

Development of an Acupuncture Protocol for Cerebral Palsy

Abstract

In Australia, acupuncture is not commonly employed as a rehabilitative choice for children with cerebral palsy CP, whereas in China it is a standard practice. This report provides a preliminary protocol for acupuncturists treating children with CP. It also considers the safety and efficacy of acupuncture in paediatric healthcare. The Delphi method was chosen to systematically combine expert opinions and achieve a group consensus in the formulation of a CP protocol. Acupuncture was considered by the experts to be beneficial in CP. Any adverse effects of acupuncture, as highlighted by the Delphi method, were determined to be minimal and the majority of risks able to be mitigated by appropriate training and caution, reduction in acupuncture stimulation strength, and decreased needle retention time. Further research is required to ascertain the benefits acupuncture may provide to children with CP.

Introduction

Cerebral palsy CP is a neurological disorder that affects movement and posture. It is the most common physical disability in childhood.¹ In Traditional Chinese Medicine (TCM), signs and symptoms of CP are centred around neurological deficits and muscular tone. These aspects correlate with the Kidney, Liver, and Spleen within the TCM paradigm. According to TCM theory, Kidney essence produces marrow, a combination of bone marrow, the brain and spinal cord, which when deficient may correspond to aspects of impeded neurological development seen in CP.² Similarly, Liver blood provides nourishment to the sinews and insufficient Liver blood may be related to the contractions and spasms of CP.³ Furthermore, Spleen qi is essential in both the development of muscle as well as being the foundation of qi and blood production for the body. Therefore Spleen qi deficiency and the resulting qi and blood deficiency is reflected by flaccidity and weakness in the limbs and inadequate nourishment of both brain and body.^{1, 4}

Therefore severe deficiencies of Kidney essence, Liver blood or Spleen qi, particularly at the point of conception, may result in neurological impairment, excessive or inappropriate muscular contractions, spasms, weakness, or flaccidity that are symptomatic of CP.

In China, with the modernisation of TCM concepts, a treatment plan of acupuncture combined with conventional treatment is considered the most appropriate rehabilitation strategy to overcome CP. These combined therapies dominate treatment approaches used by hospitals and national research institutes for CP.⁵

Acupuncture mechanisms

The mechanisms of acupuncture on CP are thought to primarily be a result of neural adaptation at multiple levels along the neuromuscular pathway, in addition to alterations in cortical blood flow. Prior research has suggested that acupuncture may modulate neuromuscular communications at local spinal levels through the adaptation of alpha motor neurons in spinal reflex pathways. This may reduce the co-activation of opposing muscle groups to reduce spasticity and allow for smoother muscle movement.^{6, 7}

Furthermore, preliminary reports using scalp acupuncture suggest that alterations and subsequent improvement in blood and oxygen supply to the brain may augment reparation, activation and regeneration of injured cortical neurons.⁸ Modern neuroimaging techniques, such as functional magnetic resonance imaging, transcranial Doppler sonography and single photon emission computed tomography have confirmed an increase in cerebral blood and oxygen flow in healthy subjects who receive acupuncture.⁹ However, although CP demonstrates a degree of microcirculatory disturbance and reduced blood flow velocity in cortical capillaries,⁵ it is unknown whether these results can be extrapolated to children with CP. Nonetheless, these results highlight a potential mechanism for the use of acupuncture in CP rehabilitation.

Other studies have demonstrated immediate and short-term changes of cerebral blood flow in stroke patients as a result of acupuncture therapy, including focal increases to hypoperfused areas surrounding the ischaemic lesion and sensorimotor areas, suggesting possible attempts of neural reorganisation.¹⁰ In

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addition, the activation of proprioceptive afferent neurons with acupuncture is believed to alter signals from the motor cortex and allow for greater synchronicity between motor output and sensory feedback signals.^{6,7,11} However, while studies conducted on the effects of acupuncture in stroke-related spasticity are theoretically applicable to CP patients, the results are difficult to generalise between the two conditions.

There are few clinical trials of acupuncture for the treatment of CP. A systematic review and meta-analysis¹² highlighted a number of beneficial effects of acupuncture, with or without conventional therapies; however, there was insufficient evidence to conclude overall benefit. As no acupuncture protocol has been published for the treatment of CP, the establishment of a treatment protocol is the first step to help ensure research is reproducible and provide consistency in relation to data collation and evaluation.

Method

The Delphi method was adopted in this study, which is a structured group communication process, directed by rounds of opinion and feedback. Participants were asked to answer two rounds of surveys via email. Given the prevalence of acupuncture in China, the initial questionnaires and consent forms were translated into Mandarin and sent to Chinese CP acupuncture specialists.

The first round included open-ended questions based on systematic literature reviews to allow respondents to expand upon answers and provide detailed responses. Results from participants from the first round were collated into a draft acupuncture protocol. For the second round, the draft protocol was re-circulated to the same participants with a second consent form. Participants in the second round were invited to respond to each statement by ticking 'agree', 'disagree' or 'further clarification required' and commenting as desired. Responses from the second round were then analysed to determine whether a consensus defined as an 80 per cent agreement could be reached across each protocol item. Participation in this study was voluntary and participants were not financially compensated for their time. This study was approved by the Human Research Ethics Committee at Western Sydney University (#H9877).

Results

Participants

Ten specialist clinicians were targeted and invited to participate in this study and recruited through a combination of convenience and snowball sampling methods. Six of the 10 invited experts agreed to participate in the first round Delphi questionnaire. Participants had significant post-qualification experience in acupuncture treatment for CP rehabilitation between 9 and 30 years, with a mean experience of 20 years, were employed across

four separate hospitals Nanhai Maternity and Children's Hospital [NMCH], Guangzhou First Traditional Chinese Medicine Hospital, West China Hospital of Sichuan University and Guangdong Province Zhong Shang Bo Ai Hospital and provided regular at least one session per week clinical consultations with children with CP. After the first round, four of the six participants agreed to participate in the second round. Of these four participants, three were employed at the same hospital, NMCH.

Round 1: Delphi questionnaire

Responses to the questionnaires were highly detailed and were translated into English for comparison. There were many similarities in the responses of the expert participants and a draft protocol was formulated in relation to: diagnostic pattern, acupuncture point selection, method of needling, age, intervention time and safety recommendations. However, due to discrepancies in responses regarding acupuncture point selections for particular CP symptoms, including deformities in the upper limbs, gait disturbances and associated disorders, a second round Delphi was conducted to obtain a consensus.

Round 2: Delphi draft protocol

The responses from the first Delphi round were collated and formulated into a draft acupuncture protocol for CP and provided in Chinese to the original participants for further commentary and review. Unlike the first questionnaire, the second questionnaire required participants only to indicate if they 'agree', 'disagree' or if 'further clarification was required' and to comment if necessary. Four participants of the original panel completed the second round survey with a consensus being reached. This allowed for the generation of the final protocol with standard acupoints as described in Table 2 below. Additional comments during the second round were considered useful and included as extra acupoints.

Summary features of CP protocol

Diagnosis and treatment of CP

An integrated methodology combining both TCM and conventional therapies was considered the most appropriate and beneficial approach to the diagnosis and treatment of CP. The treatment strategy was planned on the basis of both clinical symptoms and TCM pattern diagnosis.

Relative benefits

Acupuncture was considered to provide benefit for all types of CP conditions. The degree of anticipated benefit varied according to the method, duration and intensity of treatment, in addition to condition severity and patient age. Acupuncture was considered more appropriate to use in mild to moderate CP, provided that adequate duration of treatment was undertaken in combination with additional

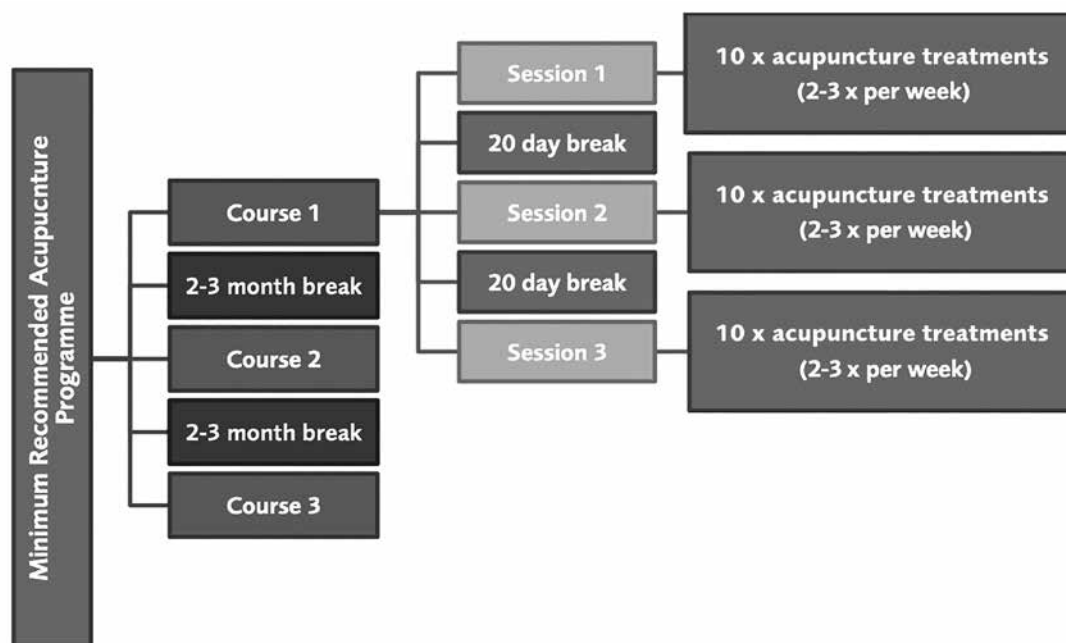


Figure 1: Delphi recommended acupuncture programme

therapeutic modalities prior to the child reaching the age of one. As a stand-alone therapy, acupuncture was not deemed sufficient to provide therapeutic benefit in CP rehabilitation.

CP diagnosis in TCM nomenclature

The Delphi survey results highlight the following as the primary TCM syndromes attributed to the symptoms of CP:

- 1 Spastic: Liver and Kidney yin deficiency.
- 2 Dyskinetic: yin deficiency causing disturbance of wind.
- 3 Ataxic: Liver and Kidney yin deficiency causing wind.
- 4 Hypotonic: Spleen and Kidney deficiency.

Commencement of treatment and duration of intervention

Acupuncture treatment can be initiated from six months of age or when CP is first diagnosed. The benefits of therapy decline with increasing age and are least effective when children are over six-years-old. Duration of acupuncture treatment programmes is dependent on the degree of ongoing symptomatic improvement; however, at least three courses of acupuncture are recommended for both acute and chronic stages of CP. Each course of acupuncture should consist of three sessions, with each session comprised of 10 acupuncture treatments administered two to three times per week. At the end of each treatment session, a recommended break of 20 days is required and following the completion of each treatment course, a two to three month break is recommended for the child to rest (see Figure 1).

Methods of acupuncture manipulation

Acupuncture needles may be inserted and removed immediately or retained for five to 30 minutes. Retention time of acupuncture needles is reduced for children below the age of one. Scalp acupuncture needles are left for 30 to 60 minutes before removal. Manipulation of needles in CP may be either manual or by means of electronic stimulation. When manipulation is manual, both body and scalp acupuncture needles should be stimulated using the 'even' method for all types of CP. This involves lifting, thrusting and rotating the needle evenly and gently at a moderate speed. In hypotonic CP, the even method of manual manipulation may be substituted for a 'reinforcing' method, which requires inserting the needle to a given depth, and rotating it gently and slowly, while thrusting the needle heavily and rapidly.

Application of electronic stimulation may be considered for both body and scalp acupuncture points; however, electronic stimulation is not recommended if a child has epilepsy, abnormal electroencephalograms, is sensitive to stimulation or feels excessive fear or tension. The relative strength of electronic stimulation should be varied in accordance with the individual tolerance of each child. Light to moderate frequencies two to 15 Hertz with intermittent wave functions dense followed by extended waves are considered appropriate in CP.

Appropriate needle size, depth and direction

Acupuncture needles between 25 to 40 millimetres long with a gauge of 0.30 millimetres are suitable for treating CP. Needle depths and directions are region-specific and insertion depths are more superficial for children below one year of age. Table 1 lists the appropriate depth range and direction of needling for different regions of the body.

Location	Depth	Needle direction
Tongue	0.1-0.2 cun	Perpendicular 90
Scalp	1-1.5 cun	Transverse-oblique 20
Neck	0.8 cun	Perpendicular 90
Abdomen	1 cun	Perpendicular 90
Upper limbs	1-1.5 cun	Perpendicular 90
Hands	0.1-0.2 cun	Perpendicular 90
Back	1-1.5 cun	Perpendicular 90, transverse-oblique 20 or oblique 45
Hips	1.5 cun	Perpendicular 90
Lower limbs	1.5 cun	Perpendicular 90
Ankle	0.5 cun	Perpendicular 90

Table 1: Appropriate regional needling depth and direction

Safety

Acupuncture was considered a safe therapeutic modality for CP when administered appropriately. The following list of conditions and scenarios preclude the use of acupuncture or restrict typical CP acupuncture methods:

- Epilepsy: acupuncture should only be applied if there have been no epileptic fits for six months or more. Electronic stimulation or strong manual stimulation is not advised and acupuncture needles should not be retained.
- Dystonic dyskinetic type CP: acupuncture needles should not be retained.
- Fever or illness: acupuncture is inadvisable if the child is not feeling well or has a fever.
- Fontanel not closed, tendency of haemorrhage, infection, tumour or recent post-operative skull defects: scalp acupuncture should not be applied.
- Tongue acupuncture needles are not to be retained.

Possible adverse effects of acupuncture in CP include local bruising, bleeding, excessive needle sensation, fainting, tension and fatigue. Recommended strategies for minimising adverse effects include reduction of stimulation strength and decreased acupuncture needle retention time.

Selection of acupuncture points

Acupuncture treatments should be based on a core formulation of acupuncture points and then individualised according to pattern differentiation and modified to accommodate changes in symptomatology, including changes in muscle tone/spasticity, posture or TCM signs and symptoms.

Specific acupuncture formulations for CP

Spasticity

The most commonly selected scalp acupuncture points include: Motor area, Balance area, Leg Motor and Sensory area. Body acupuncture: Yanglingquan GB-34 and Jiexi ST-41, Taichong LIV-3, Sanyinjiao SP-6, Taixi KID-3, Futu ST-32, Liangqiu ST-34, Shenmai BL-62, Zhaohai KID-6, Shou San Zhen and Zu Zhi San Zhen (Foot Intelligence Needles - Yongquan KID-1, Quanzhong [extra point at the midpoint of the foot in line with the tip of the second toe] and Quanzhongnei [0.8 to 1 cun lateral to Quanzhong]). To lessen spasticity

in the upper limb: Naoqing, Qiuxu GB-40, Chengshan BL-57, Kunlun BL-60, Shousanli L.I.-10, Shaohai HE-3, Jianyu L.I.-15, Waiguan SJ-5 and Yangchi SJ-4.

Dyskinesia

The most commonly selected scalp acupuncture points include: Motor area, Chorea and Tremor Control area and Balance area. Body acupuncture: Shenmai BL-62, Zhaohai KID-6, Yanglingquan GB-34, Sanyinjiao SP-6. Other acupuncture points that may also be chosen include DU-13 needles (transverse needling up the spine from lumbar to cervical region) and Ding Shen Zhen (Stabilise the Spirit Needles – a point 0.5 cun superior to Yintang [M-HN-3], plus bilateral Yangbai GB-14).

Ataxia

The most commonly selected scalp points include: Fengfu DU-16, Fengchi GB-20, Yamen DU-15. Other scalp acupuncture points chosen include Nao San Zhen (Brain Three Needles – Naohu DU-17 and bilateral Naokong GB-19), Si Shen Zhen (Intelligence Nine Needles – 1.5 cun anterior, posterior and lateral to Baihui DU-20, plus Shenting DU-24, Benshen GB-13 and Touwei ST-8), Motor area and Balance area. The most commonly selected body acupuncture points selected include: Waiguan SJ-5, Taixi KID-3, Taichong LIV-3, Sanyinjiao SP-6 and Zusanli ST-36.

Hypotonia

The most commonly selected scalp points include: Motor area and Sensory area. Other scalp acupuncture points chosen include: Balance area and Leg Motor and Sensory area. The most commonly selected body acupuncture points selected include: Zusanli ST-36 and Huantiao GB-30. Other acupuncture points that may also be chosen include: Laoshu DU-2, Yaoyangguan DU-3, Mingmen DU-4, Huatojiaji M-BW-35 points, Sanyinjiao SP-6, Yinlingquan SP-9, Xuehai SP-10, Shenque REN-8, Biguan ST-31, Futu ST-32, Liangqiu ST-34, Chengfu BL-36, Yinmen BL-37 and Weizhong BL-40.

Prescription modifications are made in accordance with TCM pathology and presenting symptomatology to enhance the efficacy of the treatment. For additional details regarding common points and additional suggested points, see Table 2.

Prescription modifications according to pathology

- The following acupuncture points may be added in addition to the point prescription:
- Spleen and Kidney yin deficiency: add Ganshu BL-18, Shenshu BL-23 and Taixi KID-3.
- Qi deficiency and blood stasis: add Qihai REN-6 and Geshu BL-17.
- Spleen deficiency with phlegm obstruction: add Pishu BL-20, Zhongwan REN-12 and Fenglong ST-40.
- Liver yin and Kidney yin deficiency: add Pishu BL-20, Shenshu BL-23, Taixi KID-3.

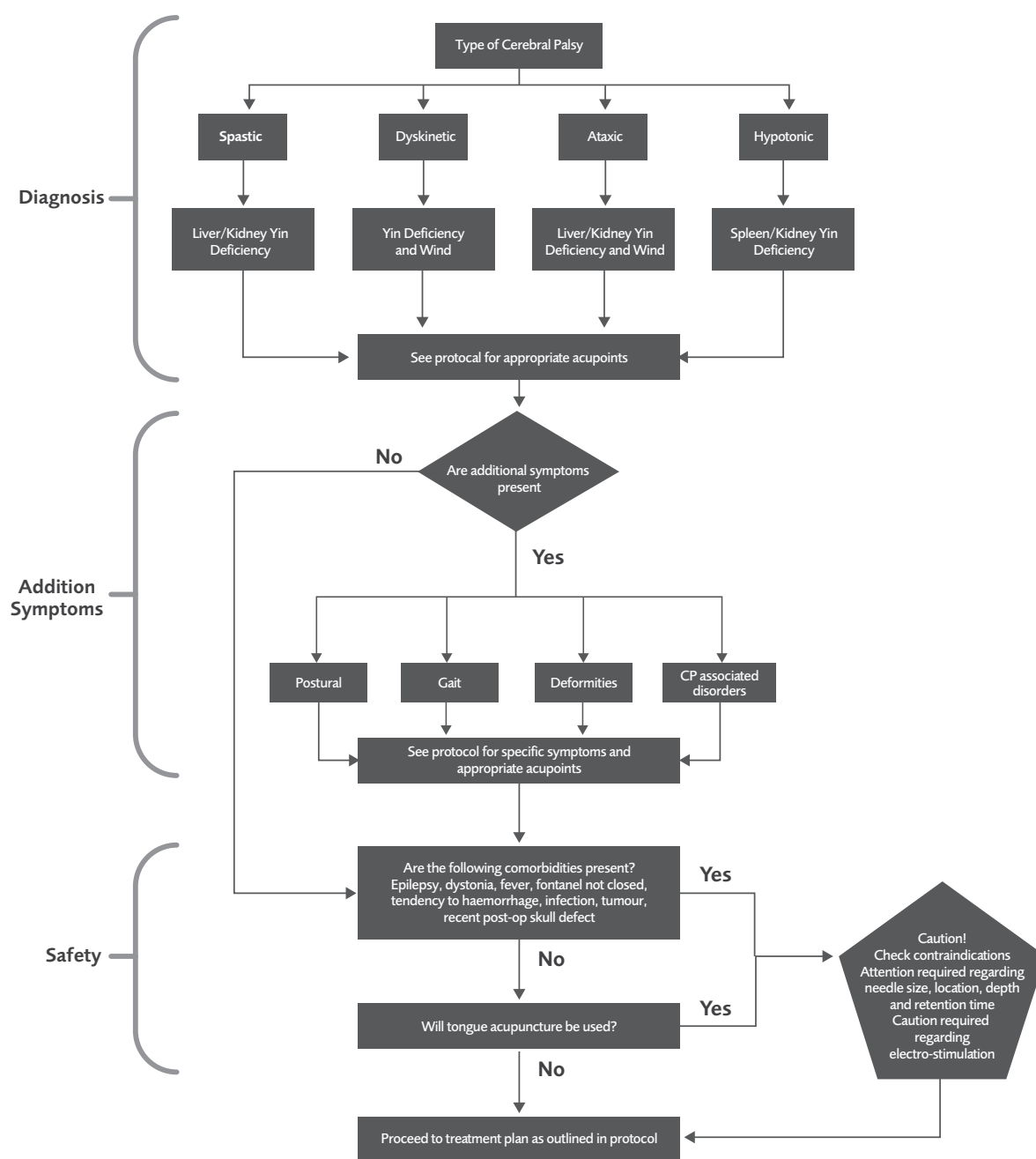


Figure 2: Protocol flowchart summary

Formulation Modification in Accordance to Symptomatology		
	Common Points (80% consensus among experts)	Other Suggested Points
<i>Postural problems</i>		
Poor head control difficulty lifting head or sustaining head position when sitting	Cervical Huatojiaji M-BW-35	Neck Three Needles (Tianzhu BL-10, Bailao [M-HN-30] and Dazhu BL-11). Jianjing GB-21, Daizhui DU-14, Tianzhu BL-10, Nao San Zhen
Control of spine posture part of sitting posture	Lumbar Huatojiaji M-BW-35, DU 13 needles	Dazhui DU-14, Zhiyang DU-9, Bladder channel local points, Nao San Zhen
Lack of balance in sitting, standing, and walking	Lumbar Huatojiaji M-BW-35, Balance area, Motor area, Sensory area, Nao San Zhen	Yaoyangguan DU-3, Mingmen DU-4, DU 13 needles, Shenshu BL-23, Dangchangshu BL-25, Shenmai BL-62, Bladder channel local points, Zhaohai KID-6, Xuehai SP-10, Zusanli ST-36, Yanglingquan GB-34, local points on affected side
<i>Deformity and dysfunction of the upper limbs</i>		
Difficulties with shoulder movement	Shoulder Three Needles (a point in the indentation below the acromion, plus two points 2 cun posterior and anterior to this), Jianyu L.I.-15	Houxi SI-3, Jianzhen SI-9, Jianqian M-UE-48, Jianjing GB-21, Binao L.I.-14
Difficulty with elbow movements	Quchi L.I.-11, Shousanli L.I.-10, Chize LU-5	Tianjing SJ-10, Binao L.I.-14, Shouwuli L.I.-13, Shaohai HE-3, Shou San Zhen (Hand Three Needles - Quchi LI-11, Waiguan SJ-5 and Hegu L.I.-4)
Difficulty rotating forearms to turn palms up and down	Waiguan SJ-5	Neiguan P-6, Shaohai HE-3, Shousanli L.I.-10, Quchi L.I.-11

Difficulty extending wrist	Daling P-7	Neiguan P-6, Laogong P-8, Yangxi L.I.-5, Yangchi SJ4, Waiguan SJ5
Difficulty extending thumb out of palm		Waiguan SJ-5, Baxie M-UE-22, Hegu L.I.-4, Yuji LU-10, Shou San Zhen, Nao San Zhen
Fisting of the hand with difficulty bending/flexing fingers to form a fist	Houxi SI-3, Wangu SI-4	Neiguan P-6, Daling P-7, Laogong P-8, Waiguan SJ-5, Baxie M-UE-22, Hegu L.I.-4
Weakness of grip difficulty in manipulating objects in the hand		Houxi SI-3, Yanggu SI-5, Wangu SJ-4, Yangxi L.I.-5, Neiguan P-6, Shousanli L.I.-10, Baxie M-UE-22, Waiguan SJ-5, Shou San Zhen, Nao San Zhen
Gait Disturbances		
Deformities of the hip joint	Biguan ST-31, Fengshi GB-31	Futu ST-32, Zhibian BL-54, Chengfu BL-36, Juliao GB-29, Huantiao GB-30, Yaoyan M-BW-24
Problems of the pelvis	Biguan ST-31, Dubi ST-35, Weizhong BL-40, Zhibian BL-54, Chengshan BL-57, Juliao GB-29, Yanglingquan GB-34, Sciatic Three Points (one point a hand width superior to the middle of the gluteal crease plus Weizhong BL-40 and Kunlun BL-60)	
Limitations in knees	Knee Three Points (Xiyan MN-LE-16, Xuehai Sp-10 and Liangqiu ST-34)	Baichongwo M-LE-34, Weizhong BL-40, Shenmai BL-62, Guangming GB-37, Qixu GB-40, Fenglong ST-40
Shenmai BL-62, Guangming GB-37, Qixu GB-40, Fenglong ST-40		
In-toeing (foot rotated inwards)	Taichong LIV-3	Guangming GB-37, Qixu GB-40, Fenglong ST-40, Shenmai BL-62
Out-toeing (foot rotated outwards)	Taibai SP-3	Yinbai SP-1, Sanyinjiao SP-6, Taichong LIV-3, Qixu GB-40
Toe walking - weight on toes	Jiexi ST-41, Qixu GB-40	Yanglingquan GB-34, Naoqing, Chengshan BL-57, Kunlun BL-60, Ankle Three Needles (Jiexi ST-41, Kunlun BL-60 and Taixi KID-3)
Limping - more weight on one foot	Xuehai SP-10, Zusanli ST-36, Nao San Zhen	Needling Gall Bladder channel points and increasing the effect of stimulation on the affected limb or needling the affected limb only.
Spastic scissor gait		Biguan ST-31, Liangqiu ST-34, Zusanli ST-36, Fenglong ST-40, Jiexi ST-41, Naoqing, Weizhong BL-40, Chengshan BL-57, Kunlun BL-60, Qixu GB-40
Toes / foot drags	Zusanli ST-36, Fenglong ST-40	Yinlingquan SP-9, Naoqing, Fenglong ST-40, Jiexi ST-41, Guangming GB-37
Waddling gait		Huantiao GB30, Chengfu BL-36, Yinmen BL-37, Weizhong BL-40, Zhibian BL-54, Kunlun BL-60, Xuehai SP-10, Lumbar Huatojiaji (M-BW-35), Nao San Zhen, Nie San Zhen (Temporal Three Needles – a point two cun superior to the apex of the ear [1.5 cun in children] with two points one cun either side)
Prescription Modifications for Associated Disorders		
Hearing deficits	Jianzhen SI-9, Tinghui GB-2, Yifeng SJ-17	Zhongzhu SJ-3, Ermen SJ-21, Xiaguan ST-7, Wangu GB-12, Naohu DU-17, Nao San Zhen
Visual impairment	Jingming BL-1, Qiuhou M-HN-8	Chengqi ST-1, Zanzhu BL-2, Guangming GB-37, Eye Three Needles (one point 0.2 cun above Jingming BL-1, another at the inferior orbital margin in line with the pupil [inserted intraorbitally], third in the superior orbital margin in line with the pupil), Nao San Zhen
Problems swallowing / chewing	Lianquan REN-23, Dicang ST-4, Jiache ST-6	Tongue Three Needles (Lianquan REN-23 plus two points 0.8 cun either side), Yifeng SJ-17, Yumen, Jinjin & Yuye M-HN-20
Speech and language problems	Lianquan REN-23	Tongue Three Needles, Yumen, Jinjin & Yuye M-HN-20, Yamen DU-15, Youmen KID-21, Yifeng SJ-17, Speech area, Nao San Zhen, Lu San Zhen (Intelligence Three Needles – Shenting DU-24 and bilateral Benshen GB-13), Speech area, Nao San Zhen, Lu San Zhen
Drooling	Chengjiang REN-24, Dicang ST-4	Lianquan REN-23, Jiache ST-6, Zusanli ST-36, Pishu BL-20, Shenshu BL-23, Yinlingquan SP-9
Incontinence	Changqiang DU-1, Guanyuan REN-4, Qihai REN-6	Zhongji REN-3, Ciliao BL-32, Zusanli ST-36, Taixi KID-3
Low intelligence		Neiguan P-6, Renzhong DU-26, Yintang M-HN-3, Shenmen HE-7, Tongli HE-5, Xinshu BL-15, Pishu BL-20, Shenshu BL-23, Sishencong M-HN-1, Baihui DU-20, Si Shen Zhen (Intelligence Nine Needles – 1.5 cun anterior, posterior and lateral to Baihui DU-20, plus Shenting DU-24), Benshen GB-13 and Touwei ST-8), Lu San Zhen
Epilepsy	Tianzhu BL-10 through to Yuzhen BL-9, Shenmai BL62, Fenglong ST-40, Taichong LIV-3	Shaohai HE-3, Tongli HE-5, Shenmen HE-7, Sanyinjiao SP-6, Taixi KID-3, Zhaohai KID-6, Neiguan P-6, Xingjian LIV-2, Naoqing, Sishencong M-HN-1

Table 2: Acupuncture protocol for cerebral palsy according to symptomatology, generated by a Delphi process

Discussion

Conventional therapy for CP management in Australia is typically a combination of adjunctive interventions, such as physiotherapy, occupational therapy, speech therapy, social work or clinical psychology, as well as medical and surgical CP management as noted by the Australian Institute of Health and Welfare.¹³ Through the application of the Delphi process, the consensus amongst the experts in this study highlighted that integration of such conventional treatment with acupuncture is the most appropriate treatment procedure for CP management. Additionally, the composite factors regarding appropriate treatment interventions, methodology and safety were ascertained from this panel of experts while also elucidating

a range of distinct characteristics for acupuncture in CP intervention. Adverse effects of acupuncture are minimal. The majority of risks of acupuncture can be mitigated by caution, reducing stimulation strength, and decreasing acupuncture needle retention time.

This protocol provides expert consensus on manipulation methodology, needle type, depth, insertion angle, duration and treatment schedule, providing treatment guidance and a protocol standard upon which further research can be built. This CP protocol is unique because it incorporates signs and symptoms specific to TCM and acupuncture intervention. The prescriptions allow for a selection of points for various symptoms of CP and categorises points as either ‘commonly recommended

points' or 'other suggested points'. Acupoints within the boundaries of this protocol may be selected for their supplementary benefits to treat symptoms present in patients. This allows for individualised treatment while remaining within a definable and safe clinical framework.

This Delphi protocol is the first attempt at constructing a clinical framework for the treatment of CP with acupuncture. However, due to the scale and complexity of this condition, there were a number of limitations in the study. First, as this protocol examined many clinical symptoms associated with CP, the questionnaire became increasingly time-consuming to complete. As participation in this study was voluntary, the time-intensive nature of the study, coupled with an inability to provide compensation to experts, limited the recruitment of expert participants thereby subjecting the protocol to possible validity concerns. Another limitation is the homogeneity of the sample; four participants in the second Delphi round originated from one hospital, NMCH, and formed the core group in the second round. As a result, a consensus was obtained earlier than expected, but the NMCH model of therapeutic care heavily influenced the subsequent protocol. Further research, including a consensus from a larger, more diverse panel of experts, and clinical trials evaluating the existing protocol, is required to ascertain the benefit acupuncture can provide to children with CP.

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Kathren Sieminski conceptualised and designed the study, drafted the initial manuscript, and approved the final manuscript as submitted.

Alan Yeung reviewed and revised the manuscript, designed tables and figures, and approved the final manuscript as submitted.

Xiaoshu Zhu coordinated and supervised data collection, critically reviewed manuscript and approved the final manuscript as submitted.

Kathren Sieminski is a practitioner of traditional Chinese medicine with ten years clinical experience. During her undergraduate studies Kathren worked as a carer for young adults with cerebral palsy. She developed close friendships from this experience and often questioned if they had received acupuncture as children whether it may have prevented the severity and development of their symptoms. She spent five months in various hospitals around China and was inspired to create this protocol as part of her honours research thesis at Western Sydney University (WSU). Her goal is to promote acupuncture as an accessible rehabilitation therapy.

Alan Yeung is completing his PhD candidature with the National Institute of Complementary Medicine at WSU and is a lecturer at both WSU and the Sydney Institute of Traditional Chinese Medicine. Alan has work on and supported a range of projects in areas related to neurocognition, cardiovascular function, affective mood states, acupuncture, herbal medicine and physical therapies.

Xiaoshu Zhu is Director of Academic Programme and Associate Dean of the School of Science and Health and a Senior Research Fellow for the National Institute of Complementary Medicine at WSU. She has over 30 years experience, with a clinical interest and focus on cancer care and women's health. She has published 39 scientific papers and edited seven books. She has also made contributions as an inaugural member of the policy committee for the Chinese Medicine Board of Australia and the Australian Health Practitioner Regulation Agency.

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