

## RESEARCH COMMUNICATION

# Healthcare Utilization in Patients with Esophageal Cancer in a High Risk Area in Northeast of Iran

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### Abstract

**Introduction:** Golestan, a province located north of Persian Gulf in northeastern part of Iran is a well known area for high risk of esophageal cancer (EC) in the world. There is no information about healthcare utilization in populations residing in the area. This study was conducted to assess utilization of healthcare and its associated factors among esophageal cancer patients in this region as well as to address ethical implication of this utilization. **Methods:** All new cases of EC in Golestan province during year of 2007 were recruited. Seven diagnostic and five therapeutic services were used to assess diagnostic utilization index (DUI), and therapeutic utilization index (TUI), respectively. Multivariate regression analysis was used to assess the relationship between variables and DUI or TUI. P-value of less than 0.05 was considered as statistically significant. **Results:** Two hundred twenty three, patients were enrolled with mean (Standard Deviation) age of 64.3 (12.5) years with 57.8% male. We observed that occupation (P<0.01), ethnicity (P<0.01) and sex (P=0.03) were strongly associated with DUI. Insurance coverage (P<0.01), place of residency (P<0.01), and occupation (P=0.01) were associated with TUI. **Conclusion:** We concluded that several factors contribute to disparity in healthcare utilization in the studied population.

**Key words:** Esophageal malignancy - healthcare utilization - social justice - Iran

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### Introduction

Resource scarcity is a major problem in health systems especially in developing countries (Murray and Lopez, 1996). So, just allocation of scarce resources is an important ethical issue of health policy making (Wikler, 2003). Health systems have to consider justice in resources allocation and ensure that all patients have just access to healthcare services. Various factors were suggested to affect utilization of healthcare services in different settings. Sudore et al. (2006) showed that utilization of healthcare services was significantly lower in low educated old patients. According to the results of a study from the USA on type 2 diabetes patients, there were some racial and ethnic inequalities for utilization of healthcare services (Harris, 2001). Newacheck et al. (1998) suggested that insurance coverage was an important factor of healthcare utilization in children. Wang and Luo (2005) showed a better healthcare utilization in rural than urban areas; they also found that access to healthcare services was better in individuals with higher education level. Steyerberg et al. (2007)

reported a higher healthcare utilization in young people. Some previous studies showed a positive relationship between socioeconomic status (SES) and healthcare utilization (van Vliet et al., 2006; Agabiti et al., 2007). Borrel et al (2001) also showed social inequalities in the use of health services.

Esophageal cancer (EC) is a fatal disease, usually diagnosed in advanced stages. EC cases often needs special considerations and access to appropriate services may have considerable effects on the disease progression and quality of life in these patients. Golestan province, in northeast of Iran, located on the Asian belt of upper gastrointestinal cancers has been known as a high risk area for EC (Pourshams et al., 2004; Kamangar et al., 2007). Various studies have been conducted to assess the etiology and risk factors of EC in this region. SES, opium consumption, alcohol consumption, drinking hot tea, silica contamination of flour, dietary intake of benzopyrene, germline BRCA2 mutations and high serum and soil selenium concentration have been suggested as possible risk factors for EC in Golestan province (Kamangar et al., 2007; Semnani et al., 2010b).

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Although EC is the major health problem in this area, there is no evidence about healthcare utilization in these patients. In other words, assessing healthcare utilization as major indicator of patient care has been neglected in previous studies from this region. So, we conducted this study to assess healthcare utilization and associated factors in EC patients in Golestan province. We also used our findings to make a generalized discussion about ethical issues of resources allocation in health systems.

## Materials and Methods

All new EC cases in Golestan province of Iran in 2007 were recruited. We obtained patients' demographic information and addresses from Golestan population-based cancer registry (Semnani et al., 2010a). Educated health professionals were asked to collect information in patients' home using a structured questionnaire. The questionnaire had two parts. The first section included demographic and SES data and the second part consisted on medical information. The questionnaire was prepared using expert specialists' comments and literature review (van Vliet et al., 2006). The reliability of the questionnaire was approved by test-re test method in a pilot study (Kappa: mean: 0.86; range: 0.61-1.00). Reviewers were asked to catch data from the patient itself. If the patient was dead, a first degree relative was asked for information.

To achieve more accurate and detailed results, healthcare was divided into diagnostic and therapeutic services. Diagnostic services utilization index (DUI) was assessed using seven diagnostic procedures, including chest X-ray, ultra-sonography of the esophagus, chest computed tomography, barium swallow, magnetic resonance imaging of chest, esophageal endoscopy and bronchoscopy. Therapeutic services utilization index (TUI) was determined considering five therapeutic services, including surgical resection, stent replacement, balloon dilatation, chemotherapy and radiotherapy.

Stage of cancer is an important factor to evaluate patients' need for diagnostic and therapeutic procedures. We did not have enough data about the stage of EC in the participants and could not assess the necessity of a procedure for patients. To overcome this limitation, two questions were asked for each procedure. The first one was "if the procedure was recommended?". The second question was "if the procedure was performed?". Answers to these questions were scored as 0 for "No" and 1 for "Yes". Then the total score of "performed" and "recommended" procedures were calculated. Finally, DUI was computed by dividing the total score of "performed diagnostic procedures" and the total score of "recommended diagnostic procedures". TUI was also calculated in the same way.

Participants' education status was categorized into four levels, including illiterate; reading and writing; primary school and secondary school or higher. Using the results of previous studies (De Irala-Estevéz et al., 2000;

Jansson et al., 2005; Islami et al., 2009) we consider four occupational groups consisted of worker, self-employed, clerk and manager. If the patient was workless, the occupation of the household head was considered.

Pearson's correlation test was used to assess the relationship between DUI or TUI and patients' age. We used One-way ANOVA test to identify the relationship between DUI or TUI and ethnicity, education and occupation. The relationship between DUI or TUI and sex, place of resident and marital status was assessed by Student t-test. P-value of less than 0.05 was considered as significant. Then we used multivariate regression analysis to determine the adjusted effects of variables on DUI and TUI. For this reason, variables with the p-value of less than 0.2 (in the univariate analysis) were entered into multivariate models. The ethical issues of this study were approved by the ethical committee of the Golestan University of Medical Sciences (GOUMS).

## Results

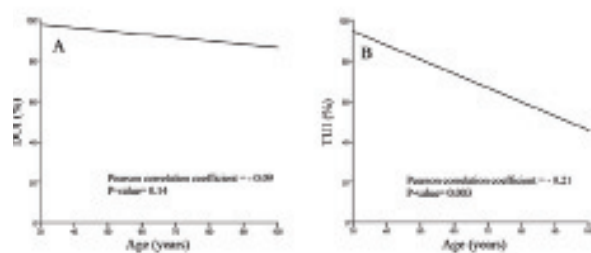
Totally, 241 EC cases were invited of which, 223 patients (response rate= 93.53%) participated in the study. Mean (SD) of patients' age was 64.3 (12.54) years. 129 cases (57.8%) were male. 167 patients (74.9%) had insurance coverage (table 1). The mean (SD) of the interval between the time of diagnosis and death (or interview) (cancer duration) was 9.62 (6.83) months.

### Factors related to DUI

The mean (SD) of DUI was 92.2 (20.5) percent. DUI for 178 cases (79.8%) was 100%. In other words, all recommended diagnostic procedures were performed in these 178 patients. No significant relationship was seen between DUI and age (Figure 1). The relationship between DUI and other variables is shown in Table 1. There was no significant relationship between DUI and place of residence, marital status, insurance coverage and education. DUI had a significant relationship with occupation, sex and ethnicity. Multivariate regression showed that occupation, ethnicity and sex had the strongest relationship with DUI.

### Factors related to TUI

The mean (SD) of TUI was 70.94 (41.25) percent. All



**Figure 1. Correlation between Age and Diagnostic Services Utilization (A) and the Therapeutic Services Utilization Index (B) in Esophageal Cancer Patients in Golestan Province of Iran**

**Table 1. Mean and Standard Error (SE) of DUI\* According to Different Variables and the Results of Multivariate Regression Analysis in Esophageal Cancer Patients in Golestan Province of Iran**

Variables		Patients (%)	DUI*		P-value	Multivariate regression analysis		
			Mean	SE		Beta <sup>1</sup>	T	P- value
Sex	Male	57.8	89.5	2.2	0.01**	-	-	-
	Female	42.2	96.0	1.2		0.15	2.13	0.03
Place of residence	Rural area	68.2	90.6	1.8	0.05**	-	-	-
	Urban area	31.8	95.6	1.7		0.12	1.58	0.12
Occupation	Worker	18.8	83.6	5.0	0.01***	-	-	-
	Self-employed	50.7	93.1	1.6		0.16	1.76	0.08
	Clerk	12.1	93.5	4.0		0.11	1.27	0.21
	Manager	18.4	97.8	1.3		0.24	2.86	<0.01
Ethnicity	Turkmen	45.1	96.6	1.1	0.04***	-	-	-
	Persian	39.8	89.0	2.9		-0.21	-2.69	<0.01
	Others	15.0	90.6	4.1		-0.12	-1.71	0.08
Age (years)	-	-	-		0.14****	-0.04	-0.58	0.56
Marital status*****	Single	19.3	89.3	4.3	0.44**	-	-	-
	Married	80.7	92.9	1.3		-	-	-
Insurance coverage*****	No	25.1	90.1	3.4	0.38**	-	-	-
	Yes	74.9	92.9	1.4		-	-	-
Education*****	Illiterate	78.5	91.7	1.5	0.72***	-	-	-
	Reading and writing	9.0	92.1	5.6		-	-	-
	Primary school	6.7	98.1	1.4		-	-	-
	≥Secondary school	5.8	92.2	7.7		-	-	-

\*Diagnostic services utilization index; <sup>1</sup>standardized; \*\*Student t-test; \*\*\*One-way ANOVA; \*\*\*\*Pearson correlation; \*\*\*\*\*Variables adjusted in multivariate analysis

**Table 2. Mean and Standard Error (SE) of TUI\* According to Different Variables and the Results of Multivariate Regression Analysis in Esophageal Cancer Patients in Golestan Province of Iran**

Variables		TUI*		P-value	Multivariate regression analysis		
		Mean	SE		Beta <sup>1</sup>	T	P- value
Place of residence	Rural area	63.9	3.7	<0.01**	-	-	-
	Urban area	86.4	3.6		0.29	4.4	<0.01
Occupation	Worker	58.9	8.0	<0.01***	-	-	-
	Self-employed	65.7	4.2		0.04	0.5	0.61
	Clerk	84.8	6.3		0.10	1.23	0.22
	Manager	87.2	4.9		0.21	2.55	0.01
Age (years)	-	-	-	<0.01****	-0.16	-2.35	0.02
Marital status	Single	58.8	7.4	0.06**	-	-	-
	Married	73.5	3.1		0.08	1.18	0.24
Insurance coverage	No	44.5	7.0	<0.01**	-	-	-
	Yes	78.1	2.9		0.35	5.45	<0.01
Education	Illiterate	67.1	3.4	0.05***	-	-	-
	Reading and writing	81.1	9.3		-0.01	-0.15	0.88
	Primary school	82.3	9.4		-0.01	-0.13	0.90
	≥Secondary school	95.8	4.2		0.00	0.05	0.96
Ethnicity*****	Turkmen	63.9	4.8	0.08***	-	-	-
	Persian	78.5	4.2		-	-	-
	Others	71.7	7.8		-	-	-
Sex*****	Male	70.4	3.9	0.83**	-	-	-
	Female	71.7	4.3		-	-	-

\*Therapeutic services utilization index; <sup>1</sup>standardized; \*\*Student t-test; \*\*\*One-way ANOVA; \*\*\*\*Pearson correlation; \*\*\*\*\*Variables adjusted in multivariate analysis

recommended therapeutic procedures were performed in 122 (60.7%) of participants (TUI=100%). Table 2 shows the relationship between TUI and other variables. There was no significant relationship between TUI and sex, ethnicity, marital status and education. We found a significant inverse correlation between TUI and age (Figure 1). TUI had a significant relationship

with insurance coverage, occupation and place of residence. There was a significant positive relationship between cancer duration and TUI (Pearson's correlation coefficient=0.2; p-value=0.006). In the multivariate analysis, insurance coverage, place of residence and the occupation had the strongest relationship with TUI (Table 2).

## Discussion

This study was conducted to assess healthcare utilization and associated factors in patients with esophageal cancer in a high risk area in northeast of Iran. The results of the present study showed that occupation, ethnicity and gender were first three variables had the strongest relationship with DUI, respectively. We also found that the strongest variables related to TUI were insurance coverage, urbanity and occupation, respectively. It seems that consideration of variables, including occupation, ethnicity, sex, insurance coverage and place of residence in health policy making may lead to ethical resource allocation in health systems.

In this study, 79.4% of participants had insurance coverage. The Iranian Ministry of Health Services and Medical Education reported that about 95% of Iranian residents are covered by health insurance systems (Akbari and Zarenejhad, 2006). Based on the constitution of the Islamic Republic of Iran, healthcare insurance must be developed throughout the country and all Iranian citizens should be covered (Islamic Cultural and Relations Organization, 1997). Our findings show that insurance coverage in our population was not favorable. So, health policy makers have to consider it as an important health issue which needs to be improved.

In more than half of participants, DUI and TUI were 100%. In other words, all recommended diagnostic and therapeutic services were done in more than 50% of participants. This shows that healthcare utilization was relatively desirable. We did not find any previous study with a similar method for assessing healthcare utilization. So, it could not be concluded if healthcare utilization status in our population was good or poor.

There was not a significant difference in TUI between males and females. Previous studies also reported similar results (Soni and Sonnenberg, 2001). However, DUI was higher in females than males. Effects of gender on access to healthcare are not clear. For example, the rates of using medical care in the absence of symptoms are lower in males than females (Mandelblatt et al., 1999). But, the results of another study suggested that men receive earlier cancer detection tests than women (Mandelblatt et al., 1996).

We found that urban residents had higher TUI than villagers. Generally, centralization of healthcare services in urban areas leads to better healthcare utilization for urbanites. This causes unethical resource utilization in health systems. Because of scarce resources and low population density in rural areas, centralization of healthcare services (specially secondary and tertiary ones) seems to be unavoidable. The best method for solving this problem is to organize an efficient system for providing villagers a simple and rapid way to access to healthcare delivery centers. This was the main goal of a newly established insurance system called as "rural health insurance" in Iran. All Iranian villagers should be covered by this insurance system (Akbari and

Zarenejhad, 2006). Secondary and tertiary healthcare services located in cities deliver to villagers through a referral systems. This is a new experience in Iran and needs more times to impress the community.

Our results showed no significant relationship between TUI and ethnicity. However, DUI was significantly higher in one of the ethnic groups. The results of a previous study showed that blacks had lower access to healthcare than whites (Greenstein et al., 2008). Other studies also found a significant difference in healthcare utilization between racial groups (Sadler et al., 2009). However, Soni and Sonnenberg (2001) suggested no relationship between ethnicity and healthcare utilization in EC patients. According to the constitution of the Islamic Republic of Iran, all patients should be equally treated, and no racial or ethnic priority is ethically accepted in health system resources allocation (Islamic Cultural and Relations Organization, 1997).

The results of the present study suggested no significant relationship between educational status and TUI or DUI. In a study from Turkey (Sadikoglu et al., 2010), there was no significant relationship between patients' education level and mammography utilization among women. Ward et al (2008) showed that cancer care utilization is more in patients with higher education levels than low educated ones. Usually, individuals with higher education may have better awareness about their health status. They may ask for healthcare services earlier and more than other ones. So, health systems should consider educational programs to improve the level of knowledge in low educated groups. This may result in just distribution of resources.

We found that patients with higher occupational levels had better healthcare utilization. McCollister et al. (2010) similarly showed a significant difference in healthcare utilization between occupational groups. Unfortunately, in most communities, utilization of health services as well as other social and economic ones are higher in high level occupational groups. This may seem to be fair in some cases of social or economic services. However, this discrepancy may not be ethically defensible about healthcare services.

Our results showed significantly higher TUI in young patients than older. Teshima et al (1998) also found that healthcare utilization was lower in old EC patients. Rijke et al (1996) also reported that the chance of not receiving therapeutic services in cancer patients increased with increasing age. The relationship between healthcare utilization and age may be explained in deferent ways. Cognitive impairments, which are more common in old patients, have been reported to affect cancer treatment (Goodwin et al., 1996). Old patients usually underestimate their risk of cancer. The elderly are represented in lower social class and have higher rates of poverty than young population. Finally, the elderly may have other chronic diseases along with increasing risk of cancer. The above mentioned factors result in lower utilization of healthcare services in old patients

than young's. So, elderly should be considered as special group in health resources allocation.

Multivariate regression analysis showed that occupation, ethnicity and gender were first three variables had the strongest relationship with DUI, respectively. We also found that the strongest variables related to TUI were insurance coverage, urbanity and occupation, respectively. It seems that considering the above mentioned factors in health policy making may have a major role in the just allocation of health system resources. The following suggestions may be helpful to achieve this goal in our area as well as other similar ones. Insurance systems are very important for ethical distribution of resources. Insurance coverage should be more effective and expanded throughout all parts of the community.

Patients living in rural areas need special consideration about their utilization of health services. Although implementation of the rural insurance system in Iran improved healthcare utilization in rural areas, but urbanites have considerably higher chance for utilizing health care's yet. Health policy makers should pay special attention to lower levels of occupational groups for resource allocation. This may come off using aid organizations and insurance systems.

Healthcare utilization is usually lower in old patients than young. This difference is not ethically accepted, and they need special consideration for appropriate access to health services. The effects of gender and ethnicity on healthcare utilization need to be clear in future studies. Any difference in healthcare access between male and female as well as between ethnic groups is un-ethical. Health system programs should be made so that no discrepancy remains between these groups.

Health is an essential right of all human beings and health systems should assure a basic level of health for everyone in the community. Just distribution of healthcare resources plays an important role for achieving this goal. There are different definitions for ethical distribution of resources. Allocating resources based on individuals' sharing in the community, equal distribution of resources between all community members, distribution of resources based on individuals' productivity, resource allocation based on cost-effectiveness of the services are some of these definitions. However, according to a frequent-used definition, considering people's need to health services as major criteria for resource allocation will assure justice in health system (Van Doorslaer et al., 2002). Healthcare utilization should not differ between groups of other variables, including age, sex, education, socioeconomic status, and occupation, place of residents, marital status, ethnicity and race. Any difference in access to health services between groups of the above mentioned factors will result in injustice within the community. So, monitoring the community to detect and correct these differences is an important duty of health systems for achieving justice.

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## References

- Agabiti N, Picciotto S, Cesaroni G, et al (2007). The influence of socioeconomic status on utilization and outcomes of elective total hip replacement: a multicity population-based longitudinal study. *Int J Qual Health Care*, **19**, 37-4.
- Akbari M, Zarenejhad A (2006). Health system aspects in Islamic Republic of Iran. Tehran: Iranian Ministry of Health and Medical Education.
- Borrell C, Fernandez E, Schiaffino A, et al (2001). Social class inequalities in the use of and access to health services in Catalonia, Spain: what is the influence of supplemental private health insurance? *Int J Qual Health Care*, **13**, 117-25.
- De Irala-Estevez J, Groth M, Johansson L, et al (2000). A systematic review of socio-economic differences in food habits in Europe: consumption of fruit and vegetables. *Eur J Clin Nutr*, **54**, 706-14.
- De Rijke JM, Schouten LJ, Schouten HC, et al (1996). Age-specific differences in the diagnostics and treatment of cancer patients aged 50 years and older in the province of Limburg, The Netherlands. *Ann Oncol*, **7**, 677-85.
- Goodwin JS, Samet JM, Hunt WC (1996). Determinants of survival in older cancer patients. *J Natl Cancer Inst*, **88**, 1031-8.
- Greenstein AJ, Litle VR, Swanson SJ, et al (2008). Racial disparities in esophageal cancer treatment and outcomes. *Ann Surg Oncol*, **15**, 881-8.
- Harris MI (2001). Racial and ethnic differences in health care access and health outcomes for adults with type 2 diabetes. *Diabetes Care*, **24**, 454-9.
- Islami F, Kamangar F, Nasrollahzadeh D, et al (2009). Socio-economic status and oesophageal cancer: results from a population-based case-control study in a high-risk area. *Int J Epidemiol*, **38**, 978-88.
- Islamic Cultural and Relations Organization (1997). The Constitution of the Islamic Republic of Iran, Article 29. Tehran: Department of Translation and Publication.
- Jansson C, Johansson ALV, Nyren O, Lagergren J (2005). Socioeconomic factors and risk of esophageal adenocarcinoma: a nationwide Swedish case-control study. *Cancer Epidemiol Biomarkers Prev*, **14**, 1754-61.
- Kamangar F, Malekzadeh R, Dawsey SM, Saidi F (2007). Esophageal cancer in Northeastern Iran: a review. *Arch Iran Med*, **10**, 70-82.
- Mandelblatt J, Andrews H, Kao R, Wallace R, Kerner J

- (1996). The late-stage diagnosis of colorectal cancer: demographic and socioeconomic factors. *Am J Public Health*, **86**, 1794-7.
- Mandelblatt JS, Yabroff KR, Kerner JF (1999). Equitable access to cancer services: A review of barriers to quality care. *Cancer*, **86**, 2378-90.
- McCollister KE, Arheart KL, Lee DJ, et al (2010). Declining health insurance access among US hispanic workers: Not all jobs are created equal. *Am J Ind Med*, **53**, 163-70.
- Murray C, Lopez A (1996). *The Global Burden of Disease*. Cambridge: Harvard University Press.
- Newacheck PW, Stoddard JJ, Hughes DC, Pearl M (1998). Health insurance and access to primary care for children. *N Engl J Med*, **338**, 513-9.
- Pourshams A, Saadatian-Elahi M, Nouraei M, et al (2004). Golestan cohort study of oesophageal cancer: feasibility and first results. *Br J Cancer*, **92**, 176-81.
- Sadikoglu G, Ozcakir A, Dogan F, Gokgoz S, Bilgel N (2010). Mammography utilization among Turkish women. *Asian Pac J Cancer Prev*, **11**, 377-81.
- Sadler GJ, Jothimani D, Zanetto U, Anderson MR (2009). The effect of ethnicity on the presentation and management of oesophageal and gastric cancers: a UK perspective. *Eur J Gastroenterol Hepatol*, **21**, 996-1000.
- Semnani S, Roshandel G, Aarabi M, et al (2010a). Annual report of the Golestan population-based cancer registry (GPCR), number 4. Gorgan: Peyk Reyhan.
- Semnani S, Roshandel G, Zendeabad A, et al (2010b). Soils selenium level and esophageal cancer: An ecological study in a high risk area for esophageal cancer. *J Trace Elem Med Biol*, **24**, 174-7.
- Soni A, Sonnenberg A (2001). Healthcare resource utilization in the management of oesophageal adenocarcinoma. *Aliment Pharmacol Ther*, **15**, 945-51.
- Steyerberg EW, Neville B, Weeks JC, Earle CC (2007). Referral patterns, treatment choices, and outcomes in locoregional esophageal cancer: a population-based analysis of elderly patients. *J Clin Oncol*, **25**, 2389-96.
- Sudore RL, Mehta KM, Simonsick EM, et al (2006). Limited literacy in older people and disparities in health and healthcare access. *J Am Geriatr Soc*, **54**, 770-6.
- Teshima T, Ikeda H, Abe M, et al (1998). Patterns of care study of radiation therapy for esophageal cancer in Japan: influence of age on parameters of treatment. *Int J Clin Oncol*, **3**, 379-85.
- Van Doorslaer E, Koolman X, Puffer F (2002). *Equity in the Use of Physician Visits in OECD Countries: has Equal Treatment for Equal Need Been Achieved? Measuring Up: Improving Health Systems Performance in OECD Countries*. Paris: Organisation for Economic Co-operation and Development.
- van Vliet EPM, Eijkemans MJC, Steyerberg EW, et al (2006). The role of socio-economic status in the decision making on diagnosis and treatment of oesophageal cancer in The Netherlands. *Br J Cancer*, **95**, 1180-5.
- Wang F, Luo W (2005). Assessing spatial and nonspatial factors for healthcare access: towards an integrated approach to defining health professional shortage areas. *Health Place*, **11**, 131-46.
- Ward E, Halpern M, Schrag N, et al (2008). Association of insurance with cancer care utilization and outcomes. *CA Cancer J Clin*, **58**, 9-31.
- Wikler D (2003). Why prioritize when there isn't enough money? *Cost Eff Resour Alloc*, **1**, 5.