

Cost and Performance Analysis of Kala-azar Case Management

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Abstract

Introduction	Kala-azar is considered, as the diseases of the poorest of poor. Kala-azar diagnosis and treatment service is free of cost to the patients, however in practice it is not so. Therefore it is imperative to assess the cost and performance of Kala azar case management in order to improve case management performance and technical efficiency in spending the resources.
Objectives	To assess the cost and performance of Kala-azar case management and determine the unit cost for the diagnosis and treatment of a case at referral hospital.
Methods	All cases of Kala-azar (160) that had admitted in STID hospital in 1999/2000 were selected for the study purpose. Observing the medical and financial records and reports of the hospitals collected data. "Step down analysis" was followed while allocating the costs.
Results	Cost for a Kala-azar case management is estimated Rs 31223 (US\$ 422) and per day per patient cost would be Rs.967 (US\$13). The treatment success rate of Amphotericin B is 90 percent. The bone marrow smear test was found positive only in 23 percent of the clinically diagnosed Kala-azar cases. The average length of hospital stay of Kala-azar cases was 32.28 days.
Conclusion	Reducing the size of personnel, contracting out the cleaning, kitchen and security services to private firms, and reducing the length of hospital stay can reduce unit cost of Kala-azar case management. Specificity and sensitivity tests should be performed to monitor the laboratory tests. Length of hospital stay can be reduced by prompt diagnosis and effective treatment. Developing sound referral system and establishing linkage with valley group of hospitals can increase bed occupancy rate.
Keywords	Kala-azar, Cost, Performance, Case Management

Introduction

Kala-azar is considered, as the disease of the poorest of poor. Patients usually come to the service centres late for the treatment because they don't know where to go for treatment. They also do not know that the diagnosis and treatment of Kala-azar is free for them. In many of the cases, clients could not come to the service centres because of the unavailability of the money to reach to the service centre. Kala-azar cases are treated in the hospitals by the first line drug Sodium Antimony Gluconate (SAG) and Amphotericin B treats the cases not responding well to SAG and relapse cases. Since 1998 majority of the cases have been treated by the Amphotericin B because of the low response of SAG. Diagnosis and treatment of Kala-azar is relatively expensive in comparison to other tropical diseases. Existing disease control network hardly brings the patients under the net of health service. Health facilities have been expanded and extended

to the rural areas but in the absence of health workers, anti-leishmanial drugs, and laboratory services, cases have less access to early diagnosis and prompt treatment services. This problem is further compounded by lack of knowledge of the patients, community involvement, knowledge and skills of the service providers and poor economic condition of the patients. Because of high spread of disease and externality, Kala-azar control services are provided as public goods.

Rationale

As per the policy of HMG/Nepal, Kala-azar diagnosis and treatment service is free of cost to the patients, however, in practice it is not so. Drugs for the treatment of Kala-azar are provided free of cost to the patients. Diagnosis and treatment costs are heavily subsidized to the clients. In many cases, fees are exempted because of poor economic condition

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of the patients. Therefore, government has to provide a sizeable lump-sum grant for the case management. This subsidisation should be justified on the ground of equity and economic efficiency. Cost and performance analysis of Kala-azar is essential to examine how efficiently the resources have been spent and what degree of performance did the hospital achieve. Similarly, it identifies the area or cost centre where efficiency could be brought. Therefore, it is imperative to assess the cost and performance of Kala-azar case management in order to improve the performance of case management and technical efficiency in spending resources.

Objectives

The objectives of the study are as follows:

- To assess the performance of Kala-azar case management
- To examine the provider's costs of Kala-azar case management
- To determine the unit cost for the diagnosis and treatment of a Kala-azar case

Materials and Methods

It is a quantitative descriptive and cross-sectional study, which was conducted at the STID hospital, the central referral hospital. It describes the frequencies of event, performance and behaviour of cases based on the collected data during Kala-azar case management process.

In 1999/2000 as many as, 160 cases of Kala-azar were recorded in the hospital. Keeping the desired number in mind all the cases, which met the eligibility criteria were included in the study. Patient's admission card, drug administration record, medical card (CARDEX) laboratory and X Rays reports were observed in details to select the patients for study purpose. All patients who clinically diagnosed as Kala-azar were included in the study. The patients who had *visceral leishmania donovani* (LD) bodies with other diseases were also included in the study. But the cost of other diseases was excluded while calculating cost. Cases that provisionally diagnosed as Kala-azar and latter etiologically diagnosed other diseases were excluded. But the cases provisionally diagnosed as any other diseases and later on etiologically diagnosed as *Visceral leishmania donovani* (LD body) were included in the study. Statements of expenditure, financial and store record and reports were observed.

Mid-point estimation was used in cost calculation of the drug and medical supplies. Financial as well

as economic costs of case management were taken into account. Measurement of financial cost was done in market price. It is assumed that tax and subsidises did not distort prices. There was nominal tax for machines and equipment those were used in hospital. There was negligible difference between the official and market exchange rates; therefore, no adjustment was made on price. Opportunity cost of volunteers was calculated on the basis of gross salary of the similar employees employed in the government hospital. Determining life years, replacement cost and interest rate annualised capital cost.

Cost centres were determined on the basis of units of the structure and nature of work of the hospital (Mill AJ 1993). OPD, IPD, laboratory, radiology, kitchen, house keeping, security, administration and pharmacy were the cost centres. Step-down analysis was followed. Assigning from each line item to the relevant cost centres computed the unit cost. Some inputs such as cost of drug, food and laundry services are directly assign to the pharmacy, kitchen and house keeping respectively.

In the second step, all costs were allocated to the final cost centres. Salary of staff was allocated on the basis of working hours; drug cost was allocated on the basis of prescription analysis. Building cost was allocated on the basis of occupied space. Costs of laundry, sweeping and cleaning, maintenances and utility were allocated on the basis of inpatients days. Food cost was allocated on the basis of judgement of dietician because patients of Kala-azar need more amount of nutritional food whereas diarrhoeal cases need less amount of food and in many cases only IV (intravenous) fluid was provided.

Proportion of referrals, length of hospital stays, treatment success rate or case recovery rate and specimen positive rates were taken as the indicators of performance. Relationship between cost and performance of Kala-azar case management was tested.

Results

Nearly two-third of the cases were male. This figure reveals that more males are susceptible to Kala-azar than females because of high exposure to the risk factors and females have less access to the central referral hospital because of unavailability of money for transportation. The male female ratio (1.86:1) reveals that the risk of infection among males is nearly doubled in comparison to females. Sixty percent of cases were married and rest were unmarried. One-fifth of the cases fell under ten

years and over one-fourth comprised by adolescents. Children aged 6 to 10 is more (17%) affected by Kala-azar followed by 16-20 and 31-35 age groups, each group comprised 14% in total population. It shows that adolescents and adult groups are more vulnerable to Kala-azar because of high mobility and exposure to the risk factors. The mean years (25) of cases indicates that more youths and adults affected than any other age groups.

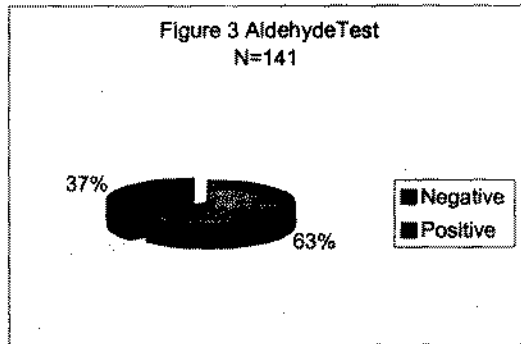
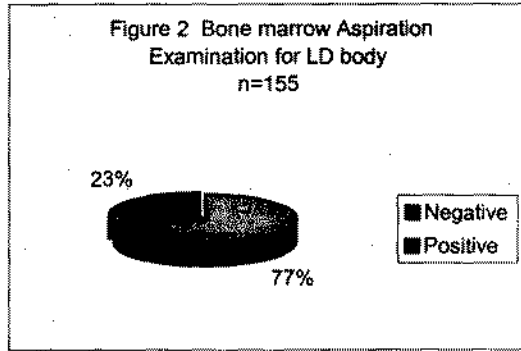
Ethnicity is one of the most important variables regarding Kala-azar. Ethnic groups have their own housing and living styles, and their behaviour influence the spread of Kala-azar. Vast majority of the cases were from marginalized and socio-economically underprivileged groups. Majority (41%) of the cases were from Chaudhary (Tharus) families, followed by Yadav, Shah; each group comprised 9% in the total cases. Other affected ethnic groups were Thakur (Barbers), Majhi (fishermen), Pandit (potters) and Muslims. Infected Mushars who could not come to the hospital should also be taken into account.

Majority (41%) of the cases reached to the appropriate health care centre between one to two month followed by 3-4 months (28%). Some of the cases (16%) reached at the appropriate health institution very late (3- 6 months). The mean time between onset of symptom(s) and seeking care was 2.96 months with standard deviation of 3.1 months indicated long delay in seeking care. These latecomers increase the pool of infection and allow spreading of the disease.

Performance of diagnostic support services

LD body demonstration in bone marrow aspirates is 80% in the most sensitive tests. Similarly, Aldehyde test is a non- specific and has low sensitivity and specificity, however, 75% positive could be found if examination is performed well (Karki 1998). Two separate microscopic examinations of bone marrow smear were done for each case, one in the STID hospital and another in the National Public Health Laboratory. The results of the both laboratories were more or less similar (only four difference). Only 23 percent of the specimens of bone marrow were found positive (Figure 2). It indicated the poor performance of etiological diagnosis. The lower percentage of positive smear might be due to inadequate specimen obtained from the ward, or the aspiration of bone marrow done without indirect evidence or lack of quality control mechanism in the laboratory.

In Aldehyde test, only 37% of samples were found positive (Figure 3). It again raised the question on the quality of test.



Performance of treatment

Over 90% of the cases recovered after the treatment. The treatment success rate met the prescribed standard. Less than 4 percent of the cases died during the treatment. About 6 percent of the cases left the hospital against medical advice (Table 1). These dropouts increased the pool of infections and helped to increase transmission. During the observation of record, investigator could not find any efforts that had made to trace the dropouts.

Kala-azar cases supposed to be treated in the hospitals by the first line drug (SAG) and cases not responding well to it, should be treated by Amphotericin B. But in practice, only less than 6 percent cases were treated by SAG because of low response of drug to the patients. Majority of the cases (84%) were treated by Amphotericin B, however, it is a second line drug.

Status of treatment	Number	Percentage
Recovered	145	90.63
LAMA	9	5.63
Death	6	3.75
Drug administration		
SAG	9	5.63
Amphotericin B	134	83.75
Others	17	10.63
Total	160	100

Length of hospital stay is one of the performance indicators. It helps to reduce the cost of treatment. Over one -fifth of the cases stayed 15 to19 days followed by 20-24 days (14%), and 25-29 days

(9%) in the hospital. It is notable that nearly 8% of the cases stayed in the hospital for two months and above. The mean days of hospital stay is 32.28, which was higher than the prescribed standard (14 days). Details are given in Table 2.

Table 2: Length of hospital stay

Hospitalized days	No	Percent
15-19	37	23.13
20-24	22	13.75
25-29	15	9.38
30-34	14	8.75
34-39	15	9.38
40-44	20	12.50
45-49	9	5.63
50-54	8	5.00
55-59	8	5.00
60 and above	12	7.50
Total	160	100.00
Average Length in Days	32.28	

Table 3 shows the cost of Kala-azar case management by capital and recurrent. Recurrent

Table 4: Unit cost of kala-azar

Items	Total cost	Per day Per patient cost	Per patient cost	Percent
Salary	2720369.7	438.4	14152.1	45.3
Allowance	292163.63	47.1	1519.9	4.9
Travel and daily allowance	4662.945	0.8	24.3	0.1
Dress	19200	3.1	99.9	0.3
Utilities (Electricity, Water, Postage, Telephone and Fuel)	122949.3	19.8	639.6	2.0
Fuel	77546.1	12.5	403.4	1.3
Maintenance	341990.7	55.1	1779.1	5.7
Stationeries and others	102363	16.5	532.5	1.7
Printing	42044.7	6.8	218.7	0.7
Books/Magazine	45799.2	7.4	238.3	0.8
Drug	1010705.1	162.9	5257.9	16.8
Other Grant (cleaning, laundry, food)	241110	38.9	1254.3	4.0
Annualized capital cost	981014	158.1	5103.5	16.3
Total	6001918.3	967.3	31223.5	100.0

Discussion

Delay in case detection and treatment of Kala-azar is one of the major problems in Nepal. It increases the pool of infection. The mean time between onset of symptom(s) and seeking care is three month, indicates longer delay in seeking care. Still quite a big number (16 percent) of clients came to the hospital only after the five months of developing the symptom(s). These latecomers not only prolonged the hospital stay and increase the cost of care but also decreased the treatment success rate. It is mainly because of lower level of knowledge of rural people about kala-azar. Only ten percent of the cases referred from health posts and other hospitals.

costs comprised significant share (84 %) to the total cost, only 16 percent of the total cost comprised by the capital cost. Similarly, about one-fourth of the total cost was comprised by indirect cost (indirect to the institution).

Table 3: Total cost by recurrent and capital

Categories	Direct cost	Indirect cost	Total cost	Percent
Recurrent cost	3936664	1084240	5020904	84
Annualized Capital cost	-	981014	981014	16
Grand Total	3936664	2065254	6001918	100

Information on unit cost of Kala-azar case management is useful in planning purpose; it is also useful in allocating resources between Kala-azar and other tropical and infectious diseases. The unit cost for a Kala-azar case management was estimated Rs. 31223 (US \$ 419.3). The average cost per day per inpatient care derived Rs. 967 (US \$ 13.4). Details are given in Table 4

Vast majority (90%) of the cases came to the hospital by their own initiative. This also revealed that the grass root level health system hardly detect and refer the cases of Kala-azar to the appropriate hospital.

The performance of laboratory investigation was remained far below the standard. The bone marrow smear positive rate was much lower (23%) in comparison to earlier study 82% percent (Devkota and Steinmann 1998). Standard of bone marrow smear examination positive rate is 80%. It is also interesting that the positive rate of bone marrow smear test was only 40% at BPKIHS in 1998 (Karki

1998). Records of both NPHL and the hospital were verified and the results were more or less similar. The lower positive rate might be attributed by inadequate sample or bone marrow aspirated without indirect evidence or norms and standard of laboratory investigation is not strictly maintained.

The status of treatment showed that over 90 percent of the cases recovered after treatment. The death rate of cases remained as low as 4%. The treatment success rate met the standard. But nearly 6 percent of the cases left the hospital against medical advice (LAMA). Those drop-outs raised the question on quality of care in the hospital. Those patients ought to be counselled well on the disease and proposed treatment. These LAMA cases increased the pool of infection and helped the spread of disease. In record, investigator could not find any efforts to trace out the cases. The district health offices and health posts neither refer the cases to hospital nor the hospital sent the information to the District Health Offices (DHOs) about the patients to take the necessary action in order to control the disease. Thus, there is virtually no communication between DHOs and hospital.

The prescribed treatment schedule for Amphotericin B is 14 days. The length of hospital stay prolonged, if Amphotericin B administered to the cases on alternate day. Some severe cases took longer treatment to recover fully. The average length of hospital stay was 32.28 days, which was quite longer in comparison to other hospital stay. There is statistically positive relationship ($p < 0.05$) between the length of hospital stay and total cost of management thus; reducing the length of hospital stay can reduce cost.

Information on unit cost of Kala-azar case management is useful in planning the resources in future; it is also useful in allocating resources between Kala-azar and other tropical and infectious diseases. The unit cost for a Kala-azar case management was estimated Rs. 31223 (US \$ 419.3), which is considered higher. If bed occupancy rate increased to 80 percent nearly one-third of the cost could be reduced. The average cost per day per inpatient care was estimated Rs. 967 (US \$ 13.4) which was slightly higher than the cost of private hospital (estimated cost of Kathmandu Model Hospital was Rs 800). Cleaning, kitchen, and security cost centres have higher personnel cost. The share of drug cost in the total cost is only 17%. The personnel and overhead cost comprised nearly 80% thus, intervention which needs shorter hospital stay would be more cost effective. Amphotericin B is relatively more expensive than SAG however; it would be more cost effective in inpatient service

because of shorter hospital stay and high response of drug to the patients.

Conclusion

Reducing the size of personnel, contracting out the cleaning, kitchen and security services to private firms, and reducing the length of hospital stay can reduce unit cost of Kala-azar case management. Specificity and sensitivity tests should be performed to monitor the laboratory tests. Length of hospital stay can be reduced by prompt diagnosis and effective treatment.

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