

Cost Effectiveness Analysis of Diuretics Therapy for Ascites in Hepatic Cirrhosis at Adi Husada Undaan Wetan Hospital in Surabaya

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Abstract

Background: Hepatic cirrhosis is a seriously chronic degenerative disease in which normal liver cells are damaged and are replaced by scar tissue. Ascites is the most frequent complication that happened in hepatic cirrhosis and need to be managed properly, especially in the cost effectiveness analysis. Cost Effectiveness Analysis is a form of Pharmacoeconomic study that evaluates and compares the cost and the clinical outcome of two or more treatments.

Objective: The purpose of this research is to compare the cost-effectiveness of 3 kinds of Ascites treatments: bolus intravenous Furosemid versus combination of oral Spironolakton and bolus intravenous Furosemid versus combination of oral Spironolakton, oral Furosemid and bolus intravenous Furosemid.

Method: Subjects (N = 29) were hepatic cirrhosis patients with ascites, and their age ranging from 34 to 85 years old. Data were collected from Adi Husada Undaan Wetan Hospital, Surabaya, from January 2010 to December 2011, using the retrospective approach. The sampling method used is purposive sampling. The measurement of cost was based on the cost of the drug used for the treatment and the effectiveness of the treatment is calculated based on the measurement of the increase of urine collection and the length of therapy. Data were analysed with Kruskal Wallis method and by calculating the value of Average Cost Effectiveness Ratio (ACER).

Result: The value of ACER for Furosemid bolus intravenous was IDR 139,800, for oral Spironolakton and Furosemid bolus intravenous was IDR 158,763 and for Spironolakton oral and Furosemid oral and Furosemid bolus intravenous was IDR 332,337.

Conclusion: This study showed that Ascites treatment with Furosemid bolus intravenous is most cost-effective. This result supports the preparation of the formulary with an alternative therapy which is more cost-effective.

Keywords : cost-effectiveness analysis, diuretic, cirrhosis hepatic, ascites.

Introduction

Health institutions face a multitude of conundrums as the development of new therapies seems boundless, while the resources are limited. The continuing impact of cost-containment is causing administrators and policy makers in all health fields to examine closely the costs and benefits or effectiveness of both proposed and existing interventions. It is increasingly obvious that purchasers and public agencies are demanding that health treatments be evaluated in terms of clinical and humanistic outcomes against the costs incurred. In this condition, Pharmacoeconomics is an important tool to scientifically analyze the value of a therapy. (McGhan, 2010)

Cirrhosis of the liver is a chronic degenerative disease in which normal liver cells are damaged and are then replaced by scar tissue. Cirrhosis is the ninth leading cause of disease-related death in the United States. It is the third most common cause of death in adults between the ages of 45 and 65, and 1.2% from all the deaths in United States (Wolf, 2007). Cirrhosis affects 3.6 per 1000 adults in the United States and is responsible for 26,000 deaths per year (Timm, 2006).

Cirrhosis increase drug sensitive and side-effect, because of the alteration of microcirculatory distribution of blood flow within the liver and the changes of drug metabolism in the body (Timm, 2006, Baver, 2007).

The major complications of cirrhosis include ascites, portal hypertension and variceal bleeding, hepatic encephalopathy (HE), spontaneous bacterial peritonitis (SBP), hepatorenal syndrome, and coagulation disorders (Anand, 1999, Gines, 2004, Obrien, 2005, Timm, 2006, Heidelbough, 2006, Moore, 2006). As a consequence, the treatment for complications of cirrhosis induce polypharmacy (Moore, 2006).

Ascites is frequently the initial step of cirrhosis hepatic. Ascites is defined as the pathological fluid accumulation in the peritoneum cave. In more than 50% of patients, cirrhosis will develop to become ascites in 10 years (Sease, 2008). The bad prognosis of ascites was supported by data that only 50% of patient with

ascites could live 2 years (Somali, 2006). The main purpose of ascites therapy is to increase the patient's quality of life through minimizing the difficulty to breath, the decrease of appetite, the discomfort of bowel volume increase, or the swelling of feet. Therefore the prime therapy for ascites is diuretics (Sease et.al, 2008).

A research conducted by Lorensia et al. (2009, 2010) at a Hospital in Surabaya, on 59 patients, showed that there were 195 cases (59%) with cost because of Drug Related Problems. Twent-five of the cases showed that the drug treatment was more costly than necessary and 170 cases of unnecessary drug-treatment. The cost of these drug related problems was IDR 28,631,527.29.

Ascites therapy is a relatively high cost treatment, and because it is a chronic disease where the patient must be treated long-life, it is necessary to conduct a research based on pharmacoeconomics principles to analyze the treatments and to find an effective therapy, not only in the clinical outcome but also in the economic outcome. Through conducting a Cost Effectiveness Analysis (CEA), where all the cost components, the resources consumed (inputs), and all the alternatives of therapy, with the outcomes (outputs), are analyzed and compared, a cost-effective therapy (Bootman et al., 2005) for hepatic cirrhosis with ascites complication could be found. Cost effectiveness analysis (CEA) is one of the techniques used in pharmacoeconomics research. Pharmacoeconomics is the scientific discipline that evaluates the clinical, economic and humanistic aspects of pharmaceutical products, services, and programs, as well as other health care interventions to provide health care decision makers, providers and patients with valuable information for optimal outcomes and the allocation of health care resources. Pharmacoeconomic techniques provides valuable information to health care decision makers for the allocation of scarce resources. Cost effectiveness analysis (CEA) is an analysis that compares the costs and outcomes (effects) of two or more pharmaceutical products (Bootman, 2005).

In this research, cost effectiveness analysis was conducted for the treatment of hepatic cirrhosis with ascites complication. This study aims to

compare the cost-effectiveness of 3 kinds of Ascites treatments: bolus intravenous, furosemid versus combination of oral spironolakton, and bolus intravenous furosemid versus combination of oral spironolakton, oral furosemid and bolus intravenous furosemid.

Methodology

This research is an analytical observational prospective study and was held on October 2012 to December 2012.

Research Variable

The dependent variable (DV) is cost of drug and volume of urine. The independent variable (IV) is type of diuretics, which in this research are: (1) intravenous bolus Furosemid (therapy A), (2) oral Spironolakton and intravenous bolus Furosemid (therapy B), (3) oral Spironolakton, intravenous bolus Furosemid and oral Furosemid (therapy C).

Population and Sample

The population in this study was in-house patients with hepatic cirrhosis and ascites complication in Adi Husada Hospital, Undaan Wetan, Surabaya, from January 2010 to December 2011. The sample was patients that meet the inclusion and exclusion criteria.

Inclusion criteria:

1. Cirrhosis inhouse patients with *ascites* complication at Adi Husada Undaan Wetan Hospital from January 2010 to December 2011.
2. Adult patients whose age was ≥ 23 years (Santrock, 2002).
3. Patients who received diuretics therapy.

Exclusion criteria:

1. Cirrhosis patients with ascites but without concomitant disease like hepatorenal syndrome, *hepatic carcinoma*, acute or chronic renal failure, or *Hepatic Encephalophaty*.
2. Patients who's medical record is not complete, especially the diagnosis and the volume of urine.

Data Collection

Data were collected from the Medical Record at Adi Husada Undaan Wetan Hospital from January 2010 to December 2011.

Results and Discussions

The subjects who meet the requirements were 29 patients (15 women and 14 men), with age ranging from 34 to 85 years old and mean 61.10 ± 11.11 Years. All these subjects went home in a good condition. Mean length of stay in hospital were 7.93 ± 3.48 days.

There were 15 patients who received therapy A (intravenous bolus Furosemid), 7 patients received therapy B (oral Spironolakton and intravenous bolus Furosemid), and 7 patients received therapy C (oral Spironolakton, intravenous bolus Furosemid and oral Furosemid).

The cost was calculated based on the cost of drug used for the therapy (diuretics drug). The mean cost of therapy A was IDR 55.92 ± 32.12 , the mean cost of therapy B was IDR 90.72 ± 11.91 , the mean cost of therapy C was IDR 189.91 ± 92.85 .

The effectiveness was calculated based on the difference of volume water intake and volume urine output, where the mean was -213.95 ± 593.84 ml, and the effectiveness of therapy A was 40.0 %, the effectiveness of therapy B was 57,1 %, and the effectiveness of therapy C was 57,1 %.

In this research the cost-effectiveness grid could not be used to make a conclusion, because there were 3 kinds of drug therapy, therefore ACER (average cost effectiveness ratio) was used to compare the cost effectiveness of the therapies used and to make a conclusion, which of the 3 kinds of drug therapy is most cost-effective.

The average cost effectiveness ratio (ACER) was calculated based on the formula:

$$ACER = \frac{\text{cost of drug}}{\text{effectiveness of drug}}$$

The ACER for therapy A was IDR 139,800.00, the ACER for therapy B was IDR 158,762.00, and the ACER for therapy C was IDR 332,337.00.

Conclusion and Recommendation

From the cost of drug viewpoint, the cheapest is therapy A, from the effectiveness of drug, therapy B and therapy C were more effective than therapy A, and from the value of ACER, the most cost-effective therapy was therapy A.

This research has several limitations, like, the cost used is the direct medical cost of the drugs for diuretic effect, the parameter measured to evaluate the effectiveness is volume of urine, and the relatively small number of patients.

Further research is needed to identify other component of costs, like, the cost of other drugs used for the medication, the nonmedical costs and the indirect costs. Identification and measurement of other parameters, like, length of hospital stay, and to enlarge the samples, in order to get a more accurate result.

Note: therapy A is intravenous bolus Furosemid, therapy B is oral Spironolakton and intravenous bolus Furosemid, and therapy C is oral Spironolakton, intravenous bolus Furosemid and oral Furosemid.

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