A Cross-sectional Survey of Rehabilitation Service Provision for Children with Brain Injury in Selangor, Malaysia

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ABSTRACT

Purpose: *Rehabilitation services in Malaysia are provided by both governmental and non-governmental agencies but there are challenges, such as the lack of integration between agencies, and accessibility barriers to services especially for the population of urban poor and people in the rural areas. With the help of a survey, this project aimed to gain a better understanding of rehabilitation services provided for children with brain injury within the state of Selangor and Federal Territories of Kuala Lumpur and Putrajaya.*

Method: *A list of 205 organisations that provide rehabilitation services for children with neurological injuries was compiled. The researchers attempted to verify the services by visiting the facilities or via telephone or email communication if visits were not possible.*

Results: *The researchers were able to verify 83% of the organisations identified. There are 40 hospitals and 17 service providers for acute and/or chronic physical rehabilitation services for persons with disabilities of all ages, including children.*

Conclusion: *Findings showed the unequal distribution of rehabilitation service provision by districts. Service providers were concentrated in the urban areas. Setting up new healthcare facilities is one of the solutions but the costs for development, construction, and manpower could be high. An alternative solution is proposed, namely, the use of a home-based virtual rehabilitation programme.*

Key words: *availability, accessibility, unequal distribution*

INTRODUCTION

Effective physical rehabilitation requires active and repetitive training (Ministry of Health, 1999; Galvin et al, 2011) although the training parameters in various

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rehabilitation programmes differ in terms of intensity, types of therapy, duration of training, and training conditions. Hellweg and Johannes (2008) concluded from their systematic review that intensive rehabilitation programmes result in earlier and better functional abilities among clients with traumatic brain injury or TBI. The guideline from Virginia Health System (Virginia Commonwealth University Medical Centre, 2014) suggests that acute rehabilitation should involve 30 - 90 minutes of therapy per day, five to seven days a week, and outpatient therapy should involve 30 - 120 minutes of therapy per day, three days a week. This would necessitate frequent professional inputs and many contact hours to achieve the optimum outcome. Unfortunately, this kind of intensive rehabilitation is not always achievable given the current rehabilitation resources.

This paper focusses on the provision of physical rehabilitation services in Malaysia. The following section discusses the current situation of rehabilitation service provision, specifically about what the public and private healthcare sector can offer. Subsequently, the issue of availability is illustrated through the gap between the demand for services and the restrictions within the health workforce; while the issue of accessibility to healthcare services is exemplified by the physical barriers such as distance to healthcare facilities and lack of transportation.

Service Provision in Malaysia

Rehabilitation services in Malaysia are provided by both governmental and non-governmental agencies. Public and private hospitals, health clinics, Community-based Rehabilitation (CBR) centres, and non-government organisations (NGOs) provide various levels of services - from consultation, treatment, acute and chronic interventions to home-intervention. The challenges pertaining to these service provisions are the lack of integration between agencies, the availability of services and skilled professionals, accessibility barriers to services especially for the urban poor population and people living in rural areas, and affordability of services (Amar, 2008; Balakrishnan and Kumaresan, 2014; Dzalani and Shamsuddin, 2014). This paper lays emphasis on the availability and accessibility of the rehabilitation services. Availability of healthcare refers to the adequacy of the supply of services and resources to meet the needs of clients (Penchansky and Thomas, 1981). Accessibility refers to the ease of access to the location of service provisions, taking into consideration other logistics factors such as distance, transportation resources and travel time (Penchansky and Thomas, 1981).

Within the public sector, rehabilitation services such as physiotherapy or occupational therapy are mainly available at state and national hospitals, and at certain district hospitals. Although not all hospitals have rehabilitation wards, they would have rehabilitation units providing outpatient services. CBR centres have been set up nationwide as a 'one-stop' generalist centre for persons with disabilities. The services provided include diagnosis, rehabilitation, treatment, special education and vocational training. However, the available services vary from centre to centre, depending on the availability of funding and trained staff or therapists. In fact, many centres were underperforming due to the lack of skilled manpower supply (Balakrishnan and Kumaresan, 2014).

Most private hospitals do offer various rehabilitation services, depending on the size and structure of the healthcare facilities. As for the NGOs, many centres are set up with the aim of providing early intervention, learning, training programmes and rehabilitation services for persons with disabilities, inclusive of children. However, the services offered lay emphasis on early intervention and education training, with less physical rehabilitation services. The actual number of services is not available as there is still a lack of integration between relevant stakeholders (Amar, 2008; Balakrishnan and Kumaresan, 2014).

The improvement in the Malaysian healthcare sector has led to a decline in the mortality rate. Advances in technology and medical services have resulted in individuals surviving from severe injuries, unlike before. However, these survivors are left with more severe and complex disabilities. Consequently, the demand for rehabilitation has increased (Ministry of Health, 2010a). There is a considerable lack of physiotherapists and occupational therapists (Ministry of Health, 2010b, 2017a) due to the low intake of trainees for training (Ministry of Health, 2010a). In addition, training is long and once training is completed the lure of the private sector is stronger. This has further contributed to the imbalanced distribution of manpower (Ministry of Health, 2010b). The high demand, coupled with the continual migration of clinicians from the public to the private sector, has resulted in a heavier workload for an already stressed public sector which currently caters to 60% of the population. Consequently, public healthcare is struggling to ensure sufficient contact time with clients (Ministry of Health, 2010b).

It is estimated that approximately 80% of people with disabilities worldwide live in low- and middle-income countries, with only 2% having access to rehabilitation services (Puvanachandra and Hyder, 2009). In addition, the geographical dispersion of population, especially in rural areas and in developing countries,

poses another important logistics problem in accessing healthcare services. Allied health professionals including physical therapists are generally available at urban centres (Barnes, 2001; World Health Organisation, 2011). Lack of transportation is another common barrier in accessing healthcare, and the impact of transportation barriers may be higher among persons with physical disability and impaired mobility. The limited access to healthcare services outside of urban areas makes it costly and impractical for rural communities (Bury, 2005; World Health Organisation, 2011). In Malaysia, about 32% of the total population lives outside major cities, hence the lower levels of accessibility to healthcare services (Ministry of Health, 2010a).

The inadequate services, lack of professionals and resources, and the physical and communication barriers, coupled with the high demand for rehabilitation services, have compromised the ability of current healthcare service providers to deliver optimum rehabilitation. Improvement, expansion and diversification of the current healthcare system are necessary to ensure improved accessibility to healthcare services and to ensure its effectiveness (Ministry of Health, 2010b). Therefore, proper planning, design and implementation of a healthcare system are fundamental to maximise its potential.

Objective

This project aimed to review the provision of physical rehabilitation services for children with brain injury so that the information gained could contribute to better rehabilitation planning by the relevant stakeholders.

METHOD

Setting

The survey was carried out from January to April 2014, within the state of Selangor and Federal Territories of Kuala Lumpur and Putrajaya (SFT) in Malaysia.

Design

It was designed to gather information regarding the provision of physical rehabilitation services within SFT. A list of organisations that provide services for children with neurological injuries was compiled. Multiple means were employed to identify and list the service-providers through researchers' knowledge, internet

searches and the snowball sampling method. The organisations were categorised as hospital, government, or non-governmental centres.

Procedure

The researchers decided on a list of questions for the survey (see Appendix). The questions included some basic organisational details, to identify target group(s) and services offered, funding sources, and human resources information if available. The same document was used as a template to record the information gathered throughout the survey.

Inclusion criteria:

(i) Public/ private hospitals which provide medical services including rehabilitation;

(ii) Rehabilitation centres;

(iii) Non-governmental organisations involved in rehabilitation;

(iv) Organisations based within SFT.

Exclusion criteria:

(i) Specialty hospitals, e.g., maternity hospitals and dialysis centres;

(ii) Non-governmental organisations which provide care and services solely for orphans, underprivileged individuals, and/or old folks;

(iii) Organisations based outside SFT.

A list of service-providers was compiled before executing the survey. Information related to services provided by hospitals and CBR centres were obtained from the respective websites. On the assumption that hospitals and CBR centres under the public sector are genuine establishments, the researchers attempted to verify information related to non-governmental agencies only. Thus, the researchers started by contacting the centres for an appointment to visit the facility whenever possible. If visiting was not possible, attempts were made to obtain information via telephone or email communication.

Data Analysis

All information gathered through the survey was tabulated in Microsoft Excel. Frequency analysis was conducted to obtain an overview of data collected.

Since this survey included all types of rehabilitation services for children with neurological disabilities, the data relevant to physical rehabilitation was extracted subsequently. Further analysis was conducted to examine the distribution of services within SFT, using the estimated incidence of children with brain injury (Tay et al, 2016) and the reported population density per district (Department of Statistics, 2015) as reference points.

RESULTS

The researchers attempted to verify all the NGOs (N=205) within the survey period. The 50 establishments that were already known to the researchers were not contacted. The remaining 151 establishments were contacted either via telephone or by email, and subsequently 59 of them were visited. The services of some centres were not verified as they were not cooperative or were unwilling to share information with the researcher. Despite their best efforts, the team was not able to verify 35 (17%) non-governmental organisations or associations identified (Figure 1).

Figure 1: Progress of Survey – Flowchart depicting Number of Centres verified or not verified

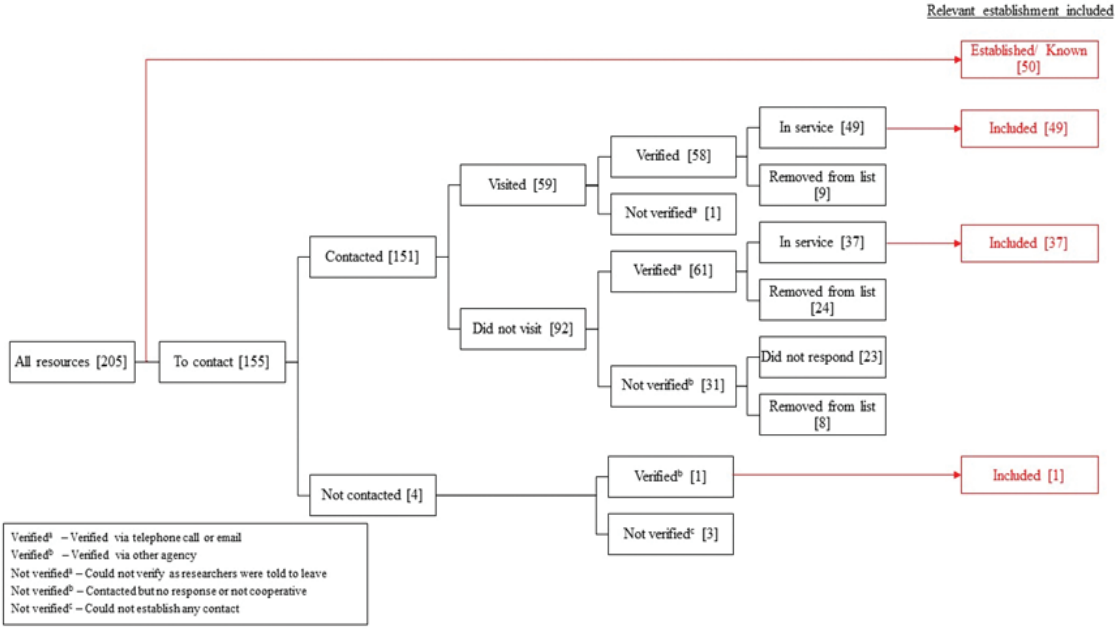


Table 1 shows the public and private hospitals and non-governmental centres that are providing rehabilitation services for children with brain injury, and their financial set-up according to districts. There are 40 hospitals and 17 service providers offering acute and / or chronic physical rehabilitation services for individuals of all ages, including children within SFT. Of the 17 NGOs, only three centres were not-for-profit centres. The Federal Territory of Kuala Lumpur and Petaling district have the highest number of services. Despite the number of services, the majority were from fee-for-service providers. Furthermore, there were no rehabilitation services in the Kuala Selangor district and Sabak Bernam district.

Table 1: Rehabilitation Services and Financial Set-Up

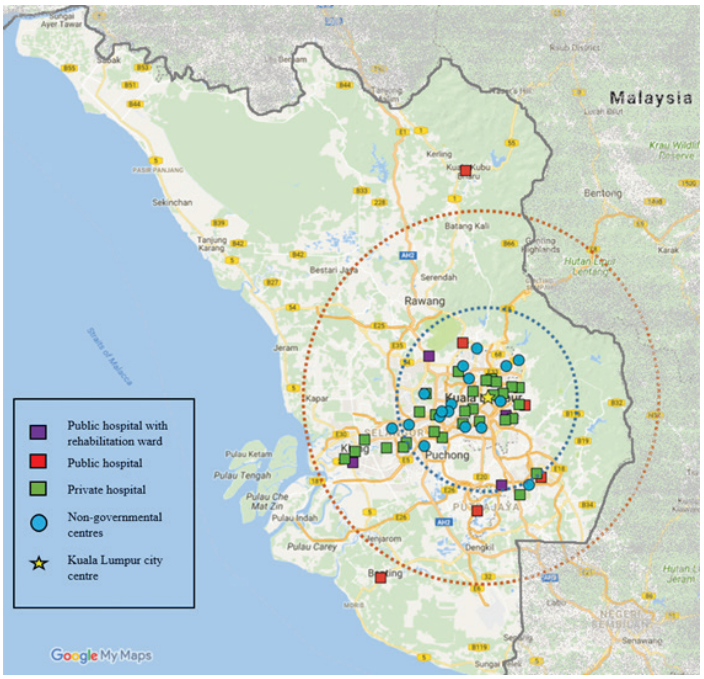
	Public hospital	**Private hospital**	**Non-governmental centre/ association**		**Total (%)**	**Ratio Centre: Client**
	Not FP*	FP	Not FP	FP		
Kuala Lumpur	2	14	1	5	22 (38.6%)	1:2
Petaling		9	2	7	18 (31.6%)	1:2
Hulu Langat	3	2		1	6 (10.5%)	1:5
Klang	1	3			4 (7.0%)	1:6
Gombak	1			1	2 (3.5%)	1:9
Kuala Langat	1				1 (1.8%)	1:7
Kuala Selangor					0 (0%)	0
Sepang†	2	1			3 (5.3%)	1:2
Hulu Selangor	1				1 (1.8%)	1:6
Sabak Bernam					0 (0%)	0
Total (FP)		29		14		
(Not FP)	11		3			
					57 (100%)	

*FP = For profit.

†Hospital Putrajaya is included based on the geographical location.

Figure 2 shows the distribution of rehabilitation services with Kuala Lumpur set as the centre for reference. Approximately 83% of these hospitals and centres are located within a 20 kilometre (km) radius from Kuala Lumpur and 97% are located within a 40 km radius from Kuala Lumpur (Figure 2). There are only two district hospitals (3%) that provide rehabilitation services that are located more than 40 km away from the city centre. This implied that service provisions were not evenly distributed or easily accessible.

Figure 2: Distribution of Rehabilitation Services



The unshaded area represents the state of Selangor and the Federal Territories of Kuala Lumpur and Putrajaya. The blue circle indicates a 20 kilometres radius and the orange circle indicates a 40 kilometres radius from Kuala Lumpur city centre.

Despite the concentration of service providers in districts with high population density and higher incidence, such as Petaling, Klang, Gombak and the Federal Territory of Kuala Lumpur, the number of clients per centre demonstrates the unequal distributions of services, with centre to incidence ratio ranging from 1:2 to 1:9 (Table 1). The centre to client ratio of 1:2 in the Federal Territory of Kuala Lumpur and Petaling districts suggests that these two districts have relatively

more rehabilitation centres, even with their higher incidence rates, as compare to other districts. In contrast, other districts with high population density such as Klang and Gombak had the ratio of 1:6 and 1:9, implying the rehabilitation service centres in these two districts cater for 3 to 5 times more clients than in the Federal Territory of Kuala Lumpur and Petaling districts.

DISCUSSION and IMPLICATIONS

This survey highlighted the unequal distribution of rehabilitation services within SFT. These services were not widely dispersed across the states, and most of them were located within a 20 km radius from the city centre. Subsequently, this might negatively affect the availability of and accessibility to these services for the population in need of rehabilitation.

The study found that rehabilitation services were generally available in hospitals and health centres that were situated relatively close to the city centre, while there is limited provision in the suburban or rural areas, leading to unequal distribution of services. The situation is often exacerbated by skills shortages. It was beyond the scope of the research team to obtain further information on the therapist to client ratio in these identified centres and hospitals. However, according to Malaysia's Health Human Resources report, there were only 4.5 and 3.4 physiotherapists and occupational therapists respectively per 100, 000 population in 2014 (Pathmanathan, 2015). This ratio was way below other countries such as Singapore, with a ratio of 30 per 100, 000 population (Ministry of Health Singapore, 2017), and Australia, with a ratio of 121 per 100, 000 population (Physiotherapy Board of Australia, 2017). The under- provision will be more glaring if one compares the health expenditure as a percentage of gross domestic product (GDP) (World Health Organisation, 2017b). Total health expenditure of GDP was 9.4% in Australia, yet understaffing of allied health professionals was still evident (Adams et al, 2015). In comparison, Malaysia had a total health expenditure of GDP of 4.2%, thus understaffing was expected to be more prominent.

Accessibility barriers due to travel distance were observed in this study. In cases where individuals live at a distance from the urban centre, the travel distance to the service providers can be as much as 60 - 100 km or more, depending on the route taken. Although the national average travel distance from a rural household to the nearest healthcare facilities was estimated to be about 11.2 km, these rural healthcare facilities usually focus on primary care such as maternal and child

health, immunisation, nutrition, dental health, treatment of common illnesses, etc., (Ariff and Teng, 2002). Specialised healthcare services such as physiotherapy and occupational therapy are not available; hence individuals requiring such services will have to travel further, as reflected in the study. Moreover, transportation is another common barrier in accessing healthcare services, but that topic is beyond the scope of this discussion.

Findings from this survey revealed that the distribution of service provision and demand was not matched to population. The number of applicable services was highest in the 2 most developed districts, while the number decreased significantly in other urban, suburban, or rural districts. Extrapolating from current findings, it is anticipated that the disparity and inadequacy of service provisions will be greater, if not similar, in other less-developed states or regions of Malaysia. This postulation is based on two indicators, namely, the number of hospitals per population (Sivasampu et al, 2015) and population density in all states within Malaysia (Department of Statistics, 2015; Sivasampu et al, 2015). Besides the state of Penang, Selangor has the highest number of hospitals per 100, 000 population. Despite these numbers, the under-provision of applicable services has been demonstrated by this survey. Consequently, this situation is expected to be worse in other states with a lower number of hospitals per 100, 000 population or with a wider dispersion of population, notwithstanding other confounding factors.

The unequal distribution of rehabilitation service provision by districts has been highlighted in this study. In order to increase the availability of and accessibility to services, the solution is to build and set up more rehabilitation centres or hospitals that provide such services in rural areas. However, this may not be a cost-effective solution as the number of brain injury clients is relatively lower in rural areas. A proposed solution is to provide a remote-monitoring virtual rehabilitation programme. With proper planning and implementation, a remote virtual rehabilitation programme may be a better approach to reach out to the wider community and to deliver the intervention at a lower cost.

One of the ways to overcome these issues is through the use of technology. In Malaysia, there is a growing trend towards telehealth (teleconsultation), by utilising information and communication technology initiatives within the healthcare services (Ministry of Health, 2010b). Healthcare service providers are encouraged to maximise the use of information and communication technology initiatives in their operations as a means of enhancing efficiency, accessibility

and productivity (Ministry of Health, 2010b). Although this comes with a cost in training, maintenance of the system and infrastructure redesign, the direct benefits of utilising information and communication technology in healthcare services can be observed in an improved healthcare delivery system (Ministry of Health, 2010b).

CONCLUSION

A survey was conducted to understand the state of physical rehabilitation services for children with brain injury in Malaysia. The findings showed that the provision of rehabilitation services was highly concentrated in the urban areas, while the availability of services decreased by more than half in the other suburban or rural areas. From the map view, it is apparent that the majority of the services are situated close to the city centre and in the areas with larger population size. This implies the unequal distribution of services, and hence raises the issues of availability and accessibility especially to those who live some distance away from the city. Additionally, it was found that besides public hospitals, a majority of the services identified were fee-for-service. Consequently, this raises the issue of affordability among the public.

Putting together these findings, the need to increase the availability of and to improve access to rehabilitation services is important. Setting up new healthcare facilities is one of the solutions but this may incur high costs in terms of development, construction, and manpower. An alternative solution proposed in this research is the use of a home-based virtual rehabilitation programme. It is envisaged that the benefits of this solution will be multifold. The rehabilitation intervention can be delivered remotely, individuals can receive a higher amount of intervention without travelling out from home or adding to the workload of therapists, and the use of virtual reality or video games can enhance one's experience and engagement in interventions. Tele-rehabilitation is not only low cost but can also reach out to the urban poor community or rural populations without excessive financial burden.

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APPENDIX

Survey Notes

Name	
Address	
Contact	
Website	
PIC	
Email	
Hour	
Status	
Funding	
Services	
Target Group	
Number	
Staffing	
Vacancy / Waiting List	
Others	