**WEIGHTED GOAL PROGRAMMING APPROACH FOR SOLVING BUDGETARY RADIATION THERAPY TREATMENT**

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**BACKGROUND AND OBJECTIVE**

In today’s fast paced and competitive era of healthcare service provision, optimal allocation of budgeted expenditure poses a critical concern among patients under radiation therapy treatment. In Levens et al [1] the authors explain how radiotherapy costs are often underestimated component of the economic assessment of new radiotherapy treatment and technologies. However, Jakovljevic et al [2] affirm how the budget impact on radiation oncology to large tertiary care clinics is likely to remain significant in the future. In Paravati etal[3] , the authors explained how factors unrelated to the individual patient can account for the majority of variation in the cost of radiation therapy treatment; suggesting potential inefficiency in healthcare expenditure. The objective of this study is to develop weighted goal programming model that allocates budgetary expenditure for radiation therapy of inpatients at a medical facility. The relevant components of budgetary expenditure considered included drugs/materials, labor and miscellaneous costs. In order to test the proposed model, data for budgetary expenditure was obtained on a monthly basis at Mulago Cancer Institute in Uganda. The study primarily examined cost requirements for two categories of patients. Category 1 patients showed symptoms of initial stages when cancer had just spread to nearby tissues of the body. Category 2 patients had the spread of cancer to several parts of the body.

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**METHODS**

A weighted goal programming model is developed and initially, the objective function is defined. The model seeks to minimize the deviation variables of the objective function.; subject to the goal values of budgetary expenditure allocated for treating category 1 and category 2 patients. The sum of weighted deviations is minimized so that actual expenditure on drugs/materials, labor and miscellaneous costs meets the projected expenditure. Resource leveling is achieved by using the simplex method for linear goal programming; that requires solving the standard minimization problem. A numerical example is presented for illustration; that determines the optimal allocation of expenditure on drugs/materials, labor and miscellaneous costs for inpatients under radiation therapy treatment.

**RESULTS AND DISCUSSION**

Results from the numerical example presented indicate that certain goals on drugs/materials, labor and miscellaneous costs can be fully or partially achieved. This however depends upon the priority levels and targets set for budgeted expenditure; in line with the two categories of patients under treatment. The application of this solution approach allows hospitals to identify satisfactory allocation of expenditure; based on the priority levels or goals set for meeting budgetary projected costs during radiation therapy treatment among patients.

**CONCLUSIONS**

The weighted goal programming approach for inpatient radiation therapy can be effective; where relevant cost categories can be priotized if necessary. This ensures cost-effective medical treatment in hospitals; a core ingredient of sustainable healthcare service provision.

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