

Cost Effectiveness of Speech Camps for Children with Cleft Palate in Thailand

Benjamas Prathanee PhD*

* Department of Otolaryngology, Faculty of Medicine, Khon Kaen University, Khon Kaen, Thailand

Most mobile cleft lip and palate (CLP) surgical units and international missions developing countries generally address surgical issues that reduce the physical abnormalities of the people. Stigmatization persists as speech therapy for most patients is delayed (or they get none at all) due to a shortage of speech and language pathologists.

Objective: To estimate cost effectiveness of speech camps.

Material and Method: The 4-day speech camp and 1-day follow-up session were established based on the Community-Based Model for Speech Disorders for Children with Cleft Lip/Palate. Twelve children with CLP (age ranged 3 years 6 months -13 years) attended a 4-day speech camp and a 1-day follow-up session (6 months later) for remediation of their articulation disorders. Estimation of both the expense and duration for both speech camp and follow-up session were compared to those for getting speech services from the nearest speech center.

Results: Both a 4-day speech camp and a 1-day follow-up session significantly reduced the number of articulation defects. The average combined cost of a speech camp and the follow-up session was 13,623.04 baht/child (or \$US 412.82/child at an exchange rate of 33 baht = \$US 1) and spent only 6 months. For getting speech services from speech center, cost would be 129,112.08 baht/child (\$US 3,912.49) and spend approximately 4-5 years to get the same number of speech services as received speech camp and 1-day follow-up session. This represents a savings of more than a million baht (~ 1,386,252.46 or \$US 42,007) over against the cost of providing speech therapy over a longer period in a hospital setting for 12 children. Moreover, children with CLP had no longer compensatory articulation defects that cause complicated speech problems and difficult solving.

Conclusion: Speech camp and follow-up session provided cost effectiveness for problem-solving in the case of lack of speech services for children with CLP in Thailand.

Keywords: Cost effectiveness, Speech camp, Cleft palate, Community-Based Model

J Med Assoc Thai 2011; 94 (Suppl. 6): S33-S39

Full text. e-Journal: <http://www.jmat.mat.or.th>

Cleft lip and palate (CLP) is one of the most common craniofacial anomalies worldwide, occurring in 0.30 to 2.65/1,000 live births⁽¹⁾. CLP is a major public health concern in Thailand, where the incidence is between 1.10 and 2.49/1,000 live births⁽²⁾. Most of the affected persons lived in the northeast region, where the annual occurrence is ~745 live births each year^(1,2).

It is estimated that there are over two million babies born each year with CLP and the cost of management exceeds the available resources, especially in most developing countries in Asia, Africa and Latin America⁽³⁾. CLP constitutes a major health problem

requiring a global strategy to deal with the epidemiological issues, primary prevention and evidence-based, cost-effective treatment.

There are several non-government organizations and charities such as Smile Train, Operation Smile, the WHO Task Force on CFA, the International Consortium on Oral Cleft Genetics (ICOCG), Interplast and other international volunteer cleft missions that help with the treatment of patients with cleft disorders in developing countries. Most of the agencies generally address surgical issues⁽⁴⁾ that help to reduce the physical abnormalities. Mobile surgical teams in Uganda reported the total cost of cleft repair was £UK 27 (1,890 baht or \$US 57.27)⁽⁵⁾. The total cost of cleft repair varies by country and has not been addressed in a systematic study.

Most of patients with CLP have persistent speech and language problems after surgery, resulting

Correspondence to:

Prathanee B, Associate Professor, Department of Otolaryngology, Faculty of Medicine, Khon Kaen University, Khon Kaen, 40002, Thailand.

Phone: 043-348-396, Fax: 043-202-490

E-mail: bprathanee@gmail.com

in ongoing social stigmatization. There are significant speech and language deficits in children with CLP, including: speech and language delay (92%), of whom half (49%) need speech and language treatment⁽⁶⁾, articulation disorders that affect their intelligibility (51-63%)⁽⁷⁾; dysphonia (12.5%)⁽⁸⁾; and, velopharyngeal incompetence (20-30%)^(9,10).

As in other developing countries, most children with CLP in Thailand, particularly those who live in the less developed northeast region, receive delayed speech therapy (or none at all). Of concern, the majority of patients needing therapy get therapy well past the age when speech is acquired and perfected. An important reason for delayed or no speech therapy in Thailand is a shortage of qualified speech-language pathologists⁽¹¹⁾. There are only 40 speech pathologists in all of Thailand, a country of 63 million. Most speech-language pathologists work in Bangkok, with five in the northern, four in the southern and one in the northeast region (where one-third of the population lives)⁽¹²⁾.

Speech camps, as well as, paraprofessional training are a popular problem-solving tool/venue for developing countries that lack speech-language pathologists⁽¹³⁾. These projects have been supported by governments and local or international non-profit organizations. No previous report, however, has investigated the amount of financial support or the cost-effectiveness of each project.

The Community-Based Model for Speech Disorders for Children with Cleft lip/palate in the Northeast-based upon the principles of community-based rehabilitation (CBR), Primary Health Care (PHC) and institutional medical approaches-was developed for reaching and treating speech problems in Thailand. The healthcare delivery model employed in Thailand is in part responsible for a shortage of qualified speech-language pathologists which in turn has resulted in a lack of speech therapy, delayed therapy or none existent services⁽¹¹⁾. The concept of speech camps to mitigate the effects the shortage was implemented in the third phase of the model. In order to plan future treatment strategies and secure funding support for speech services in Thailand, an estimation of their cost effectiveness is needed.

The purpose of the present study was to estimate the cost-effectiveness of speech services in a 4-day principle speech camp with a 1-day follow-up session for children with CLP. This article was approved the research protocol by Khon Kaen University Ethics committee (The Helsinki Declaration: HE 510134).

Material and Method

The Community-Based Speech Therapy Model for Children with CLP was applied to resolve unaddressed problems of children with associated speech disorders at Suwanaphum Hospital, in the district healthcare unit of Roi-et Province in northeastern Thailand.

The participants in the 4-day principle speech camp and 1-day follow-up session included 13 parents, 13 children with CLP, and 4 health providers for a total of 30 participants. One boy missed the 4-day principle camp because of a logistic misunderstanding and one girl missed the follow-up session for personal reasons. Therefore, we had a total of 12 children with CLP and their families enrolled in both the main camp and the follow-up session. Costs for the speech camp, the follow-up session, and getting speech services from the only nearest speech center investigated were based on the estimation of 12 families' expenses.

Five speech-language pathologists conducted the speech camp for children with CLP. The camp included: lectures; assessments of resonance; voice; intelligibility; speech and language development screening; pre- and post-articulation tests; and a hearing test. Lectures focused on the anatomy and physiology of speech production, principle for speech correction, with pre- and post-lecture knowledge tests. A practical speech therapy workshop based on each child's speech defects, both individual and group therapies, were conducted after finishing the assessment process. Caregivers and health providers were then responsible for each child's speech program, as demonstrated and assigned for continuing therapy by the speech/language pathologists; including phrases, sentences, reading and carry over conversation.

A 1-day, follow-up session was conducted six months after the principle camp. Two speech/language pathologists and two assistants ran the 1-day workshop. The principle investigator assessed the post-articulation test at the end of the session, with a focus on articulation at the word level and expected that the guardian would continue, through everyday life conversation.

Funding support for the 4-day speech camp and 1-day follow-up were investigated for a comparison of the expenses by individuals with CLP for services from the nearest and only speech center (Speech Clinic, Srinagarind Hospital, Khon Kaen Province) in northeast of Thailand. Questionnaires were used to investigate expenses by parents or caregivers. The items evaluated included: compensation for transportation, parents' or

caregivers' working, meals, overnight accommodations, service charge for speech therapy, ear, nose and throat, and hearing evaluations. Expenses were used to report the budget for the principle speech camps and a follow-up session. An estimation of average cost was used to display the data related to budget and expenses for the speech camp as well as a follow-up session and compared to getting the speech service costs when children with CLP used to go to the speech center.

Analysis

The main outcome of the present study was the number of articulation errors. Data analysis was performed by comparing the number of pre- and post-articulation errors both during the main speech camp and the one-day follow-up session, as well as, the participants' pre- and post-knowledge scores. The Wilcoxon Signed-Rank Test was used to demonstrate the effectiveness of speech therapy and descriptive analysis was used to derive an estimation of the expenses of the 4-day speech camp and a 1-day follow-up session.

Results

The characteristics of the 13 children with CLP are presented in Table 1.

The number of articulation errors of the participants is displayed in Table 2. The effectiveness

Table 1. Characteristics of children with cleft lip or/and palate

Patient Number	Age Year; month	Cleft type
1	7; 2	CP
2 ^a	11; 5	CP
3	8; 0	Lt. CLP
4	7; 0	Lt. CLP
5	6; 3	CL
6	12; 6	Lt. CLP
7	4; 6	Lt. CLP
8	10; 1	CP
9 [#]	12; 5	Bilat. CLP
10 [#]	9; 11	Bilat. CLP
11	10; 0	Rt. CLP
12	11; 3	Lt. CLP
13 ^b	10; 2	Bilat. CLP

Lt.: Left, Rt. = Right, CL = Cleft lip, CLP = Cleft lip and palate, Bilat. = Bilateral

All children had no any syndrome

[#]They are sibling, ^aa girl who missed 1-day follow-up session,

^ba boy who missed 4-day principle speech camp

of the speech camp was assessed by evaluating the mean difference in the number of articulation errors noted on the pre- and post-articulation tests (Pre-articulation 1 and Pos-articulation 1). Twelve of the 13 children with cleft lip and/or palate participated in the main speech camp for four-days with the exception one boy (child number 13) who attended only on the last day of the four-days main speech camp because of a logistical misunderstanding. His pre-articulation deficits were measured on the last day of the four days main speech camp and were used as pre-articulation test (Pre 2) compare to post-articulation test (Post 2) on the 1-day follow-up speech session. On the other hand, one girl (child number 2) did not attend the follow-up speech camp; therefore, follow-up analysis did not include her speech defects. The Wilcoxon signed-rank test indicated the significant reduction in the number of articulation defects in these children with CLP from both the 4-day speech camp and the 1-day follow-up ($Z = 3.11, p < 0.01$; $Z = 2.87, p < 0.01$)⁽¹⁴⁾.

The funding and support for these outreaches came from the National Security Health, Operation Smile Thailand and Suwannphum Hospital. The expenses are itemized in Table 3. Financial support was 163,476.50 baht (4,953.83 \$US). The average cost for the 4-day camp and the 1-day follow-up was 13,623.04 baht/child (\$US412.82).

Each family paid an average 2,739.46 baht/trip for the first visit, which included: 1) a 30-minute speech therapy session; 2) an ENT (ear, nose, and throat) examination; 3) a hearing acuity evaluation; and 4) an evaluation of expected costs and needed support (i.e., based on costs for transportation, food, accommodation and per diem).

The children with CLP in the speech camp presented no evidence of secretory otitis media (SOM); therefore, expenses for other visits after the first visit (i.e., the 2nd to 48th visit) decreased to 2,689.46 Thai baht/trip as there were no other medical expenditures needed (Table 4).

The activities undertaken each day of the 4-day camp took a full 8 hours. The first day was facilitated by five speech and language pathologists and one audiologist. The opening session was the course introduction and included a knowledge pre-test followed by lectures on the basics of speech and language problems in children with cleft/lip palate defects: this took 4 hours. Each patient then received an ear, nose and throat examination and an audiological evaluation. Meals/breaks and recreational activities for the children took 2 hours each day. On the last day of

Table 2. The number of articulation errors of children with cleft lip and/or palate

Child No.	Pre- articulation errors (Pre 1) [@]	Post-articulation errors (Post 1) [@]	Pre- articulation errors (Pre 2) [@]	Post-articulation errors (Post 2) [@]
1.	4	0	0	0
2.	4	2	N/A	N/A
3.	9	6	6	4
4.	4	3	3	2
5.	3	2	2	1
6.	11	9	9	5
7.	13	9	9	7
8.	2	1	1	1
9.	5	3		1
10.	6	1	0	0
11.	7	4	4	2
12.	1	0	0	0
13.	N/A	N/A	5	2

Child number 2: Attend only the main speech camp, Child number 13: Attend only the last day of the main speech camp and a follow-up session, [@]: Figures are the numbers of individual's articulation errors, N/Z: Not available

Table 3. Funding support and expenses for speech camps

Expense	Amount (baht)
Budget for the principle 4-day speech camp from NHS ¹	100,000.00
Additional funding from OST ¹	30,000.00
Budget for 1-day follow-up session from Suwannaphum Hospital ¹	12,000.00
Additional expense	
Salary for paraprofessionals attending/ servicing the 4-day camp & 1-day follow-up*	
1 st person 10,030/20 x 5	2,507.50
2 nd person 9,940/20 x 5	2,485.00
3 rd person 9,060/20 x 5	2,265.00
4 th person 23,320/20 x 5	5,830.00
All inclusive energy costs:	
Air-conditioning during the camp children and families slept in the meeting room for 5 days	2,800.00
Lighting for 5 days (Working hours: 9.00 am.-16.00 pm. and 20.00 pm.-6.00 am. for 4-day speech camp and 9.00 am.-16.00 pm. for 1-day follow-up)	189.00
Transportation	
4 round trips for lecturers and families in Roi-et province to Suwannaphum hospital	2,400.00
1 round-trip for lecturers and families in Khon Kaen province to Suwannaphum hospital	3,000.00
Total	163,476.50
	(4,953.83 \$US) [#]

NHS = National Health Security, OST = Operation Smile Thailand

¹ Budgets covered all included expenses: patient families' transportation and compensation, food, accommodation (meeting room), living expense, health service cost, compensation for speech and language pathologists and speech assistants, as well as project arrangement.

* Four healthcare providers were facilitators and attended the speech camp. The estimated costs are based on wages for 20-work days (4 days/person for the camp and 1 day/person for follow-up session)

[#] 33 baht = \$US 1

the camp, a post-test was administered and home assignments were given to parents/caregivers and

healthcare providers: this took 2 hours. The actual speech therapy during the camp took 2 hours on the

first day, 6 hours each on the second and third day, and 4 hours on the last day. Children with CLP received a total of 18 hours of speech services or 36 speech therapy sessions (given in 30-minute sessions) during the 4-day speech camp. Speech services included both pre- and post-articulation tests.

On the 1-day follow-up speech therapy, launched after the 4-day speech camp, lasted for six hours (given in 12 speech therapy sessions). This excluded duration of an articulation test (only a post-articulation test since the post-articulation scores from the 4-day speech camp constituted the pre-articulation score for comparison purposes).

Each child received a total of 48 speech therapy sessions, including both speech workshops. The overall cost of speech therapy and living, covering the 48 trips by the 12 children for speech services at the Speech Clinic at Khon Kaen University was ~1,549,728.96 Baht (\$US 46,961.48) (Table 5) and they would take 4-5 years for getting services from the nearest speech center to receive equal number of speech services as speech camp and a follow-up session

(possible appointment for speech therapy was once a month or one and a half months. Comparing the expense of the speech camps with the expenses that the family had to pay for receiving 48 speech therapy sessions (Table 4), it was discovered that the two workshops resulted in a savings of ~1,386,252.46 baht (42,007.65 \$US).

Discussion

The results clearly indicate that the 4-day principle speech camp and 1-day follow-up session significantly reduced the number of articulation defects in children with CLP and lowered overall expenses. Importantly, the main and follow-up workshops which provided 48 30-minute sessions of speech therapy could prevent long lasting compensatory articulatory defects and reduce duration and the number of times needed to make a trip for speech services at the nearest speech center. Because the longer children employ compensatory articulation habits, the longer and more difficult are the remedial speech services needed. Moreover, it currently takes 4 to 5 years to get speech services of 48 therapy sessions due to long waiting lists (*i.e.*, one and a half months waiting per 1 session) and the shortage of qualified speech and language pathologists. Thus, the speech camp is one of the best ways to alleviate speech and language problems, provide long-lasting remediation and lower expenses.

Based on the per capita cost of the authors' speech camps, the cost averaged 13,623.04 baht/child (\$US 412.82), a government or non-profit organization could estimate the costs of developing a national program of speech camps for people with CLP and include in public health planning. This would mitigate the problems caused by the shortage of speech therapists and particularly important in Thailand and other developing countries where there is a shortage of resources. Public health policy also needs to support

Table 4. Average living, transportation expenses and service cost per trip per person

Expense	Average/case/trip (baht)
Transportation	985.77
Food	219.23
Accommodation	476.92
Lack of income	507.54
Speech therapy	200.00
Hearing and ENT evaluation	350.00
Total with Hearing and ENT evaluation (1 st visit)	2,739.46
Total without Hearing and ENT evaluation (2 nd -48 th)	2,689.46

Table 5. Overall costs for therapy and living expenses for 48 speech therapy sessions

Expense/Visit	CLP without SOM	
	Average/case/time (Baht)	Overall expense (Baht)
1 st visit	2,739.46	2,739.46
Each visit thereafter (2 nd through 48 th)*	2,689.46	126,404.62
Total per case		129,122.08
Total = 12 cases		1,549,728.96 (\$US 46,961.48) [#]

CLP = Cleft lip and /or palate, *Without ENT and audiometry, [#] 33 baht = \$US 1

the establishment of education centers to produce more qualified speech and language pathologists for long-lasting problem solving.

Conclusion

Forty-eight speech therapies given at 4-day speech camp and 1-day follow-up session significantly reduced the number of articulation defects in persons with CLP. The cost of attending program represented a significant savings over the current model for providing speech therapy to children with CLP.

Acknowledgement

Thanks to the director and his staff at Suwanaphum Hospital, Roi-et Province, Thailand for their hospitality and support of the speech camp; the National Health Security and Operation Smile Thailand for financial support and The Center of Cleft lip-Palate and Craniofacial Deformities, Khon Kaen University, in association with Tawanchai Project (The Tawanchai Center) and Mr. Bryan Roderick Hamman for assistance with the English-language presentation of the manuscript.

Potential conflicts of interest

None.

References

1. Chowchuen B, Godfrey K. Development of a network system for the care of patients with cleft lip and palate in Thailand. *Scand J Plast Reconstr Surg Hand Surg* 2003; 37: 325-31.
2. Chuangsuwanich A, Aojanepong C, Muangsombut S, Tongpiew P. Epidemiology of cleft lip and palate in Thailand. *Ann Plast Surg* 1998; 41: 7-10.
3. Lee ST. New treatment and research strategies for the improvement of care of cleft lip and palate patients in the new millennium. *Ann Acad Med Singapore* 1999; 28: 760-7.
4. Strauss RP, Eiserman WD, D'Antonio LL, Moses M, Muntz H, Spalding P, et al. Social and ethical issues in internal cleft palate and craniofacial treatment program. Presented at the 58th Annual Meeting of the American Cleft Palate-Craniofacial Association, Minneapolis, Minnesota; April 23-28, 2001.
5. Hodges AM, Hodges SC. A rural cleft project in Uganda. *Br J Plast Surg* 2000; 53: 7-11.
6. Schonweiler B, Schonweiler R, Schmelzeisen R. Language development in children with cleft palate. *Folia Phoniatr Logop* 1996; 48: 92-7.
7. Schuster M, Maier A, Haderlein T, Nkenke E, Wohlleben U, Rosanowski F, et al. Evaluation of speech intelligibility for children with cleft lip and palate by means of automatic speech recognition. *Int J Pediatr Otorhinolaryngol* 2006; 70: 1741-7.
8. Tanpowpong K, Saisukul I, Kittimanont H, Rattanasiri S. Outcome of myringotomy with ventilation tube for otitis media with effusion in Thai children: Ramathibodi experiences. *J Med Assoc Thai* 2007; 90: 1866-71.
9. Marui M. Recent activities of speech therapists in the community: a report on community-based speech therapy. *JPN J Com Disord* 2005; 22: 31-6.
10. Prathanee B. Velopharyngeal dysfunction. In: Chauchuen B, Prathanee B, Ratanayatikul J, editors. *Cleft lip-palate and craniofacial anomalies: multidisciplinary team*. 2nd ed. Khon Kaen, Thailand: Siriphan Offset Publisher; 2002: 271-314.
11. Prathanee B, Dechongkit S, Manochiopinig S. Development of community-based speech therapy model: for children with cleft lip/palate in north-east Thailand. *J Med Assoc Thai* 2006; 89: 500-8.
12. Thai Speech and Hearing Association. A directory of speech pathologist, audiologist, medical scientist in audiology and audiotechnician. Bangkok: TSHA; 2001.
13. Landis PA. Training of a paraprofessional in speech pathology: a pilot project in South Vietnam. *ASHA* 1973; 15: 342-4.
14. Prathanee B, Lorwatanapongsa P, Makarabhirom K, Suphawattariyakul R, Wattanawongsawang W, Prohmtong S, et al. Speech camp for children with cleft lip and/or palate in Thailand. *Asian Biomed* 2011; 5: 112-8.

ความคุ้มค่าเงินของการจัดค่ายฝึกพูดสำหรับเด็กปากแหว่งเพดานโหว่

เบญจมาศ พระธานี

ภูมิหลัง: หน่วยผ่าตัดเคลื่อนที่และการทำพัทธกิจนานาชาติสำหรับภาวะปากแหว่งเพดานโหว่ในประเทศที่กำลังพัฒนามักมุ่งเน้นเรื่องการผ่าตัดเพื่อลดความผิดปกติทางร่างกายเป็นหลัก ความบกพร่องของการพูดยังคงมีอยู่ ส่วนการแก้ไขการพูดสำหรับผู้ป่วยส่วนใหญ่จะทำได้ช้า (หรือไม่ได้รับการแก้ไข) เนื่องจากภาวะขาดแคลนนักแก้ไขการพูด

วัตถุประสงค์และวิธีการ: ค่ายฝึกพูด 4 วัน และการติดตามค่าย 1 วัน ได้ถูกจัดขึ้นโดยยึดรูปแบบการบริการชุมชนสำหรับความผิดปกติของการพูดในเด็กปากแหว่งเพดานโหว่ เด็กปากแหว่งเพดานโหว่ 13 คน (อายุ 3 ปี 6 เดือน-13 ปี) เข้าค่ายฝึกพูด 4 วัน และการติดตามค่าย 1 วัน (หลังจากค่ายฝึกพูด 6 เดือน) การประเมินทั้งค่าใช้จ่าย และระยะเวลาในการเข้าค่ายฝึกพูด 4 วัน และการติดตามค่าย 1 วัน เปรียบเทียบกับค่าใช้จ่ายและระยะเวลาในการไปรับการแก้ไขการพูดจากศูนย์ให้บริการการแก้ไขการพูดที่ใกล้ที่สุด

ผลการศึกษา: ค่าเฉลี่ยของงบประมาณในการจัดค่ายฝึกพูด 4 วัน และการติดตามค่าย 1 วัน คือ 13,629.04 บาท/เด็ก 1 คน (412.82 ดอลลาร์/เด็ก 1 คน โดยมีอัตราแลกเปลี่ยน 33 บาท = 1 ดอลลาร์) และใช้ระยะเวลาในการรับบริการนาน 6 เดือน สำหรับค่าใช้จ่ายในการไปรับการแก้ไขการพูดจากศูนย์ให้บริการการแก้ไขการพูดในโรงพยาบาลที่ใกล้ที่สุดคือ 129,112.08 บาท/เด็ก 1 คน (3,912.49 ดอลลาร์/เด็ก 1 คน) และใช้ระยะเวลาในการไปรับบริการนาน 4-5 ปี จึงจะได้ผลการรักษาเท่ากับการรับบริการจากการเข้าค่ายฝึกพูด 4 วัน และการติดตามค่าย 1 วัน ซึ่งให้เห็นว่าการเข้าค่ายฝึกพูด 4 วัน และการติดตามค่าย 1 วัน ประหยัดงบประมาณมากกว่า 1 ล้านบาท (~1,386,252.46 บาท หรือ 42,007 ดอลลาร์) ยิ่งไปกว่านั้นเด็กปากแหว่งเพดานโหว่เหล่านี้ไม่ต้องเผชิญกับปัญหาการพูดไม่ชัดแบบซดเซยที่มีอยู่เป็นเวลานานซึ่งจะซับซ้อน และยากต่อการแก้ไข

สรุป: ค่ายฝึกพูด 4 วันและการติดตามค่าย 1 วันมีความคุ้มค่าในการแก้ไขปัญหาการขาดแคลนการบริการด้านแก้ไขการพูดสำหรับเด็กปากแหว่งเพดานโหว่ในประเทศไทย
