Effectiveness and Cost Analysis of Community-Based Rehabilitation Service in Bangkok

SUTTHICHAI JITAPUNKUL, M.D., M.Sc.*,
SRICHITRA BUNNAG, M.D., Ph.D.*,
SHAH EBRAHIM, M.R.C.P., D.M.**

Abstract

This paper aimed to clarify the effectiveness and the cost of the community-based rehabilitation service in Klong Toey slum after a three year study period. One hundred and seventy eight patients used community-based rehabilitation during the three year period. One hundred and fifty-seven patients (86.5%) reported that their problems/conditions were cured or improved. Only nine patients (5.1%) reported that they stopped using community-based rehabilitation because their problems/conditions did not improve. A statistically significant improvement in pain level and walking velocity assessment, in 105 and 78 patients respectively, was demonstrated. Total cost and cost per patient-day of the community-based rehabilitation were Bt 559,920 and Bt 111.1 respectively. Cost per-patient-day of this community-based rehabilitation service was compared with an estimated cost per patient-day of using rehabilitation services at Chulalongkorn University Hospital and was found to be cheaper. This study supported the role of community-based rehabilitation in Thailand. The need for a health service study in rural areas was also noted.

At present no one can neglect the significant role of rehabilitation therapy in today's health care environment. As cost of health care has become a major concern, both government and non-government organisations have turned toward rehabilitation services as a resource for preventing more costly use of the health care system in the future. There are several epidemiological studies which have demonstrated a high prevalence of disability and chronic diseases among the Thai population (1-5). It was reported that a high proportion of disabled people in Thailand could be expected to gain significantly from assessment and appropriate rehabilitation treatment(3,6). Financial status, inaccessibility, unavailability and myth are the major determinants in failure of getting hospital-based

* Department of Medicine, Faculty of Medicine, Chulalongkorn University, Bangkok 10330, Thailand.
** Department of Primary Care and Population Sciences, Royal Free Hospital Medical School, University of London, London, United Kingdom.

rehabilitation service. The need for a community-based rehabilitation service has been raised for years[7-9]. However, this essential service is available only in a few areas. Moreover, the effectiveness and cost analysis of community-based rehabilitation services in Thailand has never been determined.

Between June 1992 and May 1995, a comprehensive community service (including rehabilitation) was developed in Klong Toey slum, Bangkok (CES project). This project was fully supported by HelpAge International and aimed to provide comprehensive community care for Thai elderly living in this poor urban area. However, not only did the aged use the community-based rehabilitation service but also young people. In order to demonstrate the effectiveness and cost of this community rehabilitation service, a study design had been developed before the project was started. This paper aims to clarify the effectiveness and cost of the community-based rehabilitation service in Klong Toey slum after the three year period. The cost per-patient-day of this community-based rehabilitation service was also compared with the estimated cost per patient-day of using the rehabilitation services at Chulalongkorn University Hospital.

SUBJECTS AND METHOD

Community rehabilitation in Klong Toey slum

Between June 1992 and May 1995, the CES project was operated in Klong Toey slum. It provided comprehensive services for the elderly including home visits, home nursing, community rehabilitation and geriatric evaluation. Although the aged were the population target of this project, many young patients also used the rehabilitation services. Therefore, data from both the elderly and the young were examined.

A small community rehabilitation centre was set up at the centre of the slum area. Patients who could go to the community rehabilitation centre received rehabilitation there. Those who could not go to the centre were provided with a rehabilitation programme in their own homes. Three non-professional personnel were trained to give basic rehabilitation and assessment. These non-professional personnel provided services five days a week. They had to take responsibility for comprehensive services including home visits, home nursing services, counselling, a geriatric assessment service, and a rehabilitation service. A physiotherapist supervised these non-professional personnel and provided rehabilitation services one day a week. The types of treatment that the physiotherapist and non-professional personnel used fall into the following categories: physical methods (heat, cold, ultrasound), flexibility (passive and active movements), strength (isometric and isotonic exercise), mobilisation (a general increase in practical activities, standing, sitting, getting out of bed, walking etc), traction (cervical spinal traction), self-care (washing, dressing, feeding, grooming), counselling and aids (assessment and home provision, home modifications). Canes, crutches and walking frames were provided according to specific needs. Intermittent assessments were done until their conditions improved. Only patients with mild or moderately severe conditions were provided community-based rehabilitation. Patients with severe conditions or those who needed sophisticated equipment were referred to the Chulalongkorn University Hospital.

Measurement of outcome

The effectiveness of the rehabilitation programme was assessed by measuring walking velocity, pain levels and reasons for discontinuing the use of the rehabilitation programme. Walking velocity was measured by letting the patients walk as fast as they could along a red line for a distance of 10 metres. If patients could not walk or could walk less than 10 metres, the furthest distance they could walk was noted in the record sheet and walking velocity was rated as zero metre per second. The time used for this 10-metre distance was recorded at the beginning of services, once a week during services and at the end of services.

Subjects who had pain and needed rehabilitation services were allowed to rate the severity of pain, using a scale that ranged from 0 (no pain) to 10 (maximum pain). Data of pain score was collected at the beginning of services, once a week during services and at the end of services.

All patients, including those who discontinued prematurely, were visited by a research staff within one month of their rehabilitation programme being discontinued. Patients and/or their family members were asked for reasons why they terminated their treatment (e.g. Was the patient cured/much improved, improved or not-improved/worse? Did the patient have no time or have to

work or have no companion? Did the patient not want to go without any specific reason, or have an acute illness which caused them to stop treatment?) Before being questioned patients and their family members were informed about the study. They were assured that their answers were confidential and would have no negative-impact on them.

Measurement of cost

Cost data of the community-based rehabilitation were extracted from financial record of the CES project which listed actual expenditure over the three year study period. Using these data, costs were calculated for a physiotherapist, non-professional personnel, equipment, aids, consumable, overheads, recruitment and training of non-professional personnel and administration. It was estimated that 40 per cent of working time of the non-professional personnel was devoted to rehabilitation services. Total programme costs were calculated for the three years combined. The cost per patient for the programme was then calculated by dividing the total programme expenditure by the total number of patients. Costs relating to the research aspects, including research staff and data handling, were excluded from this analysis.

Cost data for rehabilitation in Chulalongkorn University Hospital were calculated for both direct and indirect costs. Direct costs included basic rehabilitation fees and travelling costs. Indirect costs included the minimal daily wage of a worker, as declared by the Thai government. This cost is applied for companions who took patients to the hospital. The cost per patient per day for using the rehabilitation services at Chulalongkorn University Hospital was then calculated by the summation of rehabilitation fee, travelling expenses and minimal daily wage.

A statistically significant difference of pre- and post-rehabilitation walking velocity was clarified by using student's paired *t* test (alpha error < 5%). Wilcoxon signed rank test was used for determining the statistical difference between pre- and post-rehabilitation pain score (alpha error < 5%). The SPSS-PC programme was used for statistical analysis.

RESULTS

Between June 1992 and May 1995, 178 patients received rehabilitation treatment from the community-based rehabilitation service. Their main problems were lower back pain (23.6%), osteoarthritis of the knee (19.7%), shoulder pain (15.7%), stroke (12.4%) and cervical spondylosis (7.9%). Mean age and its standard deviation were 64.2 and 15.1 years respectively. Fifty one per cent of these subjects were aged 60 years or over. Forty per cent were male. One hundred and thirty six patients received the complete rehabilitation programme and were discharged with approval. Forty two patients stoped the rehabilitation programme themselves. The mean and its standard deviation of duration of treatment were 28.2 and 15.8 days respectively.

Effectiveness of community-based rehabilitation

Walking velocity was tested in 78 patients. The means (standard deviations) of walking velocity at the beginning and the end of services were 0.38 (0.14) and 0.59 (0.17) metres per second respectively. ($p < 0.05$)

Pain score before rehabilitation programme was measured in 124 patients. However, nineteen of these patients did not complete the rehabilitation programme. Therefore, 105 patients completed the pain score tests both before and after the rehabilitation programme and were included in the analysis. The means (standard deviations) of pain score rated by 105 patients at the beginning and the end of services were 7.2 (1.4) and 3.7 (2.8) respectively. ($p < 0.05$)

From 178 patients, 136 patients were discharged from treatment with approval by the personnel of the CES projects. Forty two patients stopped rehabilitation treatment without approval. Reasons of treatment termination are summarised in Table 1.

Cost per patient-day of the community-based rehabilitation

During the three year period, the total cost for the rehabilitation service was Bt 559,920. Nearly 60 per cent of the total cost contributed to the wages for the three non-professional personnel and a physiotherapist. The total number of patient-days was 5,014. Thus, the actual direct cost per patient-days was Bt 111.1. Indirect cost from the loss of income to care-givers was minimal because the non-professional personnel arranged care for the patients if care-givers were not available. Because it took almost 1 hour from Klong Toey slum to Chulalongkorn University Hospital and the

Table 1. Reasons of community-based rehabilitation termination.

Reasons	Discharged by personnel (n = 136)	Did not continue treatment (n = 42)
Cured / much improved	70	8
Improved	62	14
Not improved	2	7
No time / had to work	-	7
No companion	-	2
Did not want to go without any specific reason	-	1
Had acute illness	2	3

Table 2. Total community-based rehabilitation cost (Baht), after three years.

a physiotherapist	90,720
non-professional personnel*	237,600
equipment	108,000
aids	13,600
consumable	22,000
overheads**	32,400
recruitment and training of non-professional personnel	7,600
administration	48,000
Total cost	559,920

* The non-professional personnel spent approximately 40% of working time for rehabilitation services.
** Based on the cost of a dedicated serviced room at 10,800 Baht per year

patients had to wait before receiving therapy, (for not less than 15 minutes), the patients and their companions might be affected by stress. Thus, the intangible cost of the community-based rehabilitation service was assumed to be less than that of the alternative programme at the Chulalongkorn University Hospital. (Table 3)

Cost per patient-day of the hospital-based rehabilitation at the Chulalongkorn University Hospital

The lowest service fee of rehabilitation at the Chulalongkorn University Hospital was Bt30-Bt50 per session of treatment. Patients and their companions had to pay Bt12-Bt80 for transportation. (Bt12 for a bus and Bt80 for a taxi or equivalent). At least half of the patients required companions to take them to the hospital and these companions had to stop work for that period. People in this slum area were mainly labourers and were paid daily. The daily wage was Bt122 (average for three years). Thus, the indirect costs were not less than half of Bt122 (Bt61.5) per patient-day. In conclusion, if the patients in Klong Toey slum who used community-based rehabilitation services had gone to receive rehabilitation treatment at the Chulalongkorn University Hospital, the total cost per patient-day would be Bt103.5-Bt191.5. (Table 3)

DISCUSSION

Evaluation of the effectiveness and the cost of community-based rehabilitation is essential to identify programmes which maximise health gain with the least cost to society. Currently there is little information on the effectiveness and cost of community-based rehabilitation services in Thailand. The evaluation of the effectiveness of our community-based rehabilitation programme in a poor urban area of Bangkok demonstrated an impressive result. Only nine patients (5.1%) reported that they stopped using the community-based rehabilitation because their problems/con-

Table 3. Cost of rehabilitation programmes at the community-based and hospital-based rehabilitation.

Places of programmes	Cost per patient-day (Baht)			
	Direct		Indirect	Intangible
	service cost	transportation		
Community	111.1	-	-	less
Hospital	30-50	12-80	61.5	more

ditions had not improved. A statistically significant improvement in the pain level and walking velocity assessment in 105 and 78 patients respectively was demonstrated. It may be assumed that the outcome difference of the alternatives i.e. the community-based and hospital-based rehabilitation, were non existent or unimportant. Therefore, the difference in cost was the key factor to determine which is the better of the services as the relative effectiveness of the two methods was not a contentious issue.

It is important to recognise uncertainties surrounding the estimated cost. Discrimination between the community-based rehabilitation service costs and the other service costs in the accounts was not always easy, and some assumptions had to be made. Non-professional personnel were the major resource utilised in these comprehensive services. The time they spent on rehabilitation was calculated based on their timetable and their weekly reports. Approximately 40 per cent of their working time was dedicated to rehabilitation. Using non-professional personnel made the direct cost of this community-based rehabilitation lower than the traditional services which mainly used physiotherapists and/or occupational therapists for providing treatment. We found that this model was practical and appropriate for developing countries such as Thailand. However, the continuous supervision of the non-professional personnel was essential for assuring that they maintained a suitable level of performance. An impressive tactic used in this community-based service was a weekly discussion on case management and administration.

The hospital-based rehabilitation at the Chulalongkorn University Hospital provided care to both in-patients and out-patients. It also provided an education programme to medical personnel. Internal accounts of the department of orthopaedics and rehabilitation were complicated because this department is administrated and funded by two organisations i.e. the Thai Red Cross Society and the Chulalongkorn University. Therefore, the actual cost for hospital-based rehabilitation was difficult to estimate from the internal accounts. As such a service-fee was used for cost analysis. According to the Thai Red Cross policy, the service-fee of the Chulalongkorn University Hospital was minimal and definitely could not cover the actual expenditure of the service. The lowest service-fee was then selected as the direct cost of the hospital-based rehabilitation and used in cost comparison in this study.

The community-based rehabilitation had higher direct costs compared to the hospital-based rehabilitation, but the number of workdays lost by the companions was lower. It could be argued that attaching money values to the intangible items leads to more explicit consideration of them. However, the presence of intangible costs in the analysis is always a matter for careful consideration. Though the intangible cost of community-based rehabilitation was less than that of the hospital-based rehabilitation, they were not included in the cost comparison. This study showed that the total cost of the community-based rehabilitation was cheaper than that of the hospital-based rehabilitation, even when the intangible cost was not included. This finding supported the role of community-based rehabilitation services in Thailand[7-9]. However, models of community-based service in other areas particularly the rural areas may be different from the model used in the CES project. Service research in other areas of Thailand including studies of effectiveness and cost analysis of the services are recommended.

SUMMARY

This study calculated the cost of the community-based rehabilitation and compared it with the estimated cost of the hospital-based rehabilitation. It was found that the cost of the community-based rehabilitation was cheaper than that of the hospital-based rehabilitation. Effectiveness of the community-based rehabilitation was shown and considered to be equal to that of the hospital-based rehabilitation. Therefore, the difference in cost is the key factor to determine the choice of services and suggested that the community-based rehabilitation service in Thailand should be endorsed.

ACKNOWLEDGEMENT

The authors wish to thank HelpAge International for its generous grant support for the CES project.

(Received for publication on October 20, 1997)

REFERENCES

1. Thailand Health Research Institute, National Health Foundation. Report of the National Health Examination Survey 1991-1992. Bangkok, Health Systems Research Institute, Ministry of Public Health, 1996.
2. Thailand Health Research Institute, National Health Foundation. Report of the Health Status of Thai Elderly 1995: a National Survey of the Welfare of the Elderly in Thailand (SWET). Bangkok, Thailand Health Research Institute, National Health Foundation, 1996.
3. Jitapunkul S, Kamolratanakul P, Bunnag S. Disability among Thai elderly living in Klong Toey slum. J Med Assoc Thai 1994;77:231-8.
4. National Statistical Office, Office of the Prime Minister. Report of the Health and Welfare Survey 1991. Bangkok, Office of the Prime Minister, 1991.
5. Phanthumchinda K, Jitapunkul S, Sitthi-Amorn C, Bunnag S, Ebrahim S. Prevalence of dementia in an urban slum population in Thailand: validity of screening methods. Int J Geriatr Psychiatr 1991; 6:639-46.
6. Pongprapai S, Tayakkanonta K, Chongsuvivatwong V, Underwood P. A study on disabled children in a rural community in Southern Thailand. Disability & Rehabilitation 1996;18:42-6.
7. Jitapunkul S, Bunnag S, Ebrahim S. Health care for elderly people in developing countries: a case study of Thailand. Age Ageing 1993;22:377-81.
8. Vibulpolprasert S, Pradapmook P, Rewpaiboon V, Rujakhom V, Pengpaiboon P. Health Service System for Rehabilitation the Disables. Health Systems Research Institute, Ministry of Public Health, 1996.
9. Jitapunkul S. Phylosophy and strategic plan of elderly services in Thailand. Chula Med J 1994; 38:493-7.

ประสิทธิผลและการวิเคราะห์ต้นทุนของการบริการฟื้นฟูสมรรถภาพในชุมชนในกรุงเทพมหานครฯ

*สุทธิชัย จิตะพันธ์กุล, พ.บ., วท.ม.**

ศรีจิตรา บุนนาค, พ.บ., ปร.ด., SHAH EBRAHIM, M.R.C.P., D.M.***

การศึกษานี้มุ่งหมายที่จะแสดงถึงประสิทธิผลและต้นทุนของการบริการฟื้นฟูสมรรถภาพในชุมชนแออัดคลองเตยในระยะเวลา 3 ปีที่ให้บริการ ในระยะดังกล่าวมีผู้ป่วยจำนวน 179 คนเข้าใช้บริการฟื้นฟูสมรรถภาพ ผลการให้บริการพบว่าผู้ป่วย 157 คน (ร้อยละ 86.5) รายงานว่าปัญหาหรืออาการที่มีได้หายหรือดีขึ้น มีผู้ป่วยเพียง 9 คน (ร้อยละ 5.1) เท่านั้นที่รายงานว่าหยุดการรับบริการเนื่องจากปัญหาหรืออาการที่เป็นอยู่ไม่ดีขึ้น ผลการประเมินความเจ็บปวดและความเร็วของการเดินในผู้ป่วย 105 และ 78 คนตามลำดับพบว่าดีขึ้นอย่างมีนัยสำคัญทางสถิติ ต้นทุนทั้งหมดและต้นทุนต่อหน่วยผู้ป่วย-วันของการบริการฟื้นฟูสมรรถภาพในชุมชนเท่ากับ 559,920 และ 111.1 บาทตามลำดับ เมื่อเปรียบเทียบต้นทุนต่อหน่วยผู้ป่วย-วันของการบริการฟื้นฟูสมรรถภาพในชุมชนกับต้นทุนต่อหน่วยผู้ป่วย-วันของการบริการฟื้นฟูสมรรถภาพในโรงพยาบาลจุฬาลงกรณ์พบว่าต้นทุนต่อหน่วยผู้ป่วย-วันของการบริการฟื้นฟูสมรรถภาพในชุมชนมีราคาถูกกว่า การศึกษานี้สนับสนุนบทบาทของการบริการฟื้นฟูสมรรถภาพในชุมชนในประเทศไทย ผู้วิจัยเสนอให้มีการทำการศึกษาในเขตชนบทต่อไป

* ภาควิชาอายุรศาสตร์, คณะแพทยศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย, กรุงเทพ ฯ 10330

** Department of Primary Care and Population Sciences, Royal Free Hospital Medical School, University of London, London, United Kingdom.