

Costing of Training of Cardiographers in School of Cardiography, National Hospital of Sri Lanka

Karunatilaka, M. N

Registrar in Medical Administration, Post Graduate Institute of Medicine, University of Colombo, Sri Lanka

DOI: 10.29322/IJSRP.11.01.2021.p10951
<http://dx.doi.org/10.29322/IJSRP.11.01.2021.p10951>

Abstract- The School of cardiography is the only institute in Sri Lanka which train cardiographers. It offers “Diploma in ECG Technology” after a full time one-year theory and practical programme.

General Objective of this study was to cost training of a cardiographer at the School of Cardiography, National Hospital of Sri Lanka.

“Step down cost accounting” (De Silva, 2018) study design was used, involving employees at the School of Cardiography and The National Hospital of Sri Lanka. Quantitative and qualitative study methods were used for the study.

The cost of total training programme was Rs. 25,789,623.98 and cost for train one cardiographer was Rs. 486,596.68. Out all the costs nearly one third (Rs. 16,771,200.00) spent for the allowances of 40 government sector trainees and more than one fourth (Rs. 7,423,577.74) of cost fraction for the payments of permanent employees including tutors.

Index Terms- Step down cost accounting, Costing, Cardiographer, Training, NHSL

I. INTRODUCTION

The School of cardiography is the only institute in Sri Lanka which train cardiographers. It was established decades before and now functioning at the NHSL premises. Skill laboratory, lecture room and administrative section are the three main units in the school and practical training is obtained from different units in the NHSL. Skill laboratory is in the school of radiology building and other units are in the cardiology complex building. It has permanent staff of nine employees including principle, senior tutor, two tutors and five health care assistants.

School of Cardiography is training cardiographers for Ministry of Health as well as for other institutions. Last batch had 40 Ministry of Health trainees and 13 other sector trainees.

The school is offering “Diploma in ECG Technology” after a full time one-year theory and practical programme. It has five subjects including Cardiography, Anatomy, Physiology, Pharmacology and Electrotechnology. Cardiography lectures were totally given by the tutors attached to the school and other lectures were given by external resource persons. The programme has two examination after 6 months and after completion of total programme. Mid term examination is only comprising of 5 Multiple Choice Questions and final examination is comprise of Multiple-Choice Questions, Structured Essay Questions, Practical Component and a Viva (Subasingha, 2020).

II. OBJECTIVE OF THE STUDY

The objective of the study was to cost the training of a cardiographer at School of Cardiography, National Hospital of Sri Lanka.

III. METHODS

A costing study design was used, involving employees of the school of cardiography, employees of the National Hospital of Sri Lanka and employees of the Education, Training and Research Unit (ET & R). “Step down cost accounting” (De Silva, 2018) method was used for the study following referring four financial accounting methods including Operating Cost Method (Chakravarty and Debnath, 2015), Activity Based Costing method (Ibrahim *et al.*, 2012) and Time-driven Activity-based Costing method (Anzai *et al.*, 2017). Four research methods were: 1) Key Informant Interviews; 2) Desk Evaluations 3) Measurements and 4) Observations. Data extraction sheets and guidelines were the used study instruments. There were four steps in the study: 1) Search of information on costing methods from World Wide Web; 2) Interviews with Acting Principal and two tutors of School of Cardiography and chief accountant of the National Hospital of Sri Lanka. Information on training process and the facilities available at the school were obtained from tutors and principal. Information on funding system was taken by the accountant. 3) Calculation of the area was done by direct measurements and with the help of google earth. 4) Data extraction from supplies branch, pay branch and computer room of the National Hospital of Sri Lanka.

Permanent employee salaries, tutor cost, examination cost, cost of water bills and cost of electricity bill were taken into the study. Building cost, furniture cost and equipment cost were not taken into the calculation as those are old or beyond the acceptable lifetime. Part of the air-condition cost was represented through the electricity cost. Overhead cost centres and intermediate cost centres were omitted from study as their contribution to the training cost is negligible and as not feasible to study within available time.

IV. BENEFITS

This case study will enable to identify cost incurred by ministry of health for training one cardiographer at the school of Cardiography, National Hospital of Sri Lanka. Thus, the findings of this case study will allow ministry of health to assess the

economic value of the training process in order to take policy decisions on training schools.

V. RESULTS

“Step down cost accounting” method has five steps and costing was done accordance with those steps.

Step 1 – Identifying, categorizing cost centers

Cost centers for the training are lecture hall, school administration division, skill lab, lectures, paper setting, paper marking, exams, assisting conduction of exams, exam hall preparation, wards, catheterization laboratory, exercise ECG room, hospital administration, ET & R, security and janitorial service. Overhead cost centers are the hospital administration, ET

& R, security and janitorial service. Intermediate cost centers are the wards, catheterization laboratory and exercise ECG room. Final cost centers are the lecture hall, school administration division, skill lab, lectures, paper setting, paper marking, exams and exam hall preparation.

Step 2 – Collating cost/Utilization information

Cost information on salaries, allowances and utility bill payments were collected from accounts division of the National Hospital of Sri Lanka. Information of different payments including delivering lectures and conduction exams were obtained from general circulars.

1. Cost for salaries

There are nine monthly paid employees including 4 tutors and 5 Health Care Assistants (HCA) in the school.

a. Calculated cost for 4 tutors for the training period is;
 $= 1,280,760 + 1,127,304 + 1,071,864 + 1,071,864 = \text{Rs. } 4,551,792.00$

b. Calculated cost for 5 Health Care Assistants for the training period is;
 $= (\text{Total monthly pay for junior HCA/number of Junior HCA}) \times 5 \times 12$
 $= [(33,815,379.00 + 15,462,264.76 + 18,372,873.50 + 27900)/1414] \times 5 \times 12$
 $= [67,678,417.26/1414] \times 5 \times 12$
 $= \text{Rs. } 2,871,785.74$

c. Calculated cost for the 40 trainees
 $= \text{Monthly allowance} \times \text{Number of trainees} \times 12$
 $= 34,940 \times 40 \times 12$
 $= \text{Rs. } 16,771,200.00$

Figure 1: Calculation of Salaries

2. Cost for external lecturers

There are five subject areas in the training and 4 subjects done by external lecturers. Lecture cost for lecturers varies with qualifications and it was Rs 700.00, Rs 800.00 and Rs 900.00 per hour (Ministry of Health, Nutrition & Indigenous Medicine,

2016). One hundred fifty-three lecture hours were conducted by external lecturers.

3. Cost of facilities

I. Electricity cost

a. Electricity cost for the cardiology complex for the training period was;

= Average monthly bill X 12

= [(18438327.94+20770608.94+25219608.94+22715631.44) / 4] X 12

= [87144177.26 / 4] X 12

= Rs. 261,432,531.78

b. Cost for the radiology training school building for the training period was;

= Average monthly bill X 12

= 3000 X 12

= Rs. 36,000.00

II. Cost for water

= Rs. 1.175/ Sq. Feet / Month (Karunatilaka, 2020)

III. Cost for air-conditions

= Rs. 6.22 / Sq. Feet / Month (Karunatilaka, 2020)

Figure 2: Calculation of Facility Cost

4. Examination cost (Establishments division, 2014)

a. Paper setting cost

There are two types of papers for the exams. Multiple choice question (MCQ) and structured essay question (SEQ) are the two types. No cost incurred for the preparation of 10 MCQ papers as number of questions in a paper is less than stipulated number. There are 5 SEQ papers and 2200/= cost per one paper.

b. Cost for paper marking and invigilate

Cost for marking MCQ paper is Rs 15.00 and Rs. 25.00 for SEQ. Per day invigilator cost is Rs. 2000/= and Rs 1000/= for two categories of officers.

c. Cost for hall preparation and assisting exams

Four hundred rupees per person per day for preparing examination hall and Rs. 500/= per day for assisting conduction of exams.

5. Space occupied

School is operating in two separate buildings. One part is in the cardiology complex and it has area of 550 square feet. Skill lab is in the radiology training school building and it has area of 440 square feet. Total area of the cardiology complex was 109,850 square feet and area of the radiology training school was 14097 square feet.

Step 3 - Inputting data by cost centers

Direct cost centers in the training process was lectures, paper setting, paper marking, exams, assisting conduction of exams and exam hall preparation.

1. Cost for lectures	= Total lecture hours X Average lecture cost = 153 X (700 + 800 + 900) / 3	= Rs. 122,400.00
2. Cost for paper setting	= cost for MCQ paper + cost for SEQ paper = Zero cost + (Number of SEQ papers X Cost for a paper) = 0 + (5 X 2200)	= Rs. 11,000.00
3. Cost for MCQ marking	= Types of papers X Number of Trainees X cost for one paper = 10 X 53 X 15	= Rs. 7950.00
4. Cost for SEQ marking	= Types of papers X Number of Trainees X cost for one paper = 5 X 53 X 25	= Rs. 6625.00
5. Cost for practical exam	= Number of days X Number of specialists X Cost for a day = 10 X 1 X 2000 = Number of days X Number of Executives X Cost for a day = 10 X 4 X 1000	= Rs. 20,000.00 = Rs. 40,000.00
6. Cost for Viva exam	= Number of days X Number of specialists X Cost for a day = 10 X 1 X 2000 = Number of days X Number of Senior Executives X Cost for a day = 10 X 2 X 1000	=Rs. 20,000.00 =Rs. 20,000.00
7. Cost for hall preparation	= Number of days X Number of employees X Cost for a day = 21 X 2 X 400	= Rs. 16,800.00
8. Cost for hall preparation	= Number of days X Number of employees X Cost for a day = 20 X 2 X 500	=Rs. 20,000.00

Figure 3: Inputting Data for Cost Centers

Steps 4 - Stepping down

As per the overhead cost centers and intermediate cost centers were omitted from study only utility bill cost was stepped

down to the area. First calculated the percentage area utilized for the school and then stepped down the cost of utility bills to the actual area.

1. Area utilized from cardiology complex	= (550 / 109,850) X 100
	= 0.5 %
Cost for electricity (cardiology complex)	= 261,432,531.78 X 0.5 / 100
	= RS. 1,308,947.60
2. Area from radiology training school building	= (440 / 14097) X 100
	= 3.12 %
Cost for electricity (School building)	= 36,000 X (3.12 / 100)
	= Rs. 1,123.64
Total electricity cost	= 1,308,947.60 + 1,123.64
	= RS. 1,310,071.24
3. Total area for the School of Cardiography	= 550 + 440
	= 990 Square Feet
4. Cost for water	= Area X unit cost X 12 Months
	= 990 X 1.175 X 12
	= Rs. 13,959.00
5. Cost for air-condition	= Area X unit cost X 12 Months
	= 990 X 6.22 X 12
	= Rs. 521,733.60

Figure 4: Stepping down of Costs

$$\begin{aligned} \text{Cost of total programme} &= \text{Cost of final cost centers} + \text{Stepped} \\ \text{down costs} &= 24,479,552.74 + \end{aligned}$$

Step 6 – Calculating Unit cost

Final unit cost was calculated by adding costs of final cost centers and stepped down cost to find the total cost for the training program. Unit cost was calculated by dividing total cost by number of trainees in the batch.

$$\begin{aligned} &1,845,763.84 \\ &= \text{Rs. } 26,325,316.58 \end{aligned}$$

Cost of the total programme		
Cost of final cost centers		
Cost for tutors	4,551,792.00	
Cost for health care assistants	2,871,785.74	
Cost for trainees	16,771,200.00	
Cost for lectures	122,400.00	
Cost for paper setting	11,000.00	
Cost for MCQ marking	7,950.00	
Cost for SEQ marking	6,625.00	
Cost for practical exam	60,000	
Cost for Viva exam	40,000.00	
Cost for hall preparation	16,800.00	
Cost for hall preparation	20,000.00	
		24,479,552.74
Stepped down costs		
Cost for electricity	1,310,071.24	
Cost for water	13,959.00	
Cost for air-condition	521,733.60	
		1,845,763.84
Cost for total programme		26,325,316.58

Figure 5: Cost for Total Cardiography Training Programme

Cost of a trainee = Total cost for the programme / Number of trainees
 = 26,325,316.58/53
 = Rs. 496,704.09

cost for the external trainees and the cost was significant fraction of the total.

Out of total cost only four elements reserves more than% of cost fraction. Those elements were tutor, HCA, trainee and Electricity reserves% of cost fraction.

VI. DISCUSSION

The cost of total training programme was Rs. 26,325,316.58 and cost for training one cardiographer was Rs. 496,704.09. Out of total cost nearly two third (63.70%) (Rs. 16,771,200.00) was for allowances of 40 trainees. Therefore, despite of bond of Rs.100,000.00, Ministry of Health paid them Rs.419,000.00 as allowance for the training one year for the diploma. Cost of wages for 9 permanent employees attached to the school was Rs. 7,423,577.74 (28.20%) and proportionately very small amount of Rs. 122,400.00 (0.47 %) spent for external resource persons. ,% (Rs.) for examinations and >>>>>% (Rs.) for facilities (Figure 6).

Figure 6: cost distribution for the training programme

Cost of electricity (Rs. 1,310,071.24), water (Rs.13,959.00) and air-condition (Rs. 521,733.60) was negligible compare to other costs. Their cost fraction was 4.97 %, 0.05 % and 1.98 % respectively. Therefore, inclusion of water and air-condition utility cost doesn't have large impact on cost of a trainee. Examination cost was 0.62 % (Rs. 162,375.00) of total programme cost. Government has spent 24.03 % (Rs. 6,325,756.84) of total

VII. CONCLUSION

Total cost for train one cardiographer at the school of cardiography, National Hospital of Sri Lanka was Rs. 496,704.09 and the nearly one third of cost was allowance paid for the same trainees. More than one fourth of cost fraction spent for the permanent employees including tutors. Limiting factor for the per trainee cost reduction is present small lecture hall and increasing lecture hall facilities effectively reduce the cost of a trainee without compromising quality of the diploma.

Critical analysis of current bond amount of Rs. 100,000.00 will be important in future including attempt to collaborate with Ministry of Higher Education or Ministry of Vocational Training to increase the validity and to reduce financial burden to the Ministry of Health.

REFERENCES

[1] Anzai, Y., Heilbrun, M. E., Haas, D., Boi, L., Moshre, K., Minoshima, S., Kaplan, R. and Lee, V. S. (2017) "Dissecting Costs of CT Study: Application of TDABC (Time-driven Activity-based Costing) in a Tertiary Academic Center" Academic Radiology, 24(2), pp. 200-208.

- [2] Chakravarty, B.A. and Debnath, C.J. (2015) "Life cycle costing as a decision making tool for technology acquisition in radio-diagnosis", MEDICAL JOURNAL ARMED FORCES INDIA, 71, pp. 38-42.
- [3] De Silva, A. (2018) 'Costing of Institutions and Diseases' M.D. in Medical Administration Research Methodology Course [Power Point Presentation]. [De Silva, 2018]
- [4] Establishments division, (2014) "Revision of examination fees" Ministry of Public Administration and Home Affairs.
- [5] Ibrahim, R., Sa'don Samian, S., Mazli, M. Z., Amrizal, M. N. and Aljunid, S. M. (2012) "Cost of Magnetic Resonance Imaging (MRI) and Computed Tomography (CT) scan in UKMMC" BMC Health, 12(1), p11. (Roszita et al., 2012)
- [6] Ministry of Health, Nutrition & Indigenous Medicine, (2016) "Revision of Payments for The Inservice Trainers at Department of Health"
- [7] Subasingha, N. (2020) Key informant Interview, Principle, School of Cardiography, National Hospital of Sri Lanka.
- [8] Karunatilaka, M. N. (2020) Costing of Magnetic Resonance Images at epilepsy unit, National Hospital of Sri Lanka.

AUTHORS

First Author – Karunatilaka, M. N., Registrar in Medical Administration, Post Graduate Institute of Medicine, University of Colombo, Sri Lanka; *Corresponding author E- mail: mudith_karunatilaka@yahoo.com