

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/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., Soloman, 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., Soloman, 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/>

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

4

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

6

7 **ARTICLE CATEGORY: Research paper**

8

9 **ABSTRACT**

10 **Purpose:**

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

18

19 **Methods:**

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

25

26 **Results:**

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

34

35 **Conclusion:**

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

40

41 **Keywords:**

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

44

45

46

47

48

49

50

51 **Introduction**

52

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

62

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

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

73

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

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

85

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

100

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.

110

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

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

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

133

134 In this sub-study, the key areas and feasibility responses are considered based on
135 socioeconomic status of the country of the respondent. Socioeconomic status of countries was
136 coded according to the World Bank classification by income, based on the Gross National
137 Income (GNI) per capita of each respondent country. HICs are defined as those with a GNI
138 per capita of \$12,376 or more, UMICs between \$3,996 and \$12,375 and LMICs between
139 \$1,026 and \$3,995 [13].

140

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

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

151

152 Further stratification of each of the key priority areas was carried out into very feasible,
153 moderately feasible and not very feasible categories, as reported by the survey respondents.

154 Frequency distributions were then used to calculate the percentage of respondents to the three

155 feasibility categories, within each key priority area. For example, if ‘x’ number of

156 respondents listed ‘interdisciplinary care’ as a priority out of a total of ‘N’ respondents,

157 percentage values were analyzed for ‘x’ to calculate the perceived feasibility. The ‘x’

158 responses were segregated into very feasible, moderately feasible and not very feasible

159 responses and were represented as percentages to compare the feasibility of ‘interdisciplinary

160 care’ across the socioeconomic regions.

161

162 **Results**

163

164 A total of 632 responses from healthcare providers across 28 countries were obtained with

165 1343 examples listed as priorities which could facilitate recovery after stroke. Of these, 350

166 (55%) respondents belonged to High Income Countries, 238 (38%) to Upper Middle-Income

167 countries and 44 (7%) to Lower Middle-Income countries. Figure 1 represents the

168 respondents’ countries from each socioeconomic region.

169

170 *[Figure 1 near here]*

171

172 ***Demographic characteristics of respondents***

173

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

176 There was a wide variation in the professional backgrounds of the survey respondents among
177 HICs, UMICs and LMICs. The majority of respondents were physiotherapists, comprising
178 36% (126/350) of responses from HICs and 75% (33/44) from LMICs. Although responses
179 were received from many healthcare professions in HICs, this was not the case with UMICs
180 and LMICs. As represented in table 1, the majority of the respondents across all the three
181 groups were clinicians and working in inpatient/outpatient facilities.

182

183 *[Table 2 near here]*

184

185 ***Priorities for KT implementation***

186

187 Interdisciplinary care was found to be the highest priority for healthcare providers across the
188 socioeconomic regions. Similarly, access to services was also highlighted as a high priority
189 across the three types of resource settings. Clinical Practice Guidelines was considered to be
190 a high priority by a greater proportion of respondents in LMICs (15%; 17/114) as compared
191 to HIC (7%; 61/928) or UMIC (3%; 10/301). Intensity of practice was prioritized by
192 healthcare providers in HICs (12%; 110/928) much more than practitioners in UMICs (3%;
193 10/301) and LMICs (8%; 9/114). Transitions in care showed a similar trend with greater
194 proportion of healthcare providers in HICs (15%; 141/928) considering it as a high priority,
195 as compared to the UMIC (6%; 19/301) or LMIC (5%; 6/114). The differences across all the
196 other topics were considered to be too small for further interpretation. The percentage
197 comparisons of the all the key areas is represented in table 3.

198

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

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

230

231 *[Table 6 near here]*

232

233 **Discussion**

234

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

241

242 Interdisciplinary care and access to services were areas of high priority across the three
243 groups. There is robust evidence that organized, interdisciplinary stroke care reduces length
244 of institutional care and long-term disability while also enhancing recovery and independence
245 [15]. Advantages gained are applicable regardless of level or type of stroke and across the
246 stroke care pathway [16]. Although dedicated interdisciplinary stroke rehabilitation units
247 have long been considered as the “gold standard” of care, access to these units remains
248 limited not only in LMICs but HICs as well. [17]. Going forward, concentrating resources

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

251

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

269

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

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

275

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

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

292

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

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

301

302 *Future scope and Recommendations*

303

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

306

307 *LMICs*

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

322

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

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

351

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

362

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

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

383

384 **Conclusion**

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

390

391 **References**

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

- 443 17. Teasell R, Meyer M, McClure A, Pan C, Murie-Fernandez M, Foley N, Salter K. Stroke
444 Rehabilitation: An International Perspective. *Topics in Stroke Rehabilitation*.
445 2009;16:44-56. .
- 446 18. Teasell R, Salbach NM, Foley N, Mountain A, Cameron JI, Jong A, Acerra NE, Bastasi
447 D, Carter SL, Fung J, Halabi ML, Iruthayarajah J, Harris J, Kim E, Noland A,
448 Pooyania S, Rochette A, Stack BD, Symcox E, Timpson D, Varghese S, Verrilli S,
449 Gubitz G, Casaubon LK, Dowlathshahi D, Lindsay MP. Canadian Stroke Best Practice
450 Recommendations: Rehabilitation, Recovery, and Community Participation following
451 Stroke. Part One: Rehabilitation and Recovery Following Stroke; 6th Edition Update
452 2019. *Int J Stroke*. 2020 Jan 27:1747493019897843.
- 453 19. Chimatiro GL, Rhoda AJ. Scoping review of acute stroke care management and
454 rehabilitation in low and middle-income countries. *BMC Health Serv Res*.
455 2019;19(1):789.
- 456 20. N, Murray BJ, Swartz RH. Screening for Post-Stroke Depression and Cognitive
457 Impairment at Baseline Predicts Long-Term Patient-Centered Outcomes After Stroke.
458 *J Geriatr Psychiatry Neurol*. 2019;32(1):40-48.
- 459 21. Platz T. Evidence-Based Guidelines and Clinical Pathways in Stroke Rehabilitation-An
460 International Perspective. *Front Neurol*. 2019;10:200
- 461 22. Quartey J, Kwakye S. Barriers to evidence-based physiotherapy practice for stroke
462 survivors in Ghana. *S Afr J Physiother*. 2018;74(1):423.
- 463 23. Qiu X, Sit JWH, Koo FK. The influence of Chinese culture on family caregivers of
464 stroke survivors: A qualitative study. *J Clin Nurs*. 2018;27(1-2):e309-e319.
- 465 24. Chen L, Sit JW, Shen X. Quasi-experimental evaluation of a home care model for
466 patients with stroke in China. *Disabil Rehabil*. 2016;38(23):2271-6.

- 467 25. Zhou B, Zhang J, Zhao Y, Li X, Anderson CS, Xie B, Wang N, Zhang Y, Tang X, Prvu
468 Bettger J, Chen S, Gu W, Luo R, Zhao Q, Li X, Sun Z, Lindley RI, Lamb SE, Wu Y,
469 Shi J, Yan LL. Caregiver-Delivered Stroke Rehabilitation in Rural China. *Stroke*.
470 2019;50(7):1825-1830.
- 471 26. ATTEND Collaborative Group. Family-led rehabilitation after stroke in India
472 (ATTEND): a randomised controlled trial. *Lancet*. 2017;390(10094):588-599.
- 473 27. SSO Toolkit [Internet]. World Stroke Organization. 2020 [cited 25 May 2020].
474 Available from: [https://www.world-stroke.org/publications-and-](https://www.world-stroke.org/publications-and-resources/resources/sso-toolkit)
475 [resources/resources/sso-toolkit](https://www.world-stroke.org/publications-and-resources/resources/sso-toolkit)
- 476 28. Renner C, Outermans J, Ludwig R, Brendel C, Kwakkel G, Hummelsheim H. Group
477 therapy task training versus individual task training during inpatient stroke
478 rehabilitation: a randomised controlled trial. *Clin Rehabil*. 2016;30(7):637-48.
- 479 29. English C, Hillier SL, Lynch EA. Circuit class therapy for improving mobility after
480 stroke. *Cochrane Database Syst Rev*. 2017;6(6):CD007513.
- 481 30. Janssen H, Ada L, Bernhardt J, McElduff P, Pollack M, Nilsson M, Spratt NJ. An
482 enriched environment increases activity in stroke patients undergoing rehabilitation in
483 a mixed rehabilitation unit: a pilot non-randomized controlled trial. *Disabil Rehabil*.
484 2014;36(3):255-62.
- 485 31. Kwakkel G. Impact of intensity of practice after stroke: issues for consideration. *Disabil*
486 *Rehabil*. 2006;28(13-14):823-30.
- 487 32. InformMe - Telehealth resources in response to COVID-19 [Internet]. [Informme.org.au](http://informme.org.au).
488 2020 [cited 25 May 2020]. Available from:
489 <https://informme.org.au/News/2020/03/26/COVID-19-Telehealth-resources>
- 490 33. Gimigliano F, Negrini S. The World Health Organization "Rehabilitation 2030: a call for
491 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

	N	Very feasible		Not Very Feasible	
		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%

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

499

500

501

502

503

504

505

506

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

	N	Very feasible		Not very feasible	
		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

	N	Very feasible		Not very feasible	
		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%

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

514 *feasibility*

515

516

517

518

519

520

521 **Figure legends:**

522

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

524 Yellow; LMICs-Green

525