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RESEARCH ARTICLE

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Management of hemiplegic shoulder pain: A UK-wide online survey of physiotherapy and occupational therapy practice

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Abstract

Purpose: The purpose of this study was to explore, via an online survey, how therapists assess, diagnose and manage hemiplegic shoulder pain (HSP) in the United Kingdom. The objectives were to explore (1) how therapists assessed HSP, (2) what the aims of therapy were, (3) what interventions therapists used, (4) what outcome measures therapists used, (5) what training of HSP therapists had, and (6) what barriers therapists experienced in the management of HSP.

Methods: An online survey was distributed to physiotherapists (PTs) and occupational therapists (OTs) working in stroke rehabilitation via professional bodies' interest groups.

Results: Sixty-seven responses were received: 40 (60%) were PTs and 27 (40%) were OTs. Therapists routinely screened for HSP ($n = 59$, 89%). When HSP was assessed, 33 (50%) spent <10 min and 34 (50%) spent >10 min on assessment. Patient-reported pain was used for assessment of HSP by 66 (99%) of respondents. Frequent interventions included positioning ($n = 62$, 94%), posture re-education ($n = 57$, 86%), and range of motion exercises ($n = 55$, 83%). Range of movement was used as an outcome measure by 31 (47%). Sixty (91%) respondents reported receiving training in HSP management. Time constraints ($n = 41$, 62%) and lack of diagnosis of HSP ($n = 33$, 54%) were identified as barriers to providing appropriate care to people with HSP

Conclusion: Study findings showed varied practice in the assessment and treatment for HSP and indicate that time constraints are a considerable barrier to the management of these patients. Further research is required to establish best practice which may help improve outcomes and care for people with poststroke shoulder pain.

KEYWORDS

assessment, diagnosis, hemiplegic shoulder pain, management, stroke

1 | INTRODUCTION

Hemiplegic shoulder pain (HSP) is one of the four most common medical complications after a stroke alongside depression, falls, and urinary tract infections (Janus-Laszuk, Mirowska-Guzel, Sarzynska-Dlugosz, & Czlonkowska, 2017; McLean, 2004). HSP has a reported incidence of between 30% and 65% (Adey-Wakeling et al., 2015, 2016; Lindgren, Jonsson, Norrving, & Lindgren, 2007; Paolucci et al., 2016; Roosink et al., 2011). Several prospective studies have reported that almost a third of stroke survivors developed shoulder pain within six months of their stroke (Adey-Wakeling et al., 2015, 2016; Lindgren et al., 2007). The prevalence of HSP was reported to be higher in the chronic stages rather than the acute stages after stroke (Adey-Wakeling et al., 2015; Paolucci et al., 2016). Early occurrence of HSP can have adverse effects on rehabilitation (Adey-Wakeling et al., 2015; Vasudevan & Brownie, 2014) and, later, on health-related quality of life (Adey-Wakeling et al., 2016).

Causes of HSP are often multifactorial and can be broadly classified into neurological (paralysis, spasticity, altered sensation, and neuropathic pain) and mechanical factors (shoulder subluxation, rotator cuff injury, muscle imbalance, and altered scapula position; Vasudevan & Brownie, 2014). Several musculoskeletal diagnoses have been proposed as causes of HSP including rotator cuff tendonitis or tears, subacromial bursitis, bicipital tendonitis (Huang, Liang, Pong, Leong, & Tseng, 2010; Lo et al., 2003; Pong et al., 2012). However, few musculoskeletal specialist tests including modified Neer tests (impingement), hand-behind-head (function test) to localize tissue damage, have been tested in people with stroke (Adey-Wakeling et al., 2015; Dromerick, Edwards, & Kumar, 2008).

A range of treatment options for HSP including physiotherapy, massage therapy, strapping, slings, and other supports to minimize glenohumeral subluxation (GHS) and local interventions such as nerve blocks and botulinum toxin type A (BTx-A) intramuscular injections for spasticity were identified in a review of randomized controlled trials (Viana, Pereira, Mehta, Miller & Teasell, 2012). Unfortunately, optimal treatment modalities for various types of HSP remain unclear in the literature (Vasudevan & Brownie, 2014) and, in practice, linking causation with the most effective intervention/s remains problematic (Holmes & Connell, 2019).

Potential reasons for lack of evidence for the effectiveness of interventions reported in studies could be in part due to differences in the populations studied, time frames of assessment, and methods of assessment used (Adey-Wakeling et al., 2015; Lindgren et al., 2007). While most studies assessed HSP using visual analog scales (VASs; Adey-Wakeling et al., 2015; Barlak, Unsal, Kaya, Sahin-Onat, & Ozel, 2009; Gaitan et al., 2019; Huang et al., 2012) or verbal rating scales (VRSs; van Langenberghe & Hogan, 1988), some do not specify the method used to assess pain (Paci, Nannetti, Taiti, Baccini, & Rinaldi, 2007; Suethanapornkul et al., 2008). Some studies assessed pain at rest (Adey-Wakeling et al., 2016; Gaitan et al., 2019; Lo et al., 2003) while others assessed it during movement (Adey-Wakeling et al., 2015; Cheng, Lee, Liaw, Wong, & Hsueh, 1995).

Physiotherapists (PTs) and occupational therapists (OTs) are key rehabilitation professionals who support patients in stroke rehabilitation (Royal College of Physicians, 2016). We wished to understand current practice in the United Kingdom to see what assessment and treatment approaches for HSP are being used in clinical practice. The objectives were to explore (1) how therapists assessed HSP, (2) what the aims of therapy were, (3) what interventions therapists used, (4) what outcome measures therapists used, (5) what training in HSP therapists had, and (6) what barriers therapists experienced in the management of HSP.

2 | METHOD

2.1 | Participants

This study employed survey methods using an online survey tool, Qualtrics, and received ethical approval from the Research Ethics Committee, Faculty of Health and Applied Sciences, University of the West of England, Bristol. Therapists were eligible to participate in the study if they were: a PT or OT registered with their respective UK professional registration body, working in stroke rehabilitation and treating patients with HSP, able to understand and communicate in English, and able to give informed consent and participate in the online survey.

2.2 | Sample

PTs and OTs were approached through relevant professional networks hosted by the Chartered Society of Physiotherapy (CSP; "interactive CSP [iCSP]"), Association of Chartered Physiotherapists in Neurology (ACPIN), and College of Occupational Therapists' (COT) Specialist Section in Neurological Practice (SSNP). The iCSP networks included were Neurology, Physio First (Private Practice Network), and Pain Management. As it was not possible to identify therapists who were solely involved in stroke rehabilitation from the respective professional databases, a pragmatic "blanket approach" to recruitment was taken. Potential participants (1350 PTs and 1000 OTs) received an email from their respective professional bodies and were invited to take part via a web link to the survey.

The email included a participant information sheet and recipients were requested to forward the link to their colleagues as appropriate, thus sourcing additional participants who may not have been members of professional bodies or special interest groups. This broad approach to recruitment was used to recruit therapists working across the stroke care pathway in hospital and community settings. The survey was available for 6 months and during this time two subsequent reminders were sent at 3 and 5 months, respectively. Completion of the survey was taken as participants' consent to the study.

2.3 | Procedure

A questionnaire was developed and informed by (1) a review of relevant literature (Adey-Wakeling et al., 2015, 2016; Rajaratnam, Venketasubramanian, Kumar, Goh, & Chan, 2007; Royal College of Physicians, 2016; Scottish Intercollegiate Guidelines Network, 2010; Vasudevan & Brownie, 2014), (2) the content and design of similar surveys of musculoskeletal/neurological practice (Adrienne & Manigandan, 2011; French, 2007; Hanchard et al., 2011; Kilbride et al., 2013; Walsh & Hurley, 2009), and (3) consensus-reaching discussions of our research team consisting of a nurse (Candy McCabe), academic PTs (Praveen Kumar and Mary Cramp), OT (Ailie Turton), and consultant therapist (Mark Smith), with chronic pain and shoulder pain expertise, practicing clinicians (PT/OT) ($n = 3$) working in the area of HSP. The specific aims of the current survey were compared with those of the previous published surveys and key features of the previous tools were selected and adapted to address those aims. The key features considered related to (1) demographics—profession, settings, and experience in years, (2) number of patients seen, and (3) aims of assessment and treatment. This approach facilitated the comprehensive development of the questionnaire.

A draft survey was compiled by the lead researcher (Praveen Kumar) and circulated to members of the research team for review and reformulation of questions. Subsequent drafts of the survey were also distributed to PTs/OTs ($n = 6$) working in stroke rehabilitation in two local National Health Service (NHS) Hospital Trusts in the region. Based on their comments, amendments were made to the questionnaire in preparation for a national survey. Using an iterative process, a total of four drafts of the survey were developed and refined in this way, before the final, fifth version was agreed upon. A total of 29 questions were included in the final version, and the questionnaire utilized a mix of yes/no responses with options to add comments ($n = 6$), fill in the blanks ($n = 6$), multiple-choice questions with options to add further comments ($n = 10$), Likert scales ($n = 2$), and open-ended questions ($n = 5$).

The final online version of the survey addressed the following main areas (Appendix S1):

1. Participant characteristics including work settings
2. Clinical services
3. Assessments used
4. Aims of therapy
5. Interventions used
6. Outcome measures used
7. Training of HSP including challenges to the management of HSP

2.4 | Data analysis

Descriptive analyses, including frequencies, percentages, and measures of centrality (median) and dispersion (range) were used to summarize the data. For open-ended questions, synonym-based word frequency analysis (Pina, Massoudi, Chester, & Koyanagi, 2019) was used. In cases when participants did not answer a specific question, their data for that specific question were omitted.

3 | RESULTS

Missing data within the questionnaire responses was ≤5%, except for Question 28, which was answered by 52 respondents (78%). This required a free-text response to the question: "What else do you see as a challenge in providing care for shoulder pain in people with stroke?"

3.1 | Participant characteristics (Q1–Q6)

A total of 67 responses were received from 40 PTs (60%) and 27 OTs (40%) working in stroke rehabilitation. The majority of participants ($n = 62$; 92%) worked in the NHS. Participants' ($n = 65$) clinical experience in stroke varied: 39 (60%) had 6–10 years, 17 (26%) had 11–20 years, and 9 (14%) had more than 21 years of experience in stroke rehabilitation. Twenty-six (39%) respondents worked in community settings and 25 (38%) worked in acute units (Table 1).

3.2 | Clinical services and assessment criteria (Q7–Q22)

Table 2 presents data for Q7–Q22. Across 67 respondents, a median of 55 (range 4–500) patients with stroke were seen in 1 year and of these, a median of 20 (1–200) had HSP. Routine screening for HSP was undertaken by 59 (89%) respondents. The time spent for the assessment of HSP varied, 33 (50%) spent <10 min and 34 (50%) spent >10 min. The most frequent duration spent for the treatment of HSP was between 30 and 60 min per session as reported by 21 (31%) respondents. The majority of respondents, 51 (76%), reported receiving no referrals specific to HSP.

Patients' self-reported pain ($n = 66$, 99%), examination for GHS ($n = 63$, 94%), range of movement ($n = 61$, 93%), and spasticity ($n = 53$, 79%) were frequently reported components of assessments. Musculoskeletal tests such as passive external rotation was used by 44 respondents (67%), followed by passive hand-behind-neck used by 19 (29%) of respondents. Forty (63%) respondents reported the criteria to discharge patients was due to no change in patients' symptoms, or treatment choices were exhausted. Referrals to musculoskeletal PTs were considered by 37 (55%) respondents. Of 57 responses, 10 (15%) reported referring patients for diagnostic ultrasound. One potential reason for nonreferral was lack of access to services (Table 2).

3.3 | Aims of therapy (Q23)

Aims of therapy were predominantly focused on decreasing pain with 53 (80%) respondents selecting this option, followed by education on shoulder pain which was opted for by 52 (79%), and promoting self-

TABLE 1 Participant characteristics—Q1–Q6

Characteristics	Response options	Number (%) of valid response
Q1. Profession ($n = 67$)	Physiotherapists	40 (60%)
	Occupational therapists	27 (40%)
Q2[a]. Employment ($n = 67$)	NHS	56 (84%)
	Private practice	11 (16%)
	Social enterprise	5 (7%)
Q3[a]. In what settings do you manage individuals with HSP ($n = 66$)	Community	26 (39%)
	Acute hospital	25 (38%)
	Rehabilitation unit	25 (38%)
	Early supported discharge	14 (21%)
	Others (outpatients)	3 (5%)
	Intermediate care	1 (2%)
Q4. UK employment grade ($n = 62$)	Band 5	2 (3%)
	Band 6	32 (52%)
	Band 7	20 (32%)
	Band 8a	6 (10%)
	Band 8b	23 (%)
	Band 8c	0 (0%)
Q5. Number of years qualified ($n = 66$)	0–2	2 (3%)
	3–5	8 (12%)
	6–10	17 (26%)
	11–15	13 (20%)
	16–20	8 (12%)
	>21	18 (27%)
Q6. Number of years worked in stroke rehabilitation ($n = 65$)	0–2	14 (22%)
	3–5	13 (20%)
	6–10	12 (18%)
	11–15	10 (15%)
	16–20	7 (11%)
	>21	9 (14%)

Note: Social enterprise—In the UK, it is a not-for-profit organization funded by the NHS and local authorities.
Abbreviations: ESD, early supported discharge; HSP, hemiplegic shoulder pain; NHS, National Health Service.
[a]Multiple answers could be selected for these questions, so total responses may exceed 100%.

management for shoulder pain was selected by 50 (75%) of respondents (Table 3).

3.4 | Interventions for HSP (Q24)

Positioning ($n = 62$, 94%), posture re-education ($n = 57$, 86%), range of motion (ROM) exercises ($n = 55$, 83%), supporting the person to self-manage their pain ($n = 54$, 82%), education regarding shoulder pain ($n = 51$, 77%), and strengthening exercises ($n = 48$, 73%) were most commonly reported treatment options. The reasons for selecting these interventions were predominantly designed to prevent mechanical damage that could be contributing to HSP. Shoulder slings were used by 33 (50%) of the respondents. "Passive" interventions such as electrotherapy modalities and acupuncture were used less frequently (Table 4).

3.5 | Outcome measures for HSP (Q25)

Range of movement was used as an outcome measure by 31 (47%) respondents, followed by functional tests ($n = 27$, 41%). Strength

TABLE 2 Information about clinical services and criteria used to assess hemiplegic shoulder pain (HSP)—Q7–Q22

Question (respondents)	Response options/received	Number and percentage of valid responses/Range
Q7[a]. Number of stroke patients treated in the last 1 year ($n = 67$)	Median 55	4–500
Q8[a]. Number of HSP patients treated in the last 1 year ($n = 65$)	Median 28	1–200
Q9. Do you routinely check for HSP ($n = 66$)	Yes	59 (89%)
	No	7 (11%)
Q10[b]. What clinical assessment do you undertake to confirm if someone has HSP ($n = 67$)	Patients reported pain	66 (99%)
	GHS	63 (94%)
	ROM	61 (91%)
	Spasticity	53 (79%)
	Strength	51 (76%)
	Palpation	42 (67%)
	No formal test	6 (9%)
	Other (please detail)	11 (16%)
Q11[b]. Do you use any of the following tests ($n = 66$)	Passive external rotation	44 (67%)
	Passive hand-behind-neck	19 (29%)
	Supraspinatus empty can	17 (26%)
	Hawkins–Kennedy and Neer's Sign	9 (14%)
	Infraspinatus tests	6 (9%)
	Drop arm test	6 (9%)
	External rotation lag sign	5 (8%)
	Belly press test	3 (5%)
	The modified Neer test	2 (3%)
	Bear hug test	2 (3%)
	Other (please detail)	6 (9%)
	None (please detail why)	16 (24%)
	Not aware of these tests, difficult to get into starting position	
Q12[a]. The time you spend for the assessment of HSP ($n = 67$) (estimate time in minutes)	3 min	3 (4%)
	5–10 min	30 (46%)
	15–20 min	17 (25%)
	30–45 min	10 (15%)
	60 min	4 (6%)
	As required	3 (4%)
Q13[a]. The time you spend for the treatment of HSP ($n = 67$) (estimate time in minutes)	10 min	17 (25%)
	15–20 min	23 (35%)
	30–45 min	17 (25%)
	60 min	4 (6%)
	As required	6 (9%)

(Continues)

TABLE 2 (Continued)

Question (respondents)	Response options/received	Number and percentage of valid responses/Range
Q14. Over what period do you treat individuals with HSP ($n = 66$) (please specify in weeks)	1–5 weeks	17 (26%)
	6 weeks	34 (52%)
	12 weeks	7 (11%)
	As long as required	8 (12%)
Q15. How many sessions (on average) do you offer per week ($n = 67$)	1–3/week	37 (56%)
	4–6/week	19 (28%)
	8–12/week	5 (7%)
	As required/depending on goal	6 (9%)
Q16. On what basis do you offer physiotherapy to individuals with shoulder pain ($n = 64$)	Individual	47 (73%)
	Group (OT session)	17 (27%)
Q17. Criteria you used to discharge patients with HSP ($n = 64$)	No change/treatment choice exhausted	40 (63%)
	Patient improved	13 (20%)
	Transfer to other services	6 (9%)
	Length of stay	5 (8%)
Q18. Do you review your patients with shoulder pain? ($n = 67$)	Yes	44 (66%)
	No	23 (34%)
Q19[b]. What other health care services do you refer to individuals with HSP ($n = 67$)	MSK PT	37 (55%)
	Pain clinic	21 (31%)
	Clinical psychologist	11 (16%)
	Other	29 (43%)
	Spasticity clinic, GP, orthotics orthopedics/steroid injection, part of multidisciplinary package	
	None	5 (7%)
Q20. Do you specifically receive referrals for HSP ($n = 67$)	Yes	16 (24%)
	No	51 (76%)
Q21[b]. Where do you most commonly get HSP patients referred from? ($n = 42$)	GP	22 (52%)
	Stroke consultant	17 (40%)
	Hospital ward	17 (40%)
	Other therapist	20 (48%)
	Patients (self-referral)	6 (14%)
	Other (please detail)	8 (19%)
Q22. Do you refer patient for diagnostic ultrasound for HSP ($n = 67$)	Yes	10 (15%)
	No	57 (85%)
	No access or aware of services, doctors/consultants do this, need to go through GP, needs doctor referral, referral to MSK or other specialties	

Abbreviations: GHS, glenohumeral subluxation; GP, general practitioner; HSP, hemiplegic shoulder pain; MSK, musculoskeletal; OT, occupational therapy; PT, physiotherapist; ROM, range of movement.

[a]HSP was considered part of neuro-rehabilitation, the range of time includes overall rehabilitation time.

[b]Multiple answers could be selected for these questions, so total responses may exceed 100%.

TABLE 3 Aims of therapy (Q23)

What do you consider the aim of therapy for hemiplegic shoulder pain	Always	Frequently	Sometimes	Rarely	Never
Decrease pain ($n = 66$)	53 (80%)	9 (14%)	4 (6%)	0	0
Education ($n = 65$)	52 (80%)	11 (18%)	1 (1%)	0	1 (1%)
Enhance self-management ($n = 66$)	50 (76%)	13 (20%)	3 (4%)	0	0
Improve function ($n = 65$)	30 (46%)	20 (30%)	14 (21%)	2 (3%)	0
Encourage long-term exercise ($n = 64$)	27 (42%)	19 (30%)	18 (28%)	0	0
Improve posture/ergonomics $n = 66$)	27 (41%)	27 (41%)	11 (17%)	1 (1%)	0
Reduce fear avoidance ($n = 66$)	26 (40%)	21 (32%)	15 (22%)	3 (5%)	1 (1%)
Teach joint protection ($n = 65$)	25 (38%)	23 (35%)	14 (22%)	1 (2%)	2 (4%)
Improve muscle control ($n = 65$)	21 (32%)	27 (42%)	15 (23%)	2 (3%)	0
Increase range of movement ($n = 66$)	18 (28%)	32 (48%)	15 (3%)	1 (1%)	0
Reduce spasticity ($n = 65$)	16 (26%)	28 (42%)	20 (31%)	1 (1%)	0
Increase strength ($n = 66$)	11 (17%)	31 (47%)	23 (35%)	1 (1%)	0

Note: Figures are presented as a percentage of valid responses. Responses are presented in rank order based on frequency.

testing was used by 20 (34%) of the respondents while pain specific measures such as the VRS and VAS were used by 17 (28%) and 11 (20%) of respondents, respectively (Table 5).

3.6 | Training gained and barriers to management of HSP (Q26–Q29)

Sixty (91%) respondents reported receiving training in HSP management with 41 (62%) participating in in-service training and 21 (32%) receiving clinical supervision. Time constraints (62%, $n = 41$), lack of specific diagnosis (60%, $n = 37$), and lack of training in managing HSP (54%, $n = 33$) were the major barriers identified in providing appropriate care for people with HSP. Potential reasons as identified by respondents in their free-text responses were the following: (1) lack of awareness of HSP amongst other members of the multidisciplinary team, (2) patients' priorities of recovery that is focus on walking, and (3) delayed access to orthotics (Table 6).

4 | DISCUSSION

This study explored, via an online survey how therapists assessed, diagnosed, and managed HSP, what training therapists had, and what barriers therapists experienced in the management of HSP.

This study found that patient-reported pain was almost always included in the assessment of HSP. However, simple questioning about shoulder pain may not be adequate for best clinical care. In one study where patient-reported pain was recorded in 37% of the patients with HSP, therapist-led clinical examinations revealed pain in another 11%–17% of patients who originally did not self-report pain (Dromerick et al., 2008). In another study, objective passive ROM tests were associated with higher incidences of pain reports than when pain intensity was assessed by self-report alone (Adey-Wakeling et al., 2015).

Another commonly reported component of HSP assessment was examination of GHS (93%). Tissue damage in the shoulder region may be related to the increase in joint space due to subluxation causing passive overstretching, resultant injury and pain (Lindgren, Lexell, Jonsson, & Brogardh, 2012). However, the relationship between GHS and HSP has not been conclusively established; of the 14 studies included in a literature review, seven showed an association while another seven did not (Kumar, Saunders, Ellis, & Whitlam, 2013). The majority of studies which reported an association between GHS and HSP were of a cohort design and followed up patients over variable periods of time in contrast to cross-sectional studies (Kumar et al., 2013). Cohort studies are considered to be a better method for determining the incidence and natural history of a condition and distinguishing causative factors than cross-sectional studies (Mann, 2003). Therefore, there is stronger evidence for the association between GHS and HSP, and it supports incorporation of GHS as component of HSP assessment, as reported by the majority for respondents in our survey.

Several studies have reported an association between HSP and reduced ROM (Blennerhassett, Gyngell, & Crean, 2010; Lindgren et al., 2012). Yet, passive external rotation ($n = 44$, 67%) was the only musculoskeletal test frequently used. A potential reason for the results may be lack of awareness of musculoskeletal tests and ease of use with stroke patients. Studies have demonstrated the feasibility of tests such as the Modified Neer Test (forced passive forward flexion) and hand behind back (HBB) or hand behind head (HBH) on people with HSP (Adey-Wakeling et al., 2015; Dromerick, Kumar, Volshteyn, & Edwards, 2006; Rajaratnam et al., 2007). Rajaratnam et al. (2007) found that three simple bedside clinical tests (positive Neer test, pain during performance of the HBN manoeuver, and difference of greater than 10° of passive external rotation) provided a 98%

TABLE 4 Specific Interventions used for HSP (Q24)

What interventions do you use for HSP? ($n = 66$)		
Intervention	***n* (%)**	**Specific reasons for using (number of valid responses)**
Positioning	62 (94%)	Spasticity, subluxation, reduced muscle power, inattention, glenohumeral alignment, avoid shortening of muscles, avoid excessive internal rotation, potential impingement of rotator cuff, rotator cuff pathology, at risk of losing range ($n = 9$)
Posture re-education	57 (86%)	To improve scapula stability, scapula alignment, proximal weakness ($n = 8$)
Exercises ROM	55 (83%)	Stiffness, spasticity, to improve function
Self-management	54 (82%)	Awareness of posture, positioning, home exercise program ($n = 7$)
Movement re-education	53 (80%)	Scapula setting, weakness, muscular imbalance, impingement symptoms, capsulitis ($n = 6$)
Education	51 (77%)	To maintain ROM, appropriate handling during PROM, to carers and family members
Advice	50 (76%)	Positioning and handling to support the joint and avoid impingement, subluxation, stretching, edema, pain ($n = 7$)
Exercises strengthening	48 (73%)	Rotator cuff problems, to improve function, concentric/eccentric control of the larger prime movers of the shoulder joint ($n = 5$)
Exercises muscle control	47 (71%)	Strength, co-ordination, rotator cuff weakness, scapula instability ($n = 5$)
Functional exercises	45 (68%)	Weakness, pain, reduced movement, used to achieve functional progress, appropriate anticipatory and postural changes. Makes use of object affordance to improve patterns of movement and functional outcomes ($n = 5$)
Exercises proprioception	43 (65%)	Weight bearing for increased proprioceptive input and stability of scapular and rotator cuff, tone weakness ($n = 5$)
Stretching	42 (64%)	Tightness, stiffness, increased tone, spasticity, specific stretches for tight muscles, pectoral muscles, biceps, infraspinatus ($n = 10$)
Slings	33 (50%)	Pain, subluxation, during transfers ($n = 9$)
Hands on soft tissue techniques	30 (45%)	Tigger point release in pectoral, joint mobilization, spasticity
Botulin toxin injection	27 (41%)	Spasticity, tone management
Electrical stimulation	26 (39%)	Subluxation
Manual joint mobilization	26 (39%)	Capsular tightness, problems with cervico thoracic and AC joint mobility, joint stiffness ($n = 4$)
Taping	23 (35%)	Proprioception, sensory feedback, subluxation ($n = 3$)
TENS	14 (21%)	Pain around shoulder, reduced muscle power ($n = 4$)
Joint injections	11 (17%)	For arthritic conditions, other medical problems ($n = 3$)
Hydrotherapy	10 (15%)	Onward referral ($n = 2$)
Health behavior change techniques	8 (12%)	No comments provided
Acupuncture	6 (9%)	Chronic shoulder and upper limb pain ($n = 3$)
Other intervention	5 (8%)	GRASP program, CIMT for learned non-use (depending on level and cause of pain); supports other than slings such as neoprene cuffs, mirror therapy
Other electro modality	2 (3%)	No comments provided
Therapeutic ultrasound	2 (3%)	Tendonitis ($n = 1$)
Electro acupuncture	1 (2%)	No comments provided

Note: Responses are presented in rank order based on frequency. Multiple answers could be selected for these questions, so total responses may exceed 100%.

Abbreviations: CIMT, constraint induced movement therapy; GRASP, graded repetitive arm supplementary program; HSP, hemiplegic shoulder pain; ROM, range of movement; TENS, transcutaneous electrical nerve stimulation.

probability of provisional diagnosis of HSP. These tests correspond with soft tissue abnormalities observed on ultrasonic examination of patients with HSP including effusion of subacromial–subdeltoid bursa and biceps tendon sheath and tenosynovitis/tendinopathy of supraspinatus, biceps, and subscapularis tendons (Lee et al., 2009; Pong et al., 2012; Pop, 2013).

Studies using ultrasonography have indicated associations between soft tissue abnormalities, GHS, and HSP (Huang et al., 2012;

TABLE 5 Outcome assessments used for HSP (Q25)

What outcome measures do you use for individuals with HSP (number of valid responses)	Always	Frequently	Sometimes	Rarely	Never
Range of movement ($n = 66$)	31 (47%)	27 (41%)	7 (11%)	0	1 (1%)
Functional test ($n = 58$)	27 (47%)	20 (34%)	7 (12%)	0	4 (7%)
Strength ($n = 58$)	20 (34%)	23 (40%)	9 (16%)	3 (5%)	3 (5%)
Verbal rating scale ($n = 61$)	17 (28%)	22 (36%)	9 (15%)	1 (1%)	12 (20%)
Visual analog scale ($n = 56$)	11 (20%)	22 (39%)	12 (21%)	2 (4%)	9 (16%)
Proprioception ($n = 49$)	8 (16%)	14 (29%)	14 (29%)	4 (8%)	9 (18%)
Numerical rating scale ($n = 50$)	7 (14%)	28 (56%)	5 (10%)	0	10 (20%)
Motor Assessment Scale ($n = 53$)	4 (8%)	13 (25%)	12 (23%)	9 (17%)	15 (27%)
HADS ($n = 45$)	1 (2%)	4 (9%)	11 (24%)	6 (13%)	23 (52%)
Others ($n = 17$)	6 (35%)	6 (35%)	2 (12%)	2 (12%)	1 (6%)
Fugl Meyer 9 hole peg test Modified Ashworth Scale Achievement of functional goals ARMA Motor activity log Goal Attainment Scale Upper extremity functional index					
NIHSS—motor arm score ($n = 41$)	0	1 (2%)	4 (10%)	3 (7%)	33 (81%)
Illness Behavior Questionnaire ($n = 41$)	0	0	2 (5%)	1 (2%)	38 (93%)

Note: Figures are presented as a percentage of valid responses. Responses are presented in rank order based on frequency.

Abbreviations: ARMA, Action Research Arm Test; HADS, Hospital Anxiety and Depression Scale; NIHSS, National Institute of Health Stroke Scale.

Pong et al., 2012). In a longitudinal cohort study of 76 people with HSP, Pong et al. (2012) reported a higher incidence of HSP during the chronic stage (6 months) of stroke and significant associations with ROM limitations and abnormal sonographic findings. Huang et al. (2012) found that shoulder subluxation lateral distance, measured by physical examination, was a predictor for supraspinatus tendonitis and suggested that ultrasonographic examination should be conducted when subluxation lateral distance was 2.25 cm or greater. In addition to diagnosing soft-tissue injuries, ultrasound has the potential to assess GHS by measuring the acromion-greater tuberosity distance, as it may be more sensitive than physical examination (Kumar, Mardon, Bradley, Gray, & Swinkels, 2014) and thus can facilitate management of HSP. Only 15% of respondents in our survey reported referring patients for diagnostic ultrasound. Potential reasons reported by the participants were lack of awareness on how to access the services, only consultants/doctors did the referrals and, in some places, they had to go through general practitioners. This demonstrates lack of consistency in services and challenges in referring patients with HSP for ultrasound imaging. Further research is required to determine optimal use of clinical and physical measures alongside ultrasonography to improve assessment of HSP.

Positioning of the affected upper limb was at the top of therapists' intervention list with 94% of respondents reporting that they use this approach in their clinical practice. Likewise, range of movement exercises (83%), strengthening exercises (73%), and posture re-education (86%) were also common treatment interventions. These interventions were offered with a view to prevent loss, or maintain range of movement, avoid shortening of muscles, provide support for subluxation, and to improve strength in the muscles of the shoulder. One potential explanation could be that some of these interventions were prioritized in an attempt to reduce or prevent pain indirectly rather than in its own right. Associations between pain and other clinical outcomes such as weakness, spasticity, and reduced range of movement have been reported in the literature (Lindgren & Brogardh, 2014; Lindgren et al., 2012; Paci et al., 2007). Also, the listed impairments were used as surrogates for assessment of HSP; it is not surprising to see these interventions reported as frequently used.

There is lack of high-quality evidence to support the most frequently used treatment approaches for HSP. Several studies investigated the effectiveness of static positional stretches and positioning of the stroke-affected shoulder for HSP (de Jong, Diikstra, Gerristen, Geurts, & Postema, 2013; de Jong, Nieuwboer, & Aufdemkampe, 2006; Gustafsson & McKenna, 2006). These studies found that static positioning had no statistically significant effects on ROM, shoulder pain, basic arm function, or activities of daily living. Similarly, a systematic review (8 studies, $n = 340$ patients) found insufficient evidence of the efficacy of shoulder strapping for

TABLE 6 Training gained by therapists and barriers to management of HSP (Q26–29)

Have you received training in HSP management (66)	Yes	60 (91%)
	No	6 (9)%
What[a] sort of training have you received in HSP management ($n = 66$)	In-service	41 (62%)
	Clinical supervision	21 (32%)
	Conferences	16 (24%)
	CPD workshops	10 (15%)
	Other professionals	6 (10%)
	Self-directed reading	4 (7%)
	ACPIN evening lecture	1 (1%)
Barriers to HSP management		
Time constraints ($n = 66$)	-	41 (62%)
Lack of training ($n = 62$)	-	37 (60%)
Lack of diagnosis ($n = 62$)	-	33 (54%)
Not enough access to clinical supervision ($n = 59$)	-	15 (25%)

Summary of comments on barriers to management of HSP:

- Pre-existing shoulder pathologies (rotator cuff tears, subacromial impingement, adhesive capsulitis)
- Lack of evidence for orthotic devices
- Anxiety and fear avoidance behavior
- Lack of consistent approach to treatment
- The focus of physiotherapy time on walking
- Aphasia/Cognitive problems limiting patients ability to express their pain
- Lack of awareness among MDT
- Lack of long-term follow-up
- Shortened stroke pathway with limited input from therapists
- Lack of resources
- Lack of courses/training in management of HSP
- Lack of appropriate anatomy knowledge on the OT undergraduate programs
- Lack of joint MDT approach

Abbreviations: ACPIN, Association of Chartered Physiotherapist in Neurology; CPD, continuous professional development; HSP, hemiplegic shoulder pain; MDT, multidisciplinary team; OT, occupational therapist.

[a]Multiple answers could be selected for these questions, so total responses may exceed 100%.

reducing GHS and HSP (Appel, Perry, & Jones, 2014). Another review (8 studies, $n = 186$ patients) reported low-quality evidence from heterogeneous studies to support use of a shoulder orthosis to reduce HSP (Nadler & Pauls, 2017).

It was observed that some of the interventions used seemed to match well against the stated aims of physiotherapy with advice (76%), pain education (77%), and pain self-management techniques (82%) reported as frequently used treatments. Such interventions are common approaches in effective pain management and are recommended in evidence-based clinical guidelines for chronic pain (Scottish Intercollegiate Guidelines Network, 2013) and other long-term musculoskeletal conditions such as osteoarthritis (National Institute for Health and Clinical Excellence, 2014) and low back pain (National Institute for Health and Clinical Excellence, 2009). However, the evidence to support the effectiveness of pain education and self-management of pain in a stroke population has not been established. This needs to be addressed in future studies, using mixed-methodologies such that both the quantitative and qualitative aspects of this clinical problem can be effectively explored.

Also, studies should consider interdisciplinary therapies as this can improve outcomes (Debar et al., 2012).

Pain-reported outcome measures such as a VRS (28%) and VAS (20%) were less often used. Studies have reported contradicting evidence regarding self-reported pain. For example, people with left hemisphere damage post stroke, who are more likely to be aphasic, may prefer using visual images or numbers (but not words), whereas those with right hemisphere damage may do better reporting their pain using simple images or numbers (but not written or verbal responses; Benaim et al., 2007). Despite their limitations, both VAS and VRS have been found to be the most useful measures for pain, and although there is no evidence to demonstrate a difference, a VRS may be preferable to a horizontal scale as it reduces the challenge for

people with visual or attention deficits (Benaim et al., 2007; Pomeroy et al., 2000; Turner-Stokes, 2006). Measuring pain in people with stroke is a challenge because of its inherently subjective nature. Therefore, more patient consultations are needed to establish the content validity of the VAS and VRS, and the important aspects of pain that should be measured (Tyson & Brown 2014).

Nearly 60% of the respondents reported that time constraints were one of the challenges to providing appropriate care for people with HSP. In addition, the lack of a specific diagnosis of HSP was reported by 54% of respondents as a problem. Therapists identified a variety of other challenges that limited care for HSP in their free-text responses. These included perceived lack of resources, shortened stroke pathway, lack of awareness amongst multidisciplinary team members, lack of evidence and anxiety/fear avoidance from patients' perspectives, and the focus on gait-education in the acute phase of rehabilitation. Future studies should consider using a strategy that allow people with HSP to comprehensively describe the nature and impact of their shoulder problem followed by accurate clinical assessment (Dromerick et al., 2006). Clinical assessments should include palpation of shoulder region, strength testing, ROM, and other musculoskeletal tests (Dromerick et al., 2006, 2008; Vasudevan & Brownie, 2014), based on the evidence on potential risk factors for HSP such as weakness (Gamble et al., 2002) and reduced range of movement (Lindgren et al., 2012). These are vital as this will help improve patient–clinician communication and have psychological benefits for patients in chronic pain and help to establish targeted management plans (Dromerick et al., 2008).

Limitations of our survey included the small sample size. While the respondents were therapists with experience in the field of stroke rehabilitation, the majority were employed in NHS acute and community services, and the survey may provide a limited view of the scope of OT and PT rehabilitative services. Although appropriate professional bodies and special interest groups were approached to circulate the online survey, and two reminders were sent, this did not improve the response rate. Implementation of strategies to enhance the response, such as better specifying the aims of the study and means of completing the questionnaire could have been utilized and more clear explanations provided to potential participants. This would have been useful in yielding more information and should be pursued in future research of this nature.

5 | CONCLUSION

Study findings show wide variation in therapy led assessment and treatments for HSP. Time constraints are a considerable barrier to the management of these patients and specific diagnosis of HSP remains a key challenge. There is a lack of high-quality clinically relevant evidence in people with stroke for the management of HSP, and, in particular, for determining the cause of HSP at an individual level, be it mechanical and associated soft tissue injury, or neurogenic in nature. In addition, there is a need for better patient-reported measures of HSP that address current challenges and gaps highlighted by this survey. In addition, there is a need for better methods for patient reports of HSP that are specific to the challenges of current patient-reported measures in persons with stroke. Further research is required to establish best practice which may help improve outcomes and care for people with poststroke shoulder pain.

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CONFLICT OF INTEREST

The authors report no conflict of interest.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of this article.

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