

Speech Therapy for Children with Cleft Lip and Palate Using a Community-Based Speech Therapy Model with Speech Assistants

Kalyanee Makarabhirom PhD*, Benjamas Prathanee PhD**,
Ratchanee Suphawatjariyakul MA***, Phanomwan Yoodee MSc****

* Department of Communication Sciences and Disorders, Faculty of Medicine, Ramathibodi Hospital, Mahidol University, Bangkok, Thailand

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

*** Department of Otolaryngology, Saraburi Hospital, Saraburi, Thailand

**** Northern Women's Development Foundation, Chiang Rai, Thailand

Objective: Evaluate the speech services using a Community-Based Speech Therapy model by trained speech assistants (SAs) on the improvement of articulation in cleft palate children.

Material and Method: Seventeen children with repaired cleft palates who lived in Chiang Rai and Phayao provinces were registered to the camp. They received speech therapy with a 4-day intensive camp and five follow-up camps at Chiang Rai's The Young Men's Christian Association (YMCA). Eight speech assistants (SAs) were trained to correct articulation errors with specific modeling by the speech-language pathologists (SLPs). SAs encouraged family members to stimulate their children every day with speech exercise at home. Each camp was covered with a main speech therapy and others supported by the multidisciplinary team, as well as, discussion among SLPs, SAs and the care givers for feedback or difficulties.

Results: Results showed a sufficient method for treating persistent speech disorders associated with cleft palate. Perceptual analyses presented significant improvement of misarticulation sounds both word and sentence levels after speech camp (mean difference = 1.5, 95% confidence interval = 0.5-2.5, p-value <0.01; mean difference = 2.5, 95% confidence interval = 1-3, p-value <0.001, respectively).

Conclusion: The Community-Based Speech Therapy model is a valid and efficient method for providing speech therapy in cleft palate children.

Keywords: Speech therapy, Community-based speech therapy, Cleft Lip/Palate

J Med Assoc Thai 2015; 98 (Suppl. 7): S140-S150

Full text. e-Journal: <http://www.jmatonline.com>

In many patients with cleft lip and palate, speech problems can persist after the surgical treatment. Research has demonstrated that many children remain affected by speech disorders such as misarticulation (51-63%)⁽¹⁾, hypernasality (20-30%)⁽²⁾ and voice disorders (12.5%)⁽³⁾. The estimation is that 92% of the patients experience speech or language delays at some point in their development⁽⁴⁾. The overall need for speech therapy is pegged at 49% of the patients⁽⁵⁾. It is important to ensure that the patients have on time access to speech therapy^(6,7). However, economical and geographical variables affect the distribution of speech therapy in different countries. As in the Southeast Asian country of Thailand, there are a limited number of

speech-language pathologists (SLPs) who can provide quality speech therapy services for these patients. Currently, there are only 63 SLPs for a multi-ethnic population of 67 million, spread out over a geographically varied country with some areas that are difficult to access⁽⁸⁾ (27 at government and 18 in private hospitals in Bangkok, 16 in rural areas including one in the North East whereas none in the province of Chiang Rai)⁽⁹⁾. There is quite some income disparity in Thailand and many families with children with cleft lip and palate live in economically disadvantaged regions⁽⁶⁾. Particularly, the Northeast and North regions have limited access to health services⁽⁸⁾. To overcome these challenges, surgical treatment is often achieved with mobile surgical services from public and private organizations⁽⁶⁾. The overall situation and the service delivery challenges are not unique to Thailand, and many low to middle income countries still lack of speech therapy services and qualified SLPs⁽⁹⁾.

Correspondence to:

Prathanee B, Department of Otorhinolaryngology, Faculty of Medicine, Khon Kaen University, Khon Kaen 40002, Thailand, Phone: +66-43-363565
E-mail: bprathanee@gmail.com

According to projections, this personnel shortage will persist for the next 10 years^(8,9). In order to overcome the challenge of providing speech therapy in rural areas, focused and intensive community-based speech camps have been developed^(6,9). Each project (held in Amnatchareon, Suwanaphum (Roi Et), Mahasarakham and Nakhon Si Thammarat) was more effective than therapy in the hospital. It also had the function as training camp for healthcare providers⁽¹⁰⁾. These speech camps showed a statistically significant decrease in the number of misarticulations^(10,11). Similar speech camps have been used in other countries. For example, in Mexico, Pamplona, et al⁽¹²⁾ provided a group therapy for children with cleft lip and palate for four hours per day, five days a week, for three weeks. The speech outcomes for these patients were not different from the patients who had been seen in a traditional speech clinic, twice a week continuing for 12 months. Even though these projects were encouraging as a model to distribute care to underserved regions, they still did not address the dearth of qualified SLPs. The current study investigated whether community-based speech assistants could be used to bridge this gap⁽⁶⁾. This idea was grounded in the principles of Community-Based Rehabilitation, Primary Health Care System, and Institute Medical Approaches^(6,9). In the present study, this new approach was put to a test in the Chiang Rai and Payao provinces in the Northern Thailand.

Material and Method

The protocol was approved by the Institutional Review Board, the Faculty of Medicine, Ramathibodi Hospital, Mahidol University, Bangkok, Thailand. A number of stakeholders were involved in the planning of this research project, including 32 representatives from 13 hospitals in the Chiang Rai and Phayao provinces, as well as three each from associations of village health volunteers, the Chiang Rai Red Cross and the Chiang Rai Special Education Center. After meetings with these stakeholders, the research team selected qualified individuals to be trained as speech assistants (SAs) for the speech camps. Therefore, eight qualified SAs were chosen. Three SAs were from Phayao province and the remaining were from Chiang Rai province. All SAs were qualified to work as allied health professionals and lived in the same areas as the patients. They were able to implement the therapy program in a series of home visits once a week and at least three times a month. The SAs were assigned for up to three patients each. They were also required to participate in

an intensive four-day speech camp and five follow-ups.

Participants

Twenty children with cleft palate who were receiving ongoing support from the Northern Women's Development Foundation (NWDF) participated in this study. Of these 20 initial participants, two children (C008, C014) withdrew from the study at the beginning of the camp and one child (C016) moved before the follow-ups and was unable to continue the study. Completed data were obtained from 17 children. Of these, 15 children were Thai and two were Akha. None of the participants had other neurological disorders, genetic syndromes, or other disabilities.

Procedures

The speech camp and the follow-up meetings were based at the Chiangrai, Young Men's Christian Association (YMCA), which is a community center that runs social programs. One intensive speech camp of four days and five follow-up camps in a bi-monthly intervals took place. Three types of activities were provided in the speech camps. The main activity was speech therapy, which took six hours per day. The other two activities were run and supported by the multidisciplinary care and the recreation team. Multidisciplinary care was also allocated to each follow-up camp i.e. growth development assessment by a pediatrician, dental assessment and education by a dentist and an orthodontist, general health care and cleft care by a nurse, as well as appearance and/or structural assessment by a plastic surgeon.

On the first day of an intensive speech camp, there were morning nine stations with the activities of 1) patient registration and photography, 2) history taking by the NWDF staff, 3) a pre-test for basic knowledge by the SLP team, 4) ENT examination, 5) hearing screening test by an audiologist, 6) four simple phrases articulation screening, 7) oro-facial examination, 8) speech and language screening test, and 9) perceptual evaluation of standard articulation and resonance assessment. In the afternoon sessions, there were seven stations, one station for perceptual evaluation of articulation and resonance test and six stations for speech therapy.

Assessment

To assess overall speech acceptability, a phrase-level articulation screen with a four-phrase test was carried out in a quiet room and recorded with a

Panasonic video camera (Model AG-HPX250, EN) by one of the SLPs. An oro-facial examination was undertaken by the third author and a speech and language screen was done by one of the expert SLPs in our team.

The standard articulation and resonance test were done by the first and second author using Test for Hypernasality Audible Nasal Emission/Turbulence/Consonant Error: Single word and Sentence⁽¹⁴⁾. As well in the articulation screen and as in the standard test, all subjects were asked to name the picture or read out loud in both single word and sentence which contained (in initial and final position) consonant and vowel sounds or imitate from the SLP if they could not name or read it. Resonance using a five-point ordinal scale which -1 = hyponasality, 0 = normal, 1 = mild, 2 = moderate, and 3 = severe.

The remaining three days were occupied with the intensive speech therapy sessions by seven SLPs at seven stations including one recreation station.

During the speech therapy sessions provided by the SLPs, each patient was accompanied by a female member (usually the mother) and an assigned SA. The average number of sessions was three-four times per day and took 30-45 minutes. The sessions focused on correcting articulation errors based on the patient's individual articulation assessments. It was provided by the SLP and observed by the patient's family member and designated SA. The focus of the therapy session was on one or two target sounds. The treatment followed a hierarchy approach starting with nonsense syllables, words, phrases, sentences, reading and conversational levels. Due to their exercise notes, all patients received the same treatment at different stations and the same number of therapy sessions. After the last session of each intensive and follow-up camp, therapy goals and strategies were discussed with the SAs and the patients' guardians.

The children received this conventional speech therapy at the camp, home, the local hospital, or at school. After the speech camp, each patient learned to differentiate and correct articulation errors with specific modeling by the SLP as well as practiced to improve articulation. When a stable improvement of target sound was noticed at $\geq 90\%$, they would move up to higher level or other sounds. The SA and the family member learned to assist the patient to do speech exercises as planned.

Follow-up examinations

To investigate the carry over of the trained

sounds of the patient's speech, follow-up examinations were carried out by the SLPs and research team. After the speech camp, 17 patients were seen every two-month interval, except three cases (C012, C013, C015) who missed out at the first follow-up since they were ill. The participants aged seven years and over were evaluated by clusters consonants with the single word and sentence items from the standardized Thai Articulation test⁽¹⁵⁾. To monitor the implementation of the therapy plan, one of our SAs and social workers who were staff of the Northern Women's Development Foundation (NWDF), a local community organization, visited and observed the therapy sessions that were stimulated by the SAs in the communities. In addition, all SAs met their patients once a week to facilitate speech exercises in a session of 30 to 45 minutes. The primary caregivers ensured that the patients did their exercises at home for about 15 to 30 minutes each day for three to four days a week. A logbook was kept to document the sessions. All information was directly reported to the researchers via e-mail. At least once a month, a progress assessment in speech therapy of each target patients was then updated by the SLPs and new exercises were then assigned and practiced.

Results

Seventeen children (eight girls and nine boys) aged between 3.4 and 14.0 years were recruited for the study. Each participant passed an otoacoustic emission, hearing screening test at 35 dB for at least one ear. Except one patient (C020) failed in both ears due to acute otitis media (Table 1). Three months after antibacterial treatment of middle ear disease related to the presence of adverse effects from medical treatment⁽¹³⁾, her hearing screening test was repeated. The result was passed in both ears.

At pre camp, speech and language screening test using scale from Language milestone in Thai children⁽¹⁶⁾ was conducted and found that three out of 17 cases (C009, C010, C019) were mild delayed language development when starting the camp (Table 2). The sample of speech characteristics were described with two cases of hoarse voice from catching cold, eight subjects had mild hypernasal sounds, two cases of these resonance disorders (C001 had moderate hypernasality and variable nasal air emission (NAE) and C006 had moderate hypernasality and pervasive NAE), three cases presented mild facial grimace, and five cases demonstrated mild unacceptable speech or speech deviated from normal to a mild degree in conversation.

Table 1. General information of the subjects and Oro-facial examination by SLP

Code	Age (Y:M)	gender	diagnosis	Oro-facial examination					OAE: Hearing Screening		
				Lips	Nose	Fistular	Soft Palate	Dental	Others	Rt Ear	Lt Ear
C001	14:0	Girl	Cleft soft palate	good S&F	good S&F	-	- Short palate - Slightly movement	- Dental caries	Poor tongue tip forming when protruded	Fail	Pass
C002	7:4	Girl	Rt CLP	Contour: flat	Contour: flat	-	good S&F	- Class III	-	Pass	Pass
C003	10:11	Boy	Bilat CLP	- Scar: node - Contour: flat	good S&F	-	good S&F	- Class III	-	Pass	Pass
C004	7:11	Boy	Lt CLP	- Scar: node - Contour: collapse	good S&F	-	good S&F	- Dental caries - Class III	-	Pass	Pass
C005	8:5	Boy	Lt CLP	good S&F	- Scar: node - Contour: collapse	Size 3x3 mm. at anterior	good S&F	- Class III	- Mild tongue tie	Pass	Fail
C006	9:7	Boy	Bilat CLP	- Asymmetry - Contour: flat	Contour: flat	Size 2x2 mm. at midline	good S&F	- Dental caries Class III	- Alveolar cleft	Pass	Pass
C007	8:7	Boy	Rt CLP	Contour: flat	Contour: collapse	-	good S&F	- Dental caries	-	Pass	Pass
C009	12:3	Girl	Bilat CLP	Contour: flat	Contour: flat	-	good S&F	good S&F	- Mild tongue tie	Pass	Fail
C010	7:4	Boy	Lt CLP	Good S&F	Contour: flat	-	good S&F	- Class III	-	Pass	Pass
C011	3:9	Girl	Lt CLP	Scar: node	Good S&F	-	good S&F	- Class III	-	Pass	Pass
C012	11:1	Boy	Bilat CLP	Contour: flat	Good S&F	Size 1x2 mm. at midline	- Slightly movement	- Class III	-	Pass	Pass
C013	7:4	Girl	Lt CLP	- Asymmetry - Scar: node - Function: inadequate	Asymmetry - Contour: flat	Size 1x1 mm. at anterior	good S&F	- Dental caries - Class III	-	Fail	Pass
C015	11:9	Boy	Bilat CLP	Contour: flat	Scar: contraction	-	- Short palate - Slightly movement	- Class III - use dental appliance	- Tongue protruded - Tongue thrust swallowing	Pass	Pass

CLP = cleft lip and palate; Rt = right; Lt = left; Bilat = bilateral; good S&F = good structure and function; Class III = Class III malocclusion

Table 1. Cont.

Code	Age (Y:M)	gender	diagnosis	Oro-facial examination						OAE: Hearing Screening	
				Lips	Nose	Fistular	Soft Palate	Dental	Others	Rt Ear	Lt Ear
C016	4:8	Boy	Lt CLP	Contour: collapse	Contour: flat	Size 1x1 mm. at posterior	- Bifid uvula	- Class III	- Enlarge tonsil both side (+3)	Fail	Pass
C017	6:4	Girl	Cleft soft palate	good S&F	good S&F	-	good S&F	- Dental caries - Class III	-	Pass	Pass
C018	9:0	Boy	Rt CLP	good S&F	- Scar: node	Size 2x1 mm. at anterior	good S&F	- Dental caries - Class III	-	Pass	Fail
C019	3:4	Girl	Rt CLP	good S&F	- Contour: flat	-	good S&F	- Dental caries - Class III	-	Fail	Pass
C020	4:4	Girl	Lt CLP	- Scar: node - Contour: flat	Scar: contraction	-	- Short palate - Slightly movement	- Class III	- Enlarge tonsil both side	Fail	Fail

CLP = cleft lip and palate; Rt = right; Lt = left; Bilat = bilateral; good S&F = good structure and function; Class III = Class III malocclusion

After an intensive speech camp (four days) and five one-day follow-up camps, the results of speech sounds were based on the assessment from two experienced speech-language pathologists (the principle investigator and corresponding author's judgment was 100% in agreement with each other). The majority of participants, except C011, showed decrease in a number of error sounds. Some cases used short vowel and used [s/tc^h] due to northern dialect and omission due to ethnic dialect. Some cases presented with using co-articulatory patterns and two cases (C001, C006) showed nasalized and nasal turbulence, respectively in high oral pressure sounds. Four cases (C005, C007, C015, and C017) generalized to conversational speech with normal articulatory patterns, thus could be discharged from speech therapy (Table 3).

Descriptive analyses of the number of articulation error sounds at pre- and post-speech camps in both word and sentence levels were obtained (Table 3). An analysis of differences before and after therapy was performed with Wilcoxon signed-ranked test for perceptual assessment demonstrated statistically significant ($p < 0.05$) improvement in overall production of misarticulation sounds in word and sentence levels after therapy (Table 4).

Regarding to basic knowledge outcome evaluation of all participants (children, guardians, and SAs) between pre- and post-speech camp revealed significantly higher post-camp scores than the baseline at $p < 0.001$ (Table 5).

Discussion

The present study showed that speech correction of articulation errors in cleft palate children by trained SAs could be a sufficient method for treating persistent speech disorders associated with cleft palate. SAs taught and stimulated family members (the majority were mothers) to facilitate their kids for every day speech exercise at home. The speech outcome in cleft palate patients were articulation errors and nasal resonance, accuracy or correctness of speech sounds^(7,12). These children were able to correct their articulation with specific modeling by the SAs. The best help to improve the targeted patients' articulation is involving the mother in guiding the exercises⁽¹²⁾. Perceptual analyses showed higher numbers in correctness of speech sounds compared with baseline including an improvement in the production of misarticulation sounds in words and sentences. All delayed language development children were

Table 2. Speech and Language Characteristics of the subjects

Code	Pre camp					
	Language development	Speech characteristics				Facial Grimace
		Voice	Resonance Disorders		Acceptability	
			Resonance	Nasal Air Emission		
C001	N	N	Mod hyper	Variable	N	Present
C002	N	N	N	N	N	Absent
C003	N	N	Mild hyper	N	N	Present
C004	N	N	N	N	N	Absent
C005	N	Abnormal	N	N	N	Absent
C006	N	Abnormal	mod hyper	Pervasive	N	Absent
C007	N	N	N	Variable	N	Absent
C009	Delayed	N	N	N	N	Absent
C010	Delayed	N	Mild hyper	N	Mild unaccept	Absent
C011	N	N	Mild hyper	N	Mild unaccept	Absent
C012	N	N	N	N	Mild unaccept	Absent
C013	N	N	Mild hyper	N	N	Absent
C015	N	N	Mild hyper	N	N	Present
C016	N	N	N	N	Mild unaccept	Absent
C017	N	N	N	N	N	Absent
C018	N	N	Mild hyper	N	N	Absent
C019	Delayed	N	Mild hyper	N	Mild unaccept	Absent
C020	N	N	Mild hyper	N	N	Absent

N = normal; Mod = moderate, hyper = hypernasality, unaccept = unacceptable

stimulated by their guardians under the SLP supervision during this project period. Of those, there was only a child (C010) presented with delay in language development, in which might be influenced by his ethnic stream involvement. Thereafter, their language skills were improved to normal level^(9,12).

This model of speech camp in which children received intensive speech therapy at first visit and five follow-up camps for a period of every two months showed significantly enhanced articulation improvement. Some children were able to produce normal speech during spontaneous conversational context because they were encouraged to practice by both SAs and their family members. Some studies were reported that the mothers who became active participants during speech intervention improved their communicative style and mode of interaction, thus enhanced speech development⁽¹²⁾ and quick improvement of articulation pattern in cleft palate children⁽⁶⁾. Children's speech sound production and perception errors are related to their language, learning skills and attention^(7,17). Our current study found that one participant (C011) whose family had no educational

background, economical limitations, and short attention span were presented with a number of error sounds and showed slow progression.

According to resonance disorders in relation to the effectiveness of speech therapy, it should be considered that articulation errors are also affected from velopharyngeal insufficiency (VPI). This disorder could reduce intelligibility and tackle normal articulatory patterns^(7,17). Some cases presented with using co-articulatory patterns that is the one of compensatory articulation disorders in speakers with cleft palate⁽¹⁸⁾. The cleft type characteristics for co-articulations in this study were glottal stop or back velar stop for stop consonant substitution and lingual place target phoneme that shifted posteriorly due to velopharyngeal inadequacy, resulting in a very prolonged period of speech therapy^(7,12,17). Hence, to successfully treat two cases (C001 and C006) with persisted VPI problems, it is further needed to reinvestigate improper velopharyngeal structures and function by multi-disciplinary cleft team. Another concern is dialect which may also have increased opportunities for hypernasal resonance since this phenomenon is perceived in the

Table 3. articulation assessment presented in number and characteristics of error sounds; initial and final consonant in single word and sentence level (pre and post speech camp)

ID	pre speech camp (15/10/2012)					post speech camp (18/08/2013)				
	Age (Y:M)	Error sound	Single word	Sentence	remark	Age (Y:M)	Error sound	Single word	Sentence	Remark
C001	14:0	1	[l/r]	[l/r]	-	14:10	0	pass	pass	nasalized in/f, b, t, d, k, s, k, p, h, n,/inconsistency
C002	7:4	5	[l/r], [k/t]	[l/r], [s/t], [t/ t], [k/t], [i]/ [l/r], [h/t], [o:i] [uai], [i]/[au], [eu]/[iau]	-	8:2	1	pass	[co. t/t]	-
C003	10:11	5	[l/r]	[l/r]	-	11:9	1	[l/r] inconsistency	[l/r] inconsistency	-
C004	7:11	3	[l/r], [t/t], [j/d]	[l/r], [k/t]	-	8:9	1	[k/d]	[co. dk/d]	-
C005	8:5	3	[l/r], [p,w/f]	[l/r] [j/d]	-	9:3	0	pass	pass	-
C006	9:7	5	[l/r], [h/s], [s/t], [k/t], [kw/f]	[l/r], [h/s], [s/t]	NAE in /s/	10:5	2	[t/s], [l/r]	[D/s], [l/r]	- Dental lispings - Nasal turbulence in [t, s, f]
C007	8:7	2	[l/r], [k/s]	[l/r], [k/s]	- Dental lispings	9:5	0	pass	pass	-
C009	12:3	5	[l/r], [k/d], [k/t], [k/s], [k/t]	[l/r], [k/d], [k/t], [k/s], [k/t]	-	13:1	4	[k/s], [k/d]	[k/s], [k/d], [k/t], [b/n]	-
C010	7:4	9	[l/r], [o,-k/-p], [o/-n], [p/f]	[l/r], [s/t], [o/-n], [o, -k/-p], [o/-n], [o, -k/-t], [a]/ [u]/[au]	- Omission due to dialect	8:2	4	[s/t], [l/r], [u]/[au]	s/ t, l/r, [[o/-n],	good repetition in final sound
C011	3:9	8	[l/r], [k/t]	[l/r], [o/-p], [o/-t], [o/-m], [o/-n], [ai], [w]/[iau]	-	4:8	8	[co. ts, t/s] [-n/-n], [l/r], [oj]/[uaj]	[o/-p], [o/-t], [o/-k], [o/-m], [l/r][o]/[uaj]	-

NAE = nasal air emission; co = coarticulation

Table 3. Cont.

ID	pre speech camp (15/10/2012)				post speech camp (18/08/2013)					
	Age (Y:M)	Error sound	Single word	Sentence	remark	Age (Y:M)	Error sound	Single word	Sentence	Remark
C012	11:1	8	[l/r]	[l/r], [k/t], [k/d], [k/t], [o/-t] [ia]/[a], [o]/[ua], [j]/[aj]	-	11:11	4	[k/t], [K/n], [co. kK/d]	[k/t], [w]/[ia]	
C013	7:4	5	[l/r], [s/t]	[l/r], [s/t], /ia/, /a/, [oi]/[uai], [i]/[ai]	- Dental lisping	8:2	1	[l/r] inconsistency	[l/r] inconsistency	Dental lisping
C015	11:9	2	[l/r], [w]/[ia]	[l/r]	- Dental lisping	12:7	0	Pass	Pass	
C017	6:4	1	[l/r]	[l/r]	-	7:2	0	Pass	Pass	-
C018	9:0	3	[s/t]	[l/r], [s/t], [i]/[ai]	-	9:10	1	Pass	Good repetition in [s/t]	-
C019	3:4	9	[l/r], [h/t], [p/f], [n/K], [k/t]	[p/f], [-K/-n], [uai]/[j]	-	4:2	2	[l/r], [l/d]	[l/r]	Nasalized in/f/
C020	4:0	7	[l/r], [h/t], [s/t], [j/d], [l/j]	[l/r], [h/t], [s/t], [o/-p], [k/k]	-	4:10	1	[l/r]	[l/r]	-

NAE = nasal air emission; CO = coarticulation

Table 4. Comparisons number of articulation errors pre- and post- speech camp

Parameter	Pre			Post			n	Median difference	Z	p-value	95% CI
	Median	Minimum	Maximum	Median	Minimum	Maximum					
Initial & final consonants											
Single word level	2	1	5	1	0	4	17	1.5	2.724	0.0065*	0.5-2.5
Sentence level	5	1	8	1	0	6		2.5	3.673	0.0002*	1-3

Pre = number of articulation errors in pre- articulation test, Post = number of articulation errors in post- articulation test

*Wilcoxon signed-ranked test, significant at $p < 0.05$

Table 5. Comparisons average mean and standard deviation scores of basic knowledge of all participants (children, caretakers, SA) between pre- and post- speech camp

scores of basic knowledge	M	SD	Range		t	df	p-value
			min	max			
Pre	7.97	2.220	4	12	-4.236	29	0.000*
Post	10.53	2.813	5	15			

* Paired t-test, significant at $p < 0.05$

northern, northeastern, southern languages including ethnic languages⁽³⁾. In addition, ethnic languages do not have any syllable-final phonemic consonants⁽¹⁹⁾. This language-specific articulation distortions would contribute to difficulties in evaluating speech of an unfamiliar language^(16,19).

Because of a long distance travel to the hospital with limited time and resources, this Community-based speech therapy model is more appropriated to help those children in access to speech therapy services^(6,9). This model was also able to decrease the total number of speech therapy hours. It has been addressed in saving the health care cost compared to providing speech therapy over a longterm in a hospital setting⁽²⁰⁾. Aside from those advantages, this model could be established speech therapy networking from the center to variety communities. However, if those SAs had some difficulties during speech intervention, online consultation would be an option for continuing expert support for speech therapy.

SAs were grateful in taking part in this approach for their help in improving patients' articulation. The therapy by SAs for the remaining errors in homes and school settings should be continued and as well as the training for the patient's school teachers. The parents were impressed with the process of the speech camps and both parents and SAs marked it as successful project. They would like to see this project continued to help other disadvantaged patients and recommended regular gathering of the patients. It should be organized annually to motivate each other to strengthen their quality of lives, especially on social integration.

The future studies should be concerned about those cases of VPI (Velopharyngeal Insufficiency) especially A-NAE (audible nasal air emission), they should be excluded because it might be difficult to separate from the hypernasality judgment that are affected by the experience level of the listener or

familiarity with the nasality score being assessed^(21,22). In the ratings of hypernasality, for higher accuracy level or more reliable data, it should be measured both perceptually and instrumentally with a Nasometer⁽²¹⁾.

Conclusion

To summarize, this model, based on the Community-based speech therapy by Khon Kaen model, can be a potential process for solving persistent speech disorders associated with general cleft palate. Above all, experience of organizing speech camps could be assimilated and replicated in other regions of Thailand.

Acknowledgement

This study was supported by Transforming Faces World Wide (TFW) foundation, Smile Train, Northern Women's Development Foundation, and Center for Cleft Lip and Palate and Craniofacial Deformities, Khon Kaen University in association with the Tawanchai Project. The authors would like to express special thanks to Assoc. Prof. Dr. Tim Bressmann for editing the English-language manuscript. We wish to thank the parents and children who participated in this project as well.

What is already known on this topic ?

Speech corrections for compensatory articulation errors in children with clefts were needed. However, limitations of speech services caused difficulty to access therapy in Thailand and some developing countries.

What this study adds ?

Solving limitations of speech services in clefts in Thailand by the Khon Kaen Community-Based Speech Therapy with combination of community-based rehabilitation, primary health care unit and institutional care unit was an effective way for children with clefts.

Potential conflicts of interest

None.

References

1. Schonweiler, Lisson JA, Schonweiler B, Eckardt A, Ptok M, Trankmann J, et al. A retrospective study of hearing, speech and language function in children with clefts following palatoplasty and veloplasty procedures at 18-24 months of age. *Int J Pediatr Otorhinolaryngol* 1999; 50: 205-17.
2. Kummer AW. Velopharyngeal dysfunction (VPD) and resonance disorders. In: 2. Kummer AW, editor. *Cleft palate and craniofacial anomalies: effects on speech and resonance*. San Diego, CA: Singular Press; 2001:145-76.
3. Prathanee B, Thanawirattananit P, Thanaviratananich S. Speech, language, voice, resonance and hearing disorders in patients with cleft lip and palate. *J Med Assoc Thai* 2013; 96 (Suppl 4): S71-80.
4. Schonweiler B, Schonweiler R, Schmelzeisen R. Language development in children with cleft palate. *Folia Phoniatri Logop* 1996; 48: 92-7.
5. Pamplona MC, Ysunza A, Perez G, Vergara S. Summer school speech therapy for children with cleft palate and language disorder. *Gac Med Mex* 2009; 145: 475-9.
6. Prathanee B, Dechongkit S, Manochiopinig S. Development of community-based speech therapy model: for children with cleft lip/palate in northeast Thailand. *J Med Assoc Thai* 2006; 89: 500-8.
7. Kummer AW. *Cleft palate and craniofacial anomalies: effects on speech and resonance*. 2nd ed. Clifton Park, NY: Thomson Delmar Learning; 2008.
8. Thai Speech and Hearing Association. *A directory of speech pathologist audiologist, medical scientist in audiology and audio technician*. Bangkok: Thai Speech and Hearing Association; 2001.
9. Prathanee B. Development of speech services for people with cleft palate in Thailand: lack of professionals. *J Med Assoc Thai* 2012; 95 (Suppl 11): S80-7.
10. Prathanee B, Lorwatanapongsa P, Makarabhirom K, Suphawattjariyakul R, Wattanawongsawang W, Prohmtong S, et al. Speech camp for children with cleft lip and/or palate in Thailand. *Asian Biomed* 2011; 5: 111-8.
11. Prathanee B, Lorwatanapongsa P, Makarabhirom K, Suphawattjariyakul R, Thinnaitorn R, Thanwiratananich P. Community-based model for speech therapy in Thailand: implementation. *J Med Assoc Thai* 2010; 93 (Suppl 4): S1-6.
12. Pamplona C, Ysunza A, Patino C, Ramirez E, Drucker M, Mazon JJ. Speech summer camp for treating articulation disorders in cleft palate patients. *Int J Pediatr Otorhinolaryngol* 2005; 69: 351-9.
13. Lieberthal AS, Carroll AE, Chonmaitree T, Ganiats TG, Hoberman A, Jackson MA, et al. The diagnosis and management of acute otitis media. *Pediatrics* 2013; 131: e964-99.
14. Prathanee B, Lorwatanapongsa P, Anantapong D, Buakanok N. Thai speech parameters for patients with cleft palate in a universal reporting system. *Asia Pac J Speech Lang Hear* 2011; 14: 31-49.
15. Thanaratsutikul D. *Thai articulation test* [Thesis]. Bangkok: Mahidol University; 2004.
16. Lorwatanapongsa P, Isorasena T, Arsiraveth P. *Language milestone in Thai children: a report*. Bangkok. Faculty of Medicine, Chulalongkorn University; 1989.
17. Chowchuen B, Prathanee B, Ratanayatikul J. *Cleft lip-palate and craniofacial anomalies: multidisciplinary team*. 2nd ed. Khon Kaen, Thailand: Siriphan Offset Publisher; 2002.
18. Trost JE. Articulatory additions to the classical description of the speech of persons with cleft palate. *Cleft Palate J* 1981; 18: 193-203.
19. Cordero KN. *Assessment of cleft palate articulation and resonance in familiar and unfamiliar languages: English, Spanish, and Hmong* [Dissertation]. Minneapolis, MN: University of Minnesota; 2008.
20. Prathanee B. Cost effectiveness of speech camps for children with cleft palate in Thailand. *J Med Assoc Thai* 2011; 94 (Suppl 6): S33-9.
21. Lewis KE, Watterson TL, Houghton SM. The influence of listener experience and academic training on ratings of nasality. *J Commun Disord* 2003; 36: 49-58.
22. Makarabhirom K, Prathanee B, Suphawattjariyakul R, Lorwatanapongsa P, Thinnaitorn R, Manochiopinig S. Agreement of listening judgement of articulation errors in people with cleft lip-palate by paraprofessionals. *Chiangrai Med J* 2010; 2: 25-34.

การฝึกพูดเด็กปากแหว่งเพดานโหว่ตามรูปแบบการฝึกพูดแบบชุมชนโดยผู้ช่วยฝึกพูด

กัลยาณี นกรากิรมย์, เบญจมาศ พระธานี, รัชณี สุภวัตรจริยากุล, พนมวรรณ อยู่ดี

วัตถุประสงค์: เพื่อประเมินค่ายฝึกพูดตามรูปแบบการฝึกพูดแบบชุมชนโดยผู้ช่วยฝึกพูดที่ผ่านการอบรมด้านการแก้ไขการพูดไม่ชัดในเด็ก ที่มีภาวะเพดานโหว่
วัสดุและวิธีการ: เด็กจำนวน 17 คน ในจังหวัดเชียงรายและพะเยาหลังได้รับการผ่าตัดปิดเพดานโหว่แล้ว ได้รับการฝึกพูดจากการเข้าร่วมค่ายฝึกพูดแบบ
เข้มข้น 4 วัน 1 ครั้ง และการติดตามค่าย 1 วัน จำนวน 5 ครั้ง ที่วายเอ็มซีเอจังหวัดเชียงรายโดยผู้ช่วยฝึกพูดจำนวน 8 คน ที่ผ่านการอบรมด้านการแก้ไข
การพูดไม่ชัดในเด็กที่มีภาวะเพดานโหว่จากนักแก้ไขการพูด ในการกระตุ้นสมาชิกในครอบครัวช่วยฝึกพูดเด็กที่บ้านทุกวัน ซึ่งค่ายฝึกพูดแต่ละครั้ง
ประกอบไปด้วยการฝึกพูดเป็นหลักร่วมกับการดูแลจากทีมสหวิชาชีพ และมีการอภิปรายเกี่ยวกับการสะท้อนปัญหาทั้งในกลุ่ม ผู้ช่วยฝึกพูดและผู้ดูแลเด็ก
ผลการศึกษา: ผลการศึกษาพบว่าการฝึกพูดด้วยวิธีนี้ช่วยแก้ไขความผิดปกติทางการพูดในเด็กที่มีเพดานโหว่ โดยจากการวิเคราะห์ด้วยการฟังพบว่า
เด็กพูดได้ชัดขึ้นอย่างมีนัยสำคัญทางสถิติทั้งในระดับคำและระดับประโยค (mean difference = 1.5, 95% confidence interval = 0.5-2.5, p-
value <0.01; mean difference = 2.5, 95% confidence interval = 1-3, p-value <0.001 ตามลำดับ)

สรุป: การฝึกพูดตามรูปแบบการฝึกพูดแบบชุมชนเป็นวิธีการมีคุณค่าและมีประสิทธิภาพในการฝึกพูดให้กับเด็กที่มีเพดานโหว่
