a lower bound to WTP (Neidel, 2004).

This analysis uses three valuation approaches-risk-risk tradeoff, paired risk-dollar comparison, and utility function estimation—to estimate the no pecuniary cost associated with disability in late life. In addition, we obtain an estimate of the value of life using a paired risk-dollar comparison. The data were obtained from interviews with 548 persons using an iterative computerized questionnaire. Respondents reported a median value of life of $12 million and would be willing to pay $0.9 million to avoid disability in late life, approximately $60,400 for each year of disability over age 62: the result was robust to the evaluation technique employed (Perreira and Sloan, 1999).

Cost-effectiveness analyses (CEA) express the benefits in physical units, e.g. fractures avoided, tumors detected. These analyses have a narrow application in that comparisons can only be made when the unit of outcome is exactly the same. In other words, CEA operates with an Incommensurable benefit unit which cannot be applied across different diagnoses, e.g. is the benefit from an avoided fracture any less than from a detected tumor? The purpose of cost-utility analyses (CUA) is to assist in making such comparisons. The idea behind the development of this method was to offer a commensurable unit of health outcomes, which is most commonly referred to in terms of quality-adjusted-life-years (QALYs). However, while CUAs enable wider comparisons than CEAs, the benefit unit is still restricted to health.

Cost-benefit analyses (CBA) express the benefits in monetary units. In so doing, benefits from a health care programmed become commensurable with the benefits from any other public (or private) sector programmed. These analyses, in theory, can thereby assist in answering two very important questions: (i) are the benefits from a health care programme any higher than the benefits which could be obtained had the same resources been used in any other sector of the economy, e.g. education?; and (ii) are the benefits of the programme in question any higher than its costs? A type of analysis which claims to provide answers to these two questions is clearly a powerful one (Drummond et al. 1997)[1].

Cost effectiveness of catheter ablation therapy versus amiodarone for treating ventricular tachycardia (VT) in patients with structural heart disease was evaluated. Calkins et al. (2000) calculated incremental cost-effectiveness of ablation relative to

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1 Cited by Olsen et al. 1999

amiodarone over 5 years after treatment initiation. Event probabilities were from the chili randomized clinical trial. Quality-of-life weights (utilities) were estimated using an established preference measurement technique. In a hypothetical cohort of 10000 patients, 5-years costs were higher for patients undergoing ablation compared with amiodarone therapy ($21,795 versus $19,075). Ablation also produced a greater increase in quality of life (2.78 versus 2.65 quality-adjusted life-years [QALYs]). This yielded a cost-effectiveness ratio of $20,923 per QALY gained for ablation compared with amiodarone. They found that from a societal perspective, catheter ablation appears to be a cost-effective alternative to amiodarone for treating VT patients.

Data from Asymptomatic Carotid Atherosclerosis Study (ACAS) and other studies has been combined to look at the benefits and costs of using ultrasound to screen 1,000 asymptomatic men. Derdeyn and Powers (1996) assumed that those who tested positive for carotid stenosis would be sent for angiography and that those really did have the disease would then have one of their carotid arteries surgically cleaned.

They take this angiography complication rate into account in their computer model. They also include the prevalence of carotid stenosis, the sensitivity and specifically of ultrasound method, the stroke and death rates linked to endarterectomy, the risk of stroke with medical treatment, subsequent death rates from other causes, quality of life estimates and estimated costs of the procedures.

The simulation calculates the number of years of life that screening would save; these are expressed as quality-of-life years (QALYs), where a stroke-free year's count as 1 QALY and any year after a stroke counts as 0.8 QALY. The model also generates overall costs-costs incurred through ultrasound ($109 in 1995), angiography ($2,000) and surgery ($9,000) minus costs saved over 20 years by preventing strokes, deaths and the need for long-term care. Dividing overall costs by total QALYs gives the cost per QALY.

The model revealed that 1000 asymptomatic, high-risk men who were screened for carotid stenosis once at age 60 would enjoy a total of 30 more QALYs than 1000 similar men who were not screened. The cost of adding each QALY would be about

$35,000-"relatively cost-effective compared with some other medical procedures" Powers says.

3.3 Comparison of Stent and PTCA Costs.

An observational comparison of balloon PTCA and stent costs using patients in the Duke cardiovascular disease database have been performed. The procedural costs of stenting in this exceeded those of PTCA by around $3,600, owning not only to the cost of the stent device but also to the use of a greater number of balloon catheters. Follow-up obtained on this cohort out of to 6 months revealed a 9% repeat revascularization rate in the stent patients versus 26% in the PTCA patients. As a consequence, at 6 months the cumulative costs of the two cohorts were equivalent $19,600 versus $19,800 (Peterson et al.)[1].

The use of stenting at the Beth Israel hospital has been studied in 1995 and reported that, in contrast with earlier years, stenting increasingly was being applied to long and more complex lesions and to multiple lesions per patient. In addition, more stents and more adjunctive balloon catheters were being used to achieve optimal stent deployment for each lesion. As a result, procedural costs in these more resource – intensive cases were increased by $2,000 to $4,000 over the earlier simpler single-lesion procedures (Sukin et al.)[2].

3.4 Stents open arteries, but keep costs down

Stents which prop narrowed arteries are initially more expensive than balloon angioplasty alone, but they prove durable and cost-effective with time, according to research reported in today's rapid access issue of Circulation: journal of the American Heart Association.

The study also examined the cost effectiveness of using a new blood thinner called abciximab after artery-opening procedures. The benefit depended on long-term survival. "Stenting costs about $1,400 more at the outset", said senior author David J. Cohen, M.D., associate professor of medicine at Harvard Medical School in Boston. "But

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[1,2] Cited by Topol 2003

over one year, the stent essentially paid for itself because stents reduce the rate of restenosis (artery renarrowing)".

A stent is a wire mesh tube used to prop open an artery that's recently been cleared using angioplasty. The stent is collapsed to a small diameter and put over a balloon catheter. It's then moved into the area of the blockage. When the balloon is inflated, the stent expands, locks in place and forms a scaffold. This helps keep the artery open and improved blood flow to the heart. A stent may be used along with angioplasty.

The study, Controlled Abciximab and Device Investigation to Lower Late Angioplasty Complications (CADILLAC), enrolled 1,703 patients with acute myocardial infraction. Researchers randomize 846 patients to stenting alone and treated 857 patients with balloon angioplasty alone.

Health economics determine cost-effectiveness of treatments by calculating the cost per quality-adjusted year of life gained, which is to ratio between the additional costs for the new treatment to the clinical benefit achieved. In the CADILLAC trial, the cost-effectiveness ratio for stenting was $11,237 per quality-adjusted year of life gained. Generally, treatments that cost less than $50,000 per quality-adjusted year of life gained are considered cost-effective. "So, by any reasonable standard, stenting in patients with acute MI is highly cost-effective", Cohen said.

Compared to balloon angioplasty, the use of stents added $1,148 to the procedural costs and the entire hospitalization cost $1,384 more. However, during the year after the procedure, follow-up costs for patients who received stents were $1,215 less than the follow-up costs for the balloon angioplasty patients. So the one-year cost was $18,859 for stenting and $18,690 for balloon angioplasty (American Heart Association [AHA], 2003).

3.5 Early Invasive Versus Early Conservative Strategy

88% of such patients underwent catheterization in the United States during their initial hospitalization. In a managed care environment, rates are lower and surprisingly variable, ranging from 30% to 77% in the recent study. Recent work has shown that the decision to refer for diagnostic catheterization in a cute coronary disease is at best modestly influenced by clinical factors but is substantially influenced by structural aspects of the practice environment, such as the availability of catheterization facilities at the admitting hospital, being admitted by a cardiologist who performs invasive procedures.

A decision model to compare routine coronary angiography in the convalescent phase of acute MI hospitalization with medical therapy and exercise testing has been used. Because of the lack of clinical trial data in acute coronary disease, the estimates needed for this analysis were collected from trials in chronic coronary disease and from a variety of literature and expert opinion sources. Long-term survival was projected using the coronary heart disease policy model of Weinstein and colleagues. Cost data (given in 1994 U.S. dollars) were obtained from Medicare data. In the model-based analysis, routine coronary angiography increased quality-adjusted life expectancy (through its effect on subsequent revascularization) in almost all MI subgroups examined. Only women ages 35 to 44 with normal ejection fractions, no post-MI angina, and a negative treadmill test appeared not to benefit. When costs were factored into the model, however, the cost to produce an extra unit of benefit varied substantially among subgroups. The most economically attractive cost-effectiveness ratios were obtained in patients with a history of a prior MI (presumably a surrogate marker for a greater cumulative left ventricular dysfunction) and in those with inducible myocardial ischemia. Cost – effectiveness ratios with both of these factors ranged between $44,000 and $17,000 per QALY added. Conversely, most patients with negative exercise tests had ratios exceeding $50,000 per added QALY (Kuntz et al.)[1].

[1] Cited by Topol 2003