

Central Lancashire Online Knowledge (CLOK)

Title	Evidence-based stroke rehabilitation: do priorities for practice change and feasibility of implementation vary across high income, upper and lower-middle income countries?
Type	Article
URL	https://clock.uclan.ac.uk/id/eprint/37530/
DOI	https://doi.org/10.1080/09638288.2021.1910737
Date	2021
Citation	Gururaj, Sanjana, Bird, Marie-Louise, Borschmann, Karen, Eng, Janice J., Watkins, Caroline Leigh, Walker, Marion F., Solomon, John M. and SRRR2 KT Working Group (2021) Evidence-based stroke rehabilitation: do priorities for practice change and feasibility of implementation vary across high income, upper and lower-middle income countries? Disability and Rehabilitation. ISSN 0963-8288
Creators	Gururaj, Sanjana, Bird, Marie-Louise, Borschmann, Karen, Eng, Janice J., Watkins, Caroline Leigh, Walker, Marion F., Solomon, John M. and SRRR2 KT Working Group

It is advisable to refer to the publisher's version if you intend to cite from the work.
<https://doi.org/10.1080/09638288.2021.1910737>

For information about Research at UCLan please go to <http://www.uclan.ac.uk/research/>

All outputs in CLOK are protected by Intellectual Property Rights law, including Copyright law. Copyright, IPR and Moral Rights for the works on this site are retained by the individual authors and/or other copyright owners. Terms and conditions for use of this material are defined in the <http://clock.uclan.ac.uk/policies/>

TITLE: Evidence-based stroke rehabilitation: Do priorities for practice change and feasibility of implementation vary across High income, Upper and Lower-Middle income countries?

RUNNING HEAD: Feasibility of evidence-based practice post-stroke

ARTICLE CATEGORY: Research paper

ABSTRACT

Purpose:

The context of implementation plays an important role in the delivery of optimal treatments in stroke recovery and rehabilitation. Considering that stroke systems of care vary widely across the globe, the goal of the present paper is to compare healthcare providers' priority of key areas in translating stroke research to clinical practice among High Income Countries, Upper Middle- and Lower Middle- Income Countries (HICs, UMICs, LMICs). We also aimed to compare perceptions regarding the key areas' feasibility of implementation, and formulate recommendations specific to each socioeconomic region.

Methods:

Data related to recommendations for knowledge translation in stroke, from a primary survey from the second Stroke Recovery and Rehabilitation Roundtable were segregated based on socioeconomic region. Frequency distribution was used to compare the key areas for practice change and examine the perceived feasibility of implementation of the same across HIC, UMIC and LMICs.

Results:

A total of 632 responses from healthcare providers across 28 countries were received. Interdisciplinary care and access to services were high priorities across the three groups. Transitions in Care and Intensity of Practice were high priority areas in HICs, whereas Clinical Practice Guidelines were a high priority in LMICs. Interventions specific to clinical discipline, screening and assessment were among the most feasible areas in HICs, whereas Intensity of practice and Clinical Practice Guidelines were perceived as most feasible to implement in LMICs.

Conclusion:

We have identified healthcare providers' priorities for addressing international practice change across socioeconomic regions. By focusing on the most feasible key areas, we can aid the channeling of appropriate resources to bridge the disparities in stroke outcomes across HICs, UMICs and LMICs.

Keywords:

High-Income Countries, Upper-Middle Income Countries, Lower-Middle Income countries, Knowledge Translation, Implementation, Rehabilitation, Stroke

Introduction

The substantial gap between stroke rehabilitation practice and the current evidence-base has gained unprecedented recognition in recent years [1]. Although multiple paradigms have been used to bridge this gap, knowledge translation (KT) has emerged as an ideal tool to promote greater utilization of the existing research base. KT dynamically combines knowledge synthesis, dissemination and application to improve behaviors, practices and policies [2] which can ultimately improve outcomes after stroke. One challenge in implementing evidence-based practice in stroke rehabilitation is the large volume of research being undertaken in this area, with over 2000 Randomized Controlled Trials (RCTs) published to support clinical practice [3].

Whilst there may still be a lack of treatments that markedly promote recovery after stroke[4], recent RCTs have yielded a number of beneficial interventions. This raises important questions: how do clinicians choose which intervention to implement? Does the feasibility of the intervention in their local setting contribute to this choice? The local context in which the intervention is implemented plays an important role in this decision-making process [5].

Context refers to several factors that affect the implementation and sustainability of an intervention in a real-world setting, including the individual patient, the health professionals and the healthcare system [6]. Considering the dynamic nature of the relationship between the intervention and these factors, it is unsurprising that the local setting would influence what clinicians prioritize as important to implement [5].

One important context for consideration is socioeconomic status of a country. A growing body of literature suggests that countries of higher socioeconomic status have a lower stroke

incidence, less stroke severity and better outcomes [7]. Low and Middle-Income countries account for approximately 78% of the global Disability Adjusted Life Years (DALY's) lost due to stroke [8]. Remote locations, poor infrastructure, higher rates of poverty and poor health insurance coverage often add to the burden on healthcare systems in low-resource settings [9]. The challenges in delivering quality stroke rehabilitation, particularly in low- and middle-income countries include lacking rehabilitation services, poor internet access and inadequate education programs [10]. In this scenario, it is essential to identify what evidence-based interventions can be translated to practice in low resource settings to improve stroke rehabilitation services.

The second Stroke Rehabilitation and Recovery is an international collaborative effort to accelerate the development of effective treatments and to encourage the uptake of the best evidence in rehabilitation practice, globally [11]. A 10-member Knowledge Translation (KT) Working Group was assembled with the intention of providing an international perspective and included representatives from North America, Europe, Asia, Africa and Australia. An online survey of international healthcare professionals (Doctors, Nurses, Physiotherapists, Occupational Therapists, Speech and Language Pathologists, Psychologists and Orthotists) involved in stroke recovery was undertaken by our KT research group to gain consensus on priorities for implementation of research evidence into stroke rehabilitation practice. Our working group elicited nine key priority areas relating to stroke service delivery, system or resources: i) interdisciplinary care, ii) screening, iii) Clinical Practice Guidelines (CPG), iv) intensity of practice, v) family support, vi) access to services, vii) transitions in care, viii) equipment and technology, and ix) staffing ratios [12]. Descriptions of these nine key priority areas can be found in Appendix 1.

101 Considering the variations in availability, accessibility, affordability and awareness of
102 rehabilitation across socio-economic regions, it is unknown if the priorities of healthcare
103 professionals across these regions differ. The goal of the present paper was to identify the
104 survey respondents' priority of these nine key areas on implementing research in stroke
105 clinical practice across High, Upper-Middle and Lower-Middle Income Countries (HICs,
106 UMICs, LMICs). We also aimed to compare respondents' perceptions of the feasibility of
107 implementing these key areas across socioeconomic regions. We then provide suggestions
108 intended to augment global stroke advocacy efforts to optimize stroke rehabilitation
109 outcomes.

111 **Methods**

112
113 This paper presents a sub-analysis of survey data previously reported from the SRRR2 [12].
114 It was an open online survey, using the Qualtrics platform where responses were
115 automatically captured. The survey questions were voluntary, and IP addresses recorded to
116 prevent multiple entries. We included all submissions in the analysis, even when
117 questionnaires were terminated early. The survey was developed and distributed
118 internationally with inputs from an international advisory group and circulated to health care
119 providers. The link to the survey was available from June to December 2018. The advisory
120 group consisted of 20 representatives from 13 countries (Australia, Brazil, Canada, China,
121 India, Kyrgyzstan, Malaysia, New Zealand, Nigeria, Pakistan, Philippines, Singapore and the
122 UK) and belonged to eight professions (Neurology, rehabilitation medicine, psychology,
123 Occupational Therapy, Physiotherapy, Speech and Language Pathology, dentistry and
124 nursing). Members of the Working Group and the advisory committee then circulated the

survey using the snowball sampling method via their individual stroke networks and professional associations.

Respondents to the survey were asked to state three practice change topics that they perceived would make the largest impact on stroke recovery and rehabilitation in their local region. They then rated how feasible each of the items would be to implement in their local region (very, moderately or not very feasible). The core questions of the primary survey have been recorded in Appendix 2. Topics were then distilled by our research team into the nine key priority areas outlined above.

In this sub-study, the key areas and feasibility responses are considered based on socioeconomic status of the country of the respondent. Socioeconomic status of countries was coded according to the World Bank classification by income, based on the Gross National Income (GNI) per capita of each respondent country. HICs are defined as those with a GNI per capita of \$12,376 or more, UMICs between \$3,996 and \$12,375 and LMICs between \$1,026 and \$3,995 [13].

One member of our working group (MLB), worked on the larger data set so as to segregate responses from HICs, UMICs and LMICs. Two members of our working group (SG and JM) then individually re-coded the survey responses, identifying similar responses and extracting them into the nine key priority areas as previously described [12]. Cross verification was carried out to ensure consistency and any uncertainties during this process were clarified through discussion with authors of the primary survey. The present paper extends the work of the primary survey as recruitment for the survey was continued for a period of three months after the initial analysis. To accommodate for the new responses, an additional key area

“discipline-specific interventions” was added for this sub analysis. Following this, percentage comparisons were carried out to compare the ten priorities among HICs, UMICs and LMICs.

Further stratification of each of the key priority areas was carried out into very feasible, moderately feasible and not very feasible categories, as reported by the survey respondents. Frequency distributions were then used to calculate the percentage of respondents to the three feasibility categories, within each key priority area. For example, if ‘x’ number of respondents listed ‘interdisciplinary care’ as a priority out of a total of ‘N’ respondents, percentage values were analyzed for ‘x’ to calculate the perceived feasibility. The ‘x’ responses were segregated into very feasible, moderately feasible and not very feasible responses and were represented as percentages to compare the feasibility of ‘interdisciplinary care’ across the socioeconomic regions.

Results

A total of 632 responses from healthcare providers across 28 countries were obtained with 1343 examples listed as priorities which could facilitate recovery after stroke. Of these, 350 (55%) respondents belonged to High Income Countries, 238 (38%) to Upper Middle-Income countries and 44 (7%) to Lower Middle-Income countries. Figure 1 represents the respondents’ countries from each socioeconomic region.

[Figure 1 near here]

Demographic characteristics of respondents

The demographic characteristics of the healthcare providers across the socioeconomic regions are listed in Table. 2.

There was a wide variation in the professional backgrounds of the survey respondents among HICs, UMICs and LMICs. The majority of respondents were physiotherapists, comprising 36% (126/350) of responses from HICs and 75% (33/44) from LMICs. Although responses were received from many healthcare professions in HICs, this was not the case with UMICs and LMICs. As represented in table 1, the majority of the respondents across all the three groups were clinicians and working in inpatient/outpatient facilities.

[Table 2 near here]

Priorities for KT implementation

Interdisciplinary care was found to be the highest priority for healthcare providers across the socioeconomic regions. Similarly, access to services was also highlighted as a high priority across the three types of resource settings. Clinical Practice Guidelines was considered to be a high priority by a greater proportion of respondents in LMICs (15%; 17/114) as compared to HIC (7%; 61/928) or UMIC (3%; 10/301). Intensity of practice was prioritized by healthcare providers in HICs (12%; 110/928) much more than practitioners in UMICs (3%; 10/301) and LMICs (8%; 9/114). Transitions in care showed a similar trend with greater proportion of healthcare providers in HICs (15%; 141/928) considering it as a high priority, as compared to the UMIC (6%; 19/301) or LMIC (5%; 6/114). The differences across all the other topics were considered to be too small for further interpretation. The percentage comparisons of the all the key areas is represented in table 3.

199 *[Table 3 near here]*

200

201 ***Perceived Feasibility of Implementation***

202

203 Most of the priorities were deemed to be “moderately feasible” by majority of the
 204 respondents. Therefore, here we compare the “very feasible” and “not very feasible”
 205 categories across the socioeconomic regions to highlight the most and least implementable
 206 areas for KT in stroke care. In tables 3, 4 and 5 as well, we present the data from these two
 207 categories to provide clarity about which priorities were perceived as feasible or not very
 208 feasible.

209

210 In HICs, screening and assessment (n= 31; 48%) and interventions specific to each discipline
 211 (for example, Constraint Induced Movement Therapy for occupational therapy or Functional
 212 Electrical Stimulation for physical therapy) (n=18; 43%) were considered most feasible to
 213 implement, whereas changing staffing ratios, was considered not very feasible.

214

215 *[Table 4 near here]*

216

217 In UMICs, family support was considered to be the most feasible to implement (n=6; 55%).
 218 Similar to HICs, screening and assessment (n=17; 49%) and discipline-specific interventions
 219 (n=8; 47%) were also perceived as very feasible to implement. Transitions in care was also
 220 among the most feasible categories in UMIC (n=8; 42%).

221

222 *[Table 5 near here]*

223

In LMICs, the most feasible priorities were intensity of practice (n=6; 66%), interventions specific to discipline and (n=3; 43%) and Clinical Practice Guidelines (n=7; 41%). Equal numbers of survey respondents in LMIC perceived interdisciplinary care to be feasible as well as not very feasible to implement. All the other priorities were considered as moderately feasible by most respondents and the differences under the “very feasible” or “not very feasible” categories were considered too small for further interpretation.

[Table 6 near here]

Discussion

Despite being a global public health problem, the burden of stroke is disproportionately borne by lower-resource countries [14]. Healthcare providers are key stakeholders across the continuum of care post-stroke and their perceptions are valuable in understanding the discrepancies in global stroke care delivery. The current study identifies differences in priorities in KT among healthcare providers and academics across the socioeconomic regions and provides insights into their perceived feasibility of implementation.

Interdisciplinary care and access to services were areas of high priority across the three groups. There is robust evidence that organized, interdisciplinary stroke care reduces length of institutional care and long-term disability while also enhancing recovery and independence [15]. Advantages gained are applicable regardless of level or type of stroke and across the stroke care pathway [16]. Although dedicated interdisciplinary stroke rehabilitation units have long been considered as the “gold standard” of care, access to these units remains limited not only in LMICs but HICs as well. [17]. Going forward, concentrating resources

towards improving the functioning and accessibility of such units may be powerful ways to catalyze change across the globe.

Intensity of practice was an area of high priority in HICs which can be attributed to the awareness created among practitioners in these regions. Contemporary literature as well as best-practice recommendations from HICs countries emphasize the importance of high intensity practice in promoting functional recovery after stroke [18]. Transitions in care was also listed as a high priority only in HICs. The healthcare systems in HICs have provision for the delivery of medical and rehabilitation treatments across the stroke continuum of care, which extends into the community. In contrast, existing healthcare systems in the UMICs and LMICs are largely focused on saving lives and therefore, are acute care oriented [19]. In UMICs, screening and assessment for cognition, depression and aphasia was a high priority. This may indicate that healthcare providers in UMICs believe that screening and assessment has potential to complement existing services or that a shift in focus from delivery of interventions might improve stroke outcomes. This is in part supported by research highlighting that early screening and assessment not only prevents adverse health consequences, but also predicts long-term functional outcomes [20]. In LMICs, Clinical Practice Guidelines was listed as an area of high priority. The lack of best practice recommendations from LMICs [21] combined with the lack of awareness [22] about existing guidelines may be contributing reasons for the same.

We believe that identifying the most feasible KT priorities will aid in directing funding and resources toward the most achievable goals, ultimately improving patient outcomes in each socioeconomic region. An overall trend of higher perceived feasibility across all the topics

was observed in LMICs. This might point toward a seeming flexibility in the LMIC healthcare systems, as opposed to those of HICs which are perceived to be fairly rigid.

Screening and assessment of aphasia, cognition and depression were considered a feasible change to implement in HICs. Tools for screening and assessment of cognition, dysphagia and depression are easily available and most do not require advanced training for their use. In LMICs, family support was perceived to be feasible to implement. Due to the core values of collectivism, family interests are given higher importance than individual interests in eastern countries and often results in positive attitudes toward care-giving after stroke [23].

Transitions in care was also deemed as feasible and the introduction of home-care models after stroke [24] may benefit this process. One surprising finding was the perception that increased intensity of practice was feasible to undertake in LMICs. High Intensity practice has typically not been delivered in LMICs and even providing basic rehabilitation services has been particularly challenging. It may also be worth considering that the increasing burden of stroke in LMICs hinders the availability of high intensity practice. However, lower labor costs and the perception that staffing ratios are highly feasible to change may explain this finding and warrants further investigation. Despite the lack of Clinical Practice Guidelines developed in LMICs, the apparent feasibility of this topic might point towards general receptivity of the healthcare providers towards evidence-based practice.

Areas where an overlap of priority and feasibility were noted may be particularly important to highlight. Although intensity of practice was a high priority in HICs, appropriate staffing ratios was perceived as not very feasible to implement. In other words, HICs may be facing an inconsistency between the recommended high intensity practice and the workforce required to achieve large amounts of therapy time with individual patients. On the other hand,

Clinical Practice Guidelines was a high priority and perceived as very feasible to implement in LMICs. This gives us direction to commence targetted work in this area at the earliest opportunity.

Future scope and Recommendations

This study lays out a framework for future research and stroke care policies, to address areas in each socioeconomic region that necessitate urgent solutions.

LMICs

- As a future implication for KT research, there is a pressing need for the development of Clinical Practice Guidelines specific to lower-resource settings. Taking into consideration the cultural, geographical and economic constraints of these communities may also be vital.
- The development of guidelines is a resource-exhaustive process and may be difficult to implement in some countries. If the development of local guidelines is not possible, a framework for contextualization of the existing guidelines by national stroke care committees may help other countries in adhering to best practice recommendations.
- Rehabilitation across the stroke continuum of care from acute settings to the community may need to ensure easy access to existing best practice recommendations in order to promote awareness among healthcare providers.
- Along the lines of the recommendations above, Bernhardt et al., highlight the urgent need for adapting and contextualizing existing guidelines for low resource settings and implementation of interventions adapted to local needs [10].

323 *UMICs*

- 324 • The lack of significant results from the recent RECOVER trial [25] in China and the
325 ATTEND trial [26] in India dictate some precautions in the area of family support.
326 However, tele-rehabilitation may prove to be a promising tool to enhance both
327 transitions in care and family support.
- 328 • The World Stroke Organization (WSO) provides Stroke Support Organization (SSO)
329 toolkits to aid not only healthcare professionals but also stroke survivors and their
330 caregivers [27]. Translations of these toolkits to multiple languages are also available
331 and encouraging their utilization may be beneficial.
- 332 • Although many tools are available for screening and assessment of aphasia, cognition,
333 and depression and most are easily accessible, we believe that translation to more
334 local languages may aid in the widespread use of screening and assessment as an
335 approach to enhance quality of life after stroke.

336

337 *HICs*

- 338 • Novel solutions to increase the intensity of practice may prove to be beneficial.
339 Recent literature suggests some pragmatic ways of increasing intensity of practice.
340 Group training programs, circuit- training as well as environmental enrichment
341 techniques have showed promising results in data from HICs. [28,29,30]. Policy
342 driven changes to direct the appropriate resources and promote use of such techniques
343 in more real-world settings may be required. Further, exploration of technological
344 solutions may also aid in high intensity practice, particularly to support staffing ratios
345 [31].
- 346 • Resources for the development of patient and caregiver toolkits at discharge and tele-
347 rehabilitation services may aid in the betterment of transitions in care. Unprecedented

circumstances due to the COVID-19 pandemic has driven this agenda further. Tele rehabilitation resources have been consolidated [32] and implemented quickly to cater to the needs of stroke survivors.

The “Rehabilitation 2030- Call for Action” by WHO recognizes the ever increasing and substantial need for rehabilitation across the globe [33]. Considering the current barriers such as absence of rehabilitation policies, under-prioritization by governments, insufficient funding and rehabilitation professionals, and lack of integration into health systems, they state there is an urgent need for channeling investments into the rehabilitation workforce and infrastructure. They also emphasize the need to improve leadership and governance in these areas, signaling concentrated and coordinated efforts by stakeholders across the globe. Finally, the efforts of global stroke organizations such as the “Global Stroke services Guidelines and Action Plan” by the WSO provide reason to look forward to positive changes in stroke recovery and rehabilitation in HICs as well as LMICs [34].

The present study is a sub-study of a large multidisciplinary survey aimed at understanding healthcare providers’ perspectives about various aspects of evidence-based practice. None of the questions in the survey were mandated and this resulted in gaps in the demographic data. Future studies may benefit from exploring the effects of setting of practice, training and experience of healthcare professionals in translating research to practice. The snowball sampling strategy led to the source sample being unavailable and hence, a response rate to the survey could not be calculated. Sub-analysis of the survey dataset into responses from HICs, UMICs and LMICs revealed a lower proportion of respondents from LMICs and hence, we encourage interpretation of data from LMICs with caution. The recruitment strategy utilized may have inadvertently generated more barriers for potential participants in LMICs. These

include comparatively lesser representation from LMICs in our international advisory committee, lack of professional regulatory bodies and limited internet access in several parts of these countries. While our sample included lower-middle income countries such as Nigeria, India and Kenya, we did not have any responses from low income countries due to difficulties accessing this group. However, middle income countries make up three-quarters of the world population and 62% of the world's poor while low-income countries have declined in half over the last 20 years to approximately 10% of the world population representing 30 countries [35]. Based on our observations, we recommend more widespread studies in Low and Lower-Middle Income Countries in the future, employing more robust recruitment strategies.

Conclusion

Priorities for practice change in stroke rehabilitation vary across socioeconomic regions. Similarly, the feasibility of practice change is also variable. Improving interdisciplinary care and access to health services globally are important ways in which we can change stroke-care practice. Development of Clinical Practice Guidelines relevant to low-resource settings is urgently needed.

References

1. Morris ZS, Wooding S, Grant J. The answer is 17 years, what is the question: understanding time lags in translational research. *J R Soc Med.*2011;104(12):510-20.
2. Straus SE, Tetroe J, Graham I. Defining knowledge translation. *Can Med Assoc J.* 2009;181(3-4):165-8.

- 396 3. Evidence Reviews | EBR SR - Evidence-Based Review of Stroke Rehabilitation
 397 [Internet]. Ebrsr.com. 2020 [cited 25 May 2020]. Available from:
 398 <http://www.ebrsr.com/evidence-review>
- 399 4. Bernhardt J, Hayward KS, Kwakkel G, Ward NS, Wolf SL, Borschmann K, Krakauer
 400 JW, Boyd LA, Carmichael ST, Corbett D, Cramer SC. Agreed definitions and a shared
 401 vision for new standards in stroke recovery research: The Stroke Recovery and
 402 Rehabilitation Roundtable taskforce. *Int J Stroke*. 2017;12(5):444-450.
- 403 5. Morris JH, Bernhardtsson S, Bird ML, Connell L, Lynch E, Jarvis K, Kayes NM, Miller
 404 K, Mudge S, Fisher R. Implementation in rehabilitation: a roadmap for practitioners
 405 and researchers. *Disabil Rehabil*. 2019;12:1-10.
- 406 6. Raine R, Fitzpatrick R, Barratt H, Bevan G, Black N, Boaden R, Bower P, Campbell M,
 407 Denis J, Devers K, Dixon-Woods M, Fallowfield L, Forder J, Foy R, Freemantle N,
 408 Fulop N, Gibbons E, Gillies C, Goulding L, Grieve R, Grimshaw J, Howarth E, Lilford
 409 R, McDonald R, Moore G, Moore L, Newhouse R, O’Cathain A, Or Z, Papoutsis C,
 410 Prady S, Rycroft-Malone J, Sekhon J, Turner S, Watson S, Zwarenstein M.
 411 Challenges, solutions and future directions in the evaluation of service innovations in
 412 health care and public health. *Health Services and Delivery Research*. 2016;4:1-136.
- 413 7. Avan A, Digaleh H, Di Napoli M, Stranges S, Behrouz R, Shojaeianbabaei G, Amiri A,
 414 Tabrizi R, Mokhber N, Spence JD, Azarpazhooh MR. Socioeconomic status and stroke
 415 incidence, prevalence, mortality, and worldwide burden: an ecological analysis from
 416 the Global Burden of Disease Study 2017. *BMC Med*. 2019;17(1):191.
- 417 8. Ezejimofor MC, Chen YF, Kandala NB, Ezejimofor BC, Ezeabasili AC, Stranges S,
 418 Uthman OA. Stroke survivors in low- and middle-income countries: A meta-analysis
 419 of prevalence and secular trends. *J Neurol Sci*. 2016;364:68-76.

- 420 9. Dee M, Lennon O, O'Sullivan C. A systematic review of physical rehabilitation
 421 interventions for stroke in low and lower-middle income countries. *Disabil Rehabil.*
 422 2020;42(4):473-501.
- 423 10. Bernhardt J, Urimubenshi G, Gandhi DB, Eng JJ. Stroke rehabilitation in low-income
 424 and middle-income countries: a call to action. *The Lancet.* 2020;396 (10260):1452-62.
- 425 11. Bernhardt J, Borschmann KN, Kwakkel G, BurrIDGE JH, Eng JJ, Walker MF, Bird ML,
 426 Cramer SC, Hayward KS, O'Sullivan MJ, Clarkson AN. Setting the scene for the
 427 second stroke recovery and rehabilitation roundtable. *Int J Stroke.* 2019;14(5) :450-6.
- 428 12. Eng JJ, Bird ML, Godecke E, Hoffmann TC, Laurin C, Olaoye OA, Solomon J, Teasell
 429 R, Watkins CL, Walker MF. Moving stroke rehabilitation research evidence into
 430 clinical practice: Consensus-based core recommendations from the Stroke Recovery
 431 and Rehabilitation Roundtable. *Int J Stroke.* 2019;14(8):766-773.
- 432 13. World Bank Country and Lending Groups – World Bank Data Help Desk [Internet].
 433 Datahelpdesk.worldbank.org. 2020 [cited 25 May 2020]. Available from:
 434 [https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-](https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups)
 435 [country-and-lending-groups](https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups)
- 436 14. Johnson W, Onuma O, Owolabi M, Sachdev S. Stroke: a global response is needed. *Bull*
 437 *World Health Organ.* 2016;94(9):634-634A.
- 438 15. Miller E, Murray L, Richards L, Zorowitz R, Bakas T, Clark P, Billinger S.
 439 Comprehensive Overview of Nursing and Interdisciplinary Rehabilitation Care of the
 440 Stroke Patient. *Stroke.* 2010;41:2402-2448.
- 441 16. Clarke D, Forster A. Improving post-stroke recovery: the role of the multidisciplinary
 442 health care team. *Journal of Multidisciplinary Healthcare.* 2015;:433.

17. Teasell R, Meyer M, McClure A, Pan C, Murie-Fernandez M, Foley N, Salter K. Stroke Rehabilitation: An International Perspective. *Topics in Stroke Rehabilitation*. 2009;16:44-56. .
18. Teasell R, Salbach NM, Foley N, Mountain A, Cameron JI, Jong A, Acerra NE, Bastasi D, Carter SL, Fung J, Halabi ML, Iruthayarajah J, Harris J, Kim E, Noland A, Pooyania S, Rochette A, Stack BD, Symcox E, Timpson D, Varghese S, Verrilli S, Gubitz G, Casaubon LK, Dowlatshahi D, Lindsay MP. Canadian Stroke Best Practice Recommendations: Rehabilitation, Recovery, and Community Participation following Stroke. Part One: Rehabilitation and Recovery Following Stroke; 6th Edition Update 2019. *Int J Stroke*. 2020 Jan 27;1747493019897843.
19. Chimatiro GL, Rhoda AJ. Scoping review of acute stroke care management and rehabilitation in low and middle-income countries. *BMC Health Serv Res*. 2019;19(1):789.
20. N, Murray BJ, Swartz RH. Screening for Post-Stroke Depression and Cognitive Impairment at Baseline Predicts Long-Term Patient-Centered Outcomes After Stroke. *J Geriatr Psychiatry Neurol*. 2019;32(1):40-48.
21. Platz T. Evidence-Based Guidelines and Clinical Pathways in Stroke Rehabilitation-An International Perspective. *Front Neurol*. 2019;10:200
22. Quartey J, Kwakye S. Barriers to evidence-based physiotherapy practice for stroke survivors in Ghana. *S Afr J Physiother*. 2018;74(1):423.
23. Qiu X, Sit JWH, Koo FK. The influence of Chinese culture on family caregivers of stroke survivors: A qualitative study. *J Clin Nurs*. 2018;27(1-2):e309-e319.
24. Chen L, Sit JW, Shen X. Quasi-experimental evaluation of a home care model for patients with stroke in China. *Disabil Rehabil*. 2016;38(23):2271-6.

25. Zhou B, Zhang J, Zhao Y, Li X, Anderson CS, Xie B, Wang N, Zhang Y, Tang X, Prvu Bettger J, Chen S, Gu W, Luo R, Zhao Q, Li X, Sun Z, Lindley RI, Lamb SE, Wu Y, Shi J, Yan LL. Caregiver-Delivered Stroke Rehabilitation in Rural China. *Stroke*. 2019;50(7):1825-1830.
26. ATTEND Collaborative Group. Family-led rehabilitation after stroke in India (ATTEND): a randomised controlled trial. *Lancet*. 2017;390(10094):588-599.
27. SSO Toolkit [Internet]. World Stroke Organization. 2020 [cited 25 May 2020]. Available from: <https://www.world-stroke.org/publications-and-resources/resources/sso-toolkit>
28. Renner CLe, Outermans J, Ludwig R, Brendel C, Kwakkel G, Hummelsheim H. Group therapy task training versus individual task training during inpatient stroke rehabilitation: a randomised controlled trial. *Clin Rehabil*. 2016;30(7):637-48.
29. English C, Hillier SL, Lynch EA. Circuit class therapy for improving mobility after stroke. *Cochrane Database Syst Rev*. 2017;6(6):CD007513.
30. Janssen H, Ada L, Bernhardt J, McElduff P, Pollack M, Nilsson M, Spratt NJ. An enriched environment increases activity in stroke patients undergoing rehabilitation in a mixed rehabilitation unit: a pilot non-randomized controlled trial. *Disabil Rehabil*. 2014;36(3):255-62.
31. Kwakkel G. Impact of intensity of practice after stroke: issues for consideration. *Disabil Rehabil*. 2006;28(13-14):823-30.
32. InformMe - Telehealth resources in response to COVID-19 [Internet]. [Informme.org.au](http://informme.org.au). 2020 [cited 25 May 2020]. Available from: <https://informme.org.au/News/2020/03/26/COVID-19-Telehealth-resources>
33. Gimigliano F, Negrini S. The World Health Organization "Rehabilitation 2030: a call for action". *Eur J Phys Rehabil Med*. 2017;53(2):155-168.

- 492 34. Lindsay P, Furie KL, Davis SM, Donnan GA, Norrving B. World Stroke Organization
493 global stroke services guidelines and action plan. *Int J Stroke*. 2014; 9(Issue
494 Supplement A100):4-13.
- 495 35. Prydz EB, Wadhwa D. Classifying countries by Income. The World Bank. 2019 Sep; 9

Table 1: Demographic characteristics of the survey respondents

	HIC (N=350)		UMIC (N=238)		LMIC (N=44)	
	n	%	n	%	n	%
Profession						
Doctor	27	7.7%	46	19.3%	4	9.1%
PT*	126	36.0%	21	8.8%	33	75%
OT*	58	16.6%	4	1.7%	2	4.5%
Nurse	30	8.6%	8	2.3%	1	2.3%
SLP*	60	17.1%	3	1.3%	1	2.3%
Psychologist	9	2.6%	0	0.0%	0	0.0%
Other (Orthotics, dieticians, respiratory therapists, radiographers, social workers, paramedics, and managers)	18	5.1%	4	1.7%	1	2.3%
No response	22	6.3%	152	63.8%	2	5%
Setting						
Healthcare Facility	290	82.8%	116	48.7%	40	90.9%
Community	33	9.4%	3	1.3%	3	6.8%
Academic	14	4.0%	2	0.8%	0	0
No response	13	3.7%	117	49.1%	1	2.3%
Role						
Clinician	231	66.0%	87	36.6%	27	61.4%
Academic	63	18.0%	15	26.4%	5	11.4%
Both	2	0.6%	0	0.0%	0	0.0%
No response	54	15.4%	136	57.1%	12	27.2%

Table 2: The number of respondents reporting each key area as a priority for KT in their local health service

KEY AREAS	HIC(N=928)		UMIC(N=301)		LMIC (N=114)	
	n	%	n	%	n	%
Service Delivery						
Interdisciplinary care	157	16.9%	101	33.6%	27	23.7%
Screening and assessment	64	6.9%	35	11.6%	3	3.0%
Clinical Practice Guidelines	61	6.6%	10	3.3%	17	14.9%
Intensity	110	11.9%	10	3.3%	9	7.9%
Family support	40	4.3%	11	3.7%	9	7.9%
System						
Access to services	129	13.9%	55	18.3%	15	13.2%
Transitions in Care	141	15.2%	19	6.3%	6	5.3%
Resources						
Equipment and technology	74	8.0%	10	3.3%	10	8.8%
Staffing(numbers/ratios)	70	7.5%	7	2.3%	2	2.0%
Others						
Discipline-specific Interventions*	42	4.5%	17	5.6%	7	6.1%
Miscellaneous**	40	4.3%	26	8.6%	9	8.0%

N= total number of respondents who listed priorities for KT from each socioeconomic region

* Interventions specific to discipline included individual treatment approaches such as mirror therapy, Motor Imagery, Constraint Induced Movement Therapy, Functional Electrical Stimulation, Acceptance and Commitment therapy for treatment of depression, treatment of dysphagia, positioning to prevent shoulder subluxation etc.

** Miscellaneous included topics that did not fit into the description of the other categories such as political support from the government, annual reviews, understanding of neuroplasticity vs maladaptive plasticity, conducting large scale RCTs, encouraging more professionals into PhDs etc.

Table 3: Perceived feasibility of implementation of the key priority areas in HICs

		Very feasible		Not Very Feasible	
	N	n	%	n	%
Interdisciplinary Care	157	47	29.9%	19	12.1%
Screening and assessment	64	31	48.4%	2	3.1%
Access to services	129	26	20.1%	30	23.2%
Intensity	110	25	22.7%	24	21.8%
Transitions in care	141	23	16.3%	30	21.2%
Clinical Practice Guidelines	61	19	31.1%	10	16.3%
Specific interventions	42	18	42.8%	8	19.0%
Equipment and technology	74	14	18.9%	19	25.6%
Family support	40	12	30.0%	8	20.0%
Miscellaneous	40	12	30.0%	8	20.0%
Staffing ratios	70	10	14.2%	29	41.4%

N= Total number of respondents who prioritised a key area; n= number who responded for each level of feasibility

Table 4: Perceived feasibility of implementation of the key priority areas in UMICs

		Very feasible		Not very feasible	
	N	n	%	n	%
Interdisciplinary Care	101	37	36.6%	8	7.9%
Screening and assessment	35	17	48.5%	2	5.7%
Access to services	55	14	25.5%	10	18.0%
Transitions in care	19	8	42.1%	2	10.5%
Specific interventions	17	8	47.0%	2	11.8%
Miscellaneous	26	8	30.7%	5	19.2%
Family support	11	6	54.5%	0	0%
Clinical Practice Guidelines	10	3	30.0%	2	20.0%
Equipment and technology	10	3	30.0%	3	30.0%
Intensity	10	2	20.0%	2	20.0%
Staffing ratios	7	2	28.5%	1	14.2%

N= Total number of respondents who prioritised a key area; n= number who responded for each level of feasibility

507

508

509

510

511

512

Table 5: Perceived feasibility of implementation of the key priority areas in LMICs

		Very feasible		Not very feasible	
	N	n	%	n	%
Clinical Practice Guidelines	17	7	41.2%	5	29.4%
Intensity	9	6	66.6%	1	11.1%
Interdisciplinary Care	27	4	14.8%	4	14.8%
Access to services	15	4	26.7%	1	6.7%
Equipment and technology	10	3	30.0%	1	10.0%
Specific interventions	7	3	42.8%	1	14.2%
Miscellaneous	9	3	33.3%	2	22.2%
Screening and assessment	3	1	33.3%	0	0.0%
Family support	9	1	11.1%	1	11.1%
Transitions in care	6	1	16.6%	1	16.6%
Staffing ratios	2	1	50.0%	0	0.00%

N= Total number of respondents who prioritised a key area; n= number who responded for each level of

feasibility

521 **Figure legends:**

522

523 Figure 1: Responses received from countries represented as follows: HICs-Blue; UMICs-

524 Yellow; LMICs-Green

525