

1 Introduction

2 Traumatic injuries in working age adults are a global public health problem. Traumatic injury or ‘major
3 trauma’ describes serious and often multiple injuries where there is a strong possibility of death or
4 disability¹ (e.g. traumatic brain injuries, complex fractures). Survivors of such injuries may experience
5 physical, social, and psychological problems, such as pain, fatigue, depression and anxiety, or hidden
6 disabilities, such as cognitive problems. A significant number of people experiencing trauma have residual
7 problems affecting their ability to return to, and remain in, work^{2, 3}. Therefore, it is important that
8 rehabilitation to support these individuals is available long-term and addresses all issues.

9 Systematic reviews suggest that vocational rehabilitation improves return-to-work for some conditions,
10 such as brain and spinal cord injury⁴⁻⁶, back pain⁷ and mental health problems⁸. However, moderate to
11 severe trauma can affect single or several body regions, which frequently leads to long-term psychological
12 problems⁹. Whilst there is evidence that effective vocational rehabilitation for some types of injuries such
13 as brain and spinal cord injury addresses both physical and psychological problems^{5, 7, 10}, evidence of this
14 for orthopaedic injury is lacking^{11, 12}. Previous studies have not evaluated vocational rehabilitation in
15 complex multi-organisational settings, such as UK National Health Service (NHS) major trauma centres,
16 which receive traumatic injury patients from large geographical areas and repatriate patients to a wide
17 range of local services.

18 Rehabilitation service organisation is, in most countries, complex with multiple organisations involved. This
19 means that rehabilitation pathways are not always consistent and are challenging to standardise and
20 evaluate, even in the UK, which has a universal integrated healthcare system. The British Society of
21 Rehabilitation Medicine core standards for specialist rehabilitation following major trauma state that
22 individuals should have access to specialist vocational rehabilitation services in the UK^{13, 14}. Although
23 published standards highlight the need for support to return-to-work following trauma, there is limited
24 evidence describing the consistency and quality of service provision across the UK. Studies mapping
25 vocational rehabilitation for specific conditions, such as stroke¹⁵ and long-term neurological conditions¹⁶,
26 ¹⁷ highlight the disparity between service provision in different regions of the UK.

27 In this study, we aimed to: 1) understand where and how trauma survivors' rehabilitation needs are
28 currently met in the UK trauma pathway in terms of vocational and psychological support and; 2) map
29 current UK NHS rehabilitation (usual care) across five trauma networks. A trauma network is the
30 collaboration between providers commissioned to deliver trauma care services in a geographical area.

31 **Methods**

32 This study feeds into a larger programme of work funded by the National Institute for Health Research
33 (NIHR, Ref: RP-PG-0617-20001). Findings will inform the development and implementation of a return-to-
34 work intervention (www.ROWTATE.org.uk). Ethical approval was obtained from the University of
35 Nottingham Faculty of Medicine and Health Sciences Research Ethics Committee (Ref: FMHS 150-1811)
36 and Leicester South NHS Research Ethics Committee (Ref 19/EM/0114). Recruitment lasted 12 months,
37 starting in February 2019.

38

39 Participants were recruited using purposive sampling via the University of Nottingham research team, and
40 via Principal Investigators at five UK major trauma centres. Participants were also recruited through
41 existing contacts and known providers of rehabilitation services. Written informed consent was obtained
42 from all participants taking part in audio recorded interviews and focus groups. For all other research
43 activities (informal interviews, workshops), participants were given the time and opportunity to opt out,
44 otherwise consent was assumed.

45

46 Researchers (authors JK, KB) conducted semi-structured interviews (n=38) and focus groups (n=4 focus
47 groups, total of 17 participants) with stakeholders to obtain qualitative data about the rehabilitation
48 pathways. Workshops (n=5 workshops, total of 43 participants) with service providers and trauma
49 survivors (rehabilitation physicians, occupational therapists, physiotherapists, speech and language
50 therapists, psychologists, nurses, trauma practitioners and previous trauma patients) were also conducted
51 by researchers (JK, ST) at five UK major trauma centres to understand more about their trauma pathway.
52 For further information about the pathways, appropriate service providers (e.g. trauma practitioners, case
53 managers, trauma rehabilitation coordinator) were consulted through informal interviews (n=8) about
54 current referral processes and usual care within these centres. The data were used to map current

55 rehabilitation pathways and create a rich description of usual care across the five major trauma centres.
56 Publicly available documents/online resources (n=10) and relevant NHS Trust website were also
57 consulted. These included the National Clinical Audit of Specialist Rehabilitation for Patients with Complex
58 Need following Major Injury reports, British Society of Rehabilitation Medicine recommendations for best
59 practice and the Trauma Audit & Research Network website. Summary of resources shown in Appendix
60 1.

61 We followed Sinclair's¹⁵ approach to using soft-systems methodology to guide the data collection and
62 analysis of this study. We used an analytic soft-systems methodology framework known as CATWOE
63 (Customers, Actors, Transformation, Worldview, Owners, Environment), to guide the interview questions
64 and inform data analysis (Table 2)¹⁸. This framework enabled us to generate an operational definition of
65 usual care in the major trauma centres allowing understanding of where needs are met and to map existing
66 services. It also allowed us to understand the relationship between those delivering services (actors), such
67 as vocational rehabilitation therapists and those receiving usual care (customers), such as trauma
68 survivors.

69 Most interviews were audio recorded and transcribed where possible, otherwise notes were taken.
70 Workshops were recorded using contemporaneous notes by a researcher. All data were analysed
71 thematically following Braun and Clarke's¹⁹ approach, informed by the a priori constructs of CATWOE.
72 The transcripts were independently analysed by authors (JK and KB) and main themes identified were
73 discussed with other authors (KR, ST) for agreement. Data were also used to inform the mapping of service
74 pathways.

75 Rehabilitation pathways were visually mapped across five major trauma networks, which were informed
76 by consultation with stakeholders (e.g. rehabilitation consultants, therapists, clinical psychologists, NHS
77 managers, solicitors), as previously mentioned. In order to highlight the complexity of the system, ensure
78 consistency of reporting and enable comparison across the different trauma networks, the pathways were
79 mapped against the British Society of Rehabilitation Medicine 'Core Standards for Specialist Rehabilitation
80 following Major Trauma'. This 'ideal' pathway post-trauma is shown in Figure 1.

81 **Results**

82 We recruited a variety of key stakeholders (n=106) including trauma survivors, carers, NHS service
83 providers (e.g. case managers, general practitioners and other trauma rehabilitation specialists) private
84 service providers and solicitors. A summary of the characteristics of participants is shown in Table 1.
85 Service providers worked across different NHS healthcare settings, including acute, community and
86 primary care, private rehabilitation providers, third sector services and the insurance industry.

87

88 Data obtained through qualitative methods and extensive pathway mapping highlighted the complexity of
89 the trauma pathways across England. Some of the common issues identified across the major trauma
90 networks were: 1) inconsistent transition from acute care to community services due to a lack of
91 communication between different services and healthcare providers when a patient is discharged from
92 hospital; 2) geographical barriers (e.g. postcode lottery); 3) a lack of expertise in areas located further from
93 the major trauma centre; and 4) a clear gap in vocational and psychological support for trauma survivors,
94 particularly those with musculoskeletal injuries.

95 The mapped pathways for each major trauma network are shown in Appendices 2-6. It is clear that the
96 'ideal' flow of patients through the rehabilitation system as depicted by the British Society of Rehabilitation
97 Medicine guidelines (Figure 1), is not the case in the five networks illustrated. It is in fact, much more
98 complex, with some patients receiving no support or being referred to an inappropriate facility (e.g. spinal
99 cord injury patient being repatriated to a brain injury unit whilst waiting for an appropriate bed space).
100 However, it is important to note that some well-established pathways that sufficiently support trauma
101 survivors do exist, but the majority of these pathways are for patients with neurological conditions. A
102 summary of one pathway is shown in Figure 2, highlighting the issues at each point along the pathway.
103 There is a clear difference to the 'ideal' trauma pathway.

104 The use of the analytical framework (CATWOE) facilitated the understanding of the implementation context
105 for trauma rehabilitation services and the issues within the current pathway.

106 **Customers:** Customers are anyone that could benefit from vocational rehabilitation/psychological support,
107 which could be the trauma survivor, their family, or their employer. Individuals often have unrealistic

108 expectations of their recovery post-trauma, which causes stress to the patient and in some cases, the
109 employer:

110 *'I've got many, many patients who they ignore our [rehabilitation experts] advice and go back to*
111 *work earlier, and they go a step backwards' (Rehabilitation consultant)*

112 *'I think I should have taken on some reduced duties or something first. That was my choice. They*
113 *[employer] offered that and I said I'd be fine and then it turned out pretty bad for me.'* (Trauma
114 *survivor, musculoskeletal injury)*

115 There is also a general lack of knowledge outside of the healthcare system about the impact of trauma,
116 which makes the return-to-work process even more challenging:

117 *'There is that big question around disclosure, head injuries, trauma, for 'Joe Bloggs' employers it's*
118 *quite a hard thing to get their heads round, well hang on a minute how is this [injury] going to*
119 *impact on you [patient]?... sometimes a lot of employers, they don't know, they haven't got a clue,*
120 *they have never had to deal with it, they don't know where to go, they don't know where to ask [for*
121 *support].'* (Disability employment advisor)

122 There is a clear gap in vocational support for individuals with certain types of injuries, especially traumatic
123 amputations, and musculoskeletal injuries:

124 *'With orthopaedic, complex orthopaedic stuff, which is going to be the vast majority I think of what*
125 *you're seeing here, occupational therapy provision is difficult I think, it'd be fair to say...and there*
126 *isn't an occupational therapy vocational rehab service for these people.'* (Rehabilitation consultant)

127 *'Unless you have quite a bad head injury, they [commissioners] just don't see musculoskeletal*
128 *injuries as a problem or amputee people don't think they need help to go back to work because*
129 *they just crack on, but actually there may be things [that are required], like worksite assessment.'*
130 (Occupational therapist)

131 A number of service providers were unaware of specific support for amputees and people with burns, by
132 comparison with the well-known charities for brain and spinal injuries. The majority of vocational
133 rehabilitation teams across the five major trauma pathways only offer return-to-work support to individuals

134 with acquired or traumatic brain injury (See appendices 2-5). Thus, service providers perceive that more
135 patients with brain injury tend to get back to work than those with spinal injury, even though the latter
136 typically have no cognitive impairment:

137 *'Because I think there's actually a lower percentage of spinal clients that get back to work than*
138 *there is brain injury...where you have targeted neuro rehab but focused on vocational, you could*
139 *be looking to get sort of 30, 33% back to work whereas I think spinal is something like 19 or 20%,*
140 *which is interesting when they're cognitively intact in the main. So, you would think that the barriers*
141 *would be more physical in nature but they don't get returned' (Case manager)*

142 Stakeholders suggested that the pathway is currently skewed in favour of those with acquired brain
143 injuries, perhaps because they often require more intense, long-term rehabilitation. Stakeholders also
144 expressed concern over the lack of support for individuals that are discharged quickly from hospital, with
145 seemingly less severe injuries. These individuals move through the trauma pathway so quickly that they
146 do not get picked up by community-based services.

147 Some individuals do not want their employers to know about psychological issues or outcomes of injury
148 that are not obvious, such as fatigue, incontinence, cognitive problems and anxiety. This makes it
149 particularly challenging for therapists when supporting someone in their return-to-work, as such issues, if
150 unaddressed, may act as barriers to a sustainable return-to-work:

151 *'...most people with considerable, significant physical injuries focus on recovering the physical*
152 *component of their injuries, not recognising the psychological aspects which themselves are*
153 *neglected by the patients or their carers, and/or their staff, but are only picked up once the patient*
154 *tries to reintegrate into society' (Clinical psychologist)*

155 **Actors:** The individuals delivering care play an important part in the success of rehabilitation and an
156 individual's return-to-work. However, referrals are impacted by lack of knowledge about which services
157 currently exist and service providers' understanding of the whole rehabilitation pathway:

158 *'One of the discussions that we've just had is, we, as a service, are very unaware of exactly what's*
159 *available in the county...We met recently with representatives from some of these teams, the brain*

160 *injury team, etc, and I think the issue at the moment is that actually it's very much a patchwork of*
161 *availability. (Clinical psychologist)*

162 Although some stakeholders had better knowledge of service provision in their local area, this tended to
163 be condition-specific and relevant to their position in the pathway (e.g. an acute hospital-based
164 occupational therapist will be aware of equipment provision for discharge planning, but may not know
165 about vocational support). There is a general lack of knowledge about vocational rehabilitation and
166 psychological services across the different trauma networks.

167 Employers face similar challenges and may not always recognise psychological or hidden issues, making
168 it difficult for them to understand how to support an employee in their return-to-work. They often require
169 the help of a therapist to make workplace adjustments:

170 *'Managing those very difficult conversations because employers will say, can this person do the*
171 *job or not, and they're asking you as a clinician to make that decision. And I think one of the useful*
172 *things I've learnt from our work psychologist was, you don't say, yes or not, because you're not*
173 *the employer...sometimes I have said, you're the employer, these are the things that would support*
174 *this person to be able to do this job.'* (Vocational rehabilitation occupational therapist)

175 Another challenge raised by stakeholders was the difficulty in finding an appropriate role for someone after
176 traumatic injury and the importance of the NHS service provider (e.g. occupational therapist) in supporting
177 the employer with this process:

178 *'I think part of the difficulty is trying to work out how you can change work and getting the employers*
179 *to think differently about why they should support somebody going back to work, particularly I think*
180 *in high demand and highly technical jobs or very physical jobs. You often find that the employee*
181 *needs an alternative job that they don't have the skills to do anything else and that's very difficult.'*
182 (Occupational physician)

183 Some stakeholders stated that patients are not routinely asked about mood. One therapist highlighted the
184 challenge of supporting someone with psychological needs who does not want to engage with therapy and
185 the issue of not always being aware of such needs:

186 *'...depending on the client, we word it different ways but it's essentially how's your mood? But as*
187 *you know, people can't engage in therapy if they – if we're not addressing their mental health*
188 *because they might be so depressed that they're not opening their letters, so they don't know when*
189 *their appointment is. They can't organise themselves to get out of bed to arrange transport to get*
190 *in here. It's [addressing mental health needs] like the nuts and bolts of what we do; we can't do*
191 *what we do without being aware of that.'* (Speech and language therapist)

192 A common reason for not asking patients about their mental health or return-to-work plans was a lack of
193 confidence in dealing with these issues (i.e. not wanting to probe these important issues in case they
194 cannot support the patient), or limited referral options should individuals require more specific support
195 even when feeling confident about asking:

196 *'I think it depends if you've got an interest in it [vocational rehabilitation] as well...If you feel*
197 *confident. And what we're [senior therapists] finding...is a lot of OTs aren't feeling confident about*
198 *asking that question [about returning to work], they find it quite scary.'* (Occupational therapist)

199 Lack of service provision means that therapists are avoiding addressing issues that they cannot deal with:

200 *'There's just not really the [vocational or psychological] services out there to then signpost people*
201 *on to. So, you almost feel like you're opening a Pandora's box where you can't actually then put*
202 *those pieces back in.'* (Trauma ward occupational therapist)

203 **Transformations:** Stakeholders suggested that there is a lack of effective communication between
204 service providers, patients, and employers when a patient moves from the acute setting to the community.
205 Trauma survivors felt there was poor continuity of care and consistency in support after they left the major
206 trauma centre. Multiple service providers described the system as a lottery. This means that some
207 individuals fall through gaps in the system, receiving little or no support:

208 *'I mean it's part of the problem, it's not coordinated, it's a bit of a lottery as to what the pathway*
209 *was when you came through the service, what your injuries were, which directorate you came*
210 *through, what your postcode is, it's a lottery to what you can access. Some get really good stuff;*
211 *seen some really good UKROC [UK specialist Rehabilitation Outcomes Collaborative] rehab...but*

212 *then people have to wait four months to see an OT. It's good when you get it.' (Rehabilitation*
213 *consultant)*

214 In addition, therapists stated how hard it was to keep track of whether onward referrals for trauma survivors
215 were successful and concerns over whether their patients were receiving appropriate rehabilitation
216 following discharge:

217 *'When I was a ward therapist, you'd refer them [patients] and you didn't know if they were then*
218 *accepted, or if that referral had got missed. So, you'd just refer them in good faith, and you don't*
219 *know then what happened or if you're referring to somewhere else' (Community occupational*
220 *therapist)*

221 *'There's just nobody to take on that role for even making sure referrals have actually gone through*
222 *to these places [community teams]. And again, the numbers change from week to week and the*
223 *services change week to week. There's no central point of access for any of it [referral success].*
224 *(Hospital occupational therapist)*

225 The issue of limited resources causing long waiting lists was raised by the majority of stakeholders as one
226 of the barriers to patients receiving vocational rehabilitation. Waiting lists for community rehabilitation are
227 long across the five trauma networks, and in some areas, up to 12 months. Along with extended waiting
228 lists, there are few services providing vocational support within each trauma network, meaning that these
229 community teams are overloaded with referrals and do not have the resources to deal with the many
230 individuals requiring vocational and psychological rehabilitation, and are not receiving the timely support
231 they require:

232 *'...and again it's about the time scale and it's about the availability of resources. A health care*
233 *district might only have one neuro psychologist to deal with everything so it's how thin can they*
234 *spread themselves really?' (Case manager)*

235 **World view:** The public and professional view of vocational rehabilitation has an influence on the delivery
236 and funding of such services, which ultimately has a large impact on whether individuals are supported in
237 their return-to-work following trauma.

238 Various service providers discussed the view that delivering vocational rehabilitation in the acute setting
239 is often seen as unimportant by acute physicians and therapists. Attitudes among some healthcare
240 providers suggests that starting vocational rehabilitation in acute setting is 'too early' and is not discussed,
241 even though some are aware of the evidence supporting the benefit of early intervention²⁰⁻²⁵:

242 *'People don't know their rights about return to work or remaining in work. It's a big problem. People*
243 *don't even mention work in an acute hospital. It just doesn't even get discussed.'* (Occupational
244 *therapist)*

245 *'I think that focus is not in the mind of acute trauma team. I think in order to get it – keep that focus*
246 *this [do you want to get back to work] needs to be said from day one and day two and we keep*
247 *that over time, this chap is a driver, this chap is a butcher or something. We don't do that in the*
248 *NHS unfortunately.'* (Rehabilitation consultant)

249 In the initial stages post-injury, the focus is primarily on treating the medical issues and ensuring the patient
250 can be discharged from the major trauma centre as safely and as soon as possible. However, this means
251 that often the biopsychosocial factors that are important to an individual's recovery are sometimes
252 overlooked, especially their need to return-to-work.

253 *'Return to work is a luxury not a necessity'* (Occupational therapist)

254 A 'world view' where supporting return-to-work is seen as an extravagance and not routinely provided,
255 shows poor understanding of why vocational rehabilitation can be appropriate for those who want to work,
256 but may struggle in their pre-injury role. Some service providers suggested that employers do not know
257 how or are unwilling to support someone whose abilities have radically altered and can only, for example,
258 work a few hours per week. Being able to gradually reintegrate into work and accomplish a meaningful
259 amount of work whilst there is even more of a challenge when an employer is not willing to support their
260 employee:

261 *'If people can't get back to work within four to six weeks, they [employers] will not start a phased*
262 *return... people pull their hair out when they get hospitals or GPs say, this person can only work*
263 *two hours a week. They're like, there's no point. There's no job that can be done for two hours a*
264 *week.'* (Occupational physician)

265 **Owners:** The provision of vocational rehabilitation, or any rehabilitation services are strongly influenced
266 by government policies and those commissioning such services. This could include policy makers, service
267 managers and commissioners (someone involved in the planning and purchase of NHS and publicly
268 funded social care services) but may also include managers in an employing organisation and
269 Occupational Health or Human Resources departments.

270 One of the issues with ensuring an individual receives appropriate support post-trauma is keeping track of
271 services which are constantly changing in response to funding alterations and service developments. Even
272 when good services exist, service providers frequently expressed their frustration over instances of the
273 decommissioning of vocational rehabilitation services, which are already limited. One occupational
274 therapist explained that decommissioning often happens if the need of such a service is not recognised
275 from a commissioning perspective:

276 *'That's one of the problems, constant change. And we used to have a super vocational rehab*
277 *service in our community team and they got rid of it because they [commissioners] didn't think*
278 *people needed to return to work' (Occupational therapist)*

279 This view was corroborated by others:

280 *'There's a lot of need, and not a lot of provision... [rehabilitation] is the first thing to get axed when*
281 *budget cuts come in.'* (Rehabilitation consultant)

282 The perceived value for money of the service can determine which services are funded (i.e., services
283 appear to apply to a small percentage of a population locally or services that are not strongly evidence-
284 based). This can impact especially those with more severe trauma who need longer term support, including
285 with psychological issues:

286 *'So I think that's another thing I notice... is that hospitals are forever trying to get rid of follow-up*
287 *clinics... you're not going to spot recurrence [of psychological issues] when you see someone in*
288 *an outpatient clinic so let's just get rid of them. It's just so expensive in doctor time... But obviously*
289 *psychologically, it's really important time for continuity of relationships.'* (Clinical psychologist)

290 There was a perception that those responsible for making service delivery plans do not always understand
291 the medical diagnoses leading to poor service design and funding decisions, ineffective rehabilitation, and

292 non-individualised care. One stakeholder highlighted the challenges for trauma survivors where needs are
293 not met because services are designed to match resources. Some people fall outside the service referral
294 criteria, but have rehabilitation needs that require support, some are only able to receive rehabilitation for
295 a finite period but is required for a longer duration:

296 *‘As resources have become more limited within the NHS, you find that things have become much*
297 *more streamlined so people are only offered so many weeks of service intervention or in order to*
298 *qualify for some brain injury services you have to have more than two different problems. So, if*
299 *you need cognitive rehab and you need speech and language therapy you’ll get a service. But if*
300 *you only need cognitive rehab it’s more difficult.’ (Case manager)*

301

302 **Environmental context:** The major trauma centres across the UK are located in major cities and tend to
303 be surrounded by multiple community-based teams, with easier access to support. However, further away
304 from the trauma centre, service provision becomes patchy and there is greater inconsistency in the
305 availability of psychological and vocational support. Each major trauma centre is considered the hub of its
306 trauma network and repatriating hospitals are seen as the spokes. However, between the hub and the
307 spokes can be up to two hours travelling distance, making it challenging for patients to access the major
308 trauma outpatient services. There is also geographical disparity across the country in terms of what is
309 available for individuals post-trauma. Often those located in more rural areas receive the least support or
310 must travel long distances to receive support. One trauma survivor highlighted their experience of leaving
311 the acute setting:

312 *‘One of the areas I struggled with is when you’re in the major trauma centre, you very quickly*
313 *become aware that you are getting the best treatment that is available, but of course as soon as*
314 *you become well enough, they want to move you to either your local hospital or something like*
315 *that, which is what I did. I actually did feel – I actually feel that the physio and everything just went*
316 *down a notch, not in a bad way but in a noticeable way.’ (Trauma survivor, polytrauma)*

317 Inconsistent service provision across the country and constantly changing services means that the system
318 is challenging for service providers to navigate. Stakeholders stated that services either do not exist, had

319 been recently decommissioned, or the team was spread so thinly across the region that they were unable
320 to see new patients:

321 *'So, in terms of geographical area, [county name] is split into North and South [county name] for a*
322 *lot of services, and some services cover both parts, some just the north, some just the south. The*
323 *service that they do offer is often very different in terms of assessment, treatment, how long people*
324 *can be treated for, things like that...So it's a real patchwork...there's a lot of uncertainty.'* (IAPT
325 *Clinical psychologist)*

326 As service provision is limited in some areas, stakeholders frequently stated that patients are often offered
327 outpatient appointments at their major trauma centre, so that they receive timely support, even if it is a
328 significant distance to travel. Often no local services are available, so patients opt to return to the major
329 trauma centre, which may be difficult for individuals:

330 *'The community services are very fragmented, and again a lot of what I see is sort of more*
331 *specialist neuro rehab stuff, but similarly, you know, we end up bringing people back to physio in*
332 *[city name] sometimes, if they're struggling to access, even just for orthopaedic physio, and*
333 *particularly the less experienced, if they've got really complex, like pelvic injury, all those kind of*
334 *things.'* (Rehabilitation consultant)

335 **Discussion**

336 Our findings support the hypothesis that the rehabilitation pathways followed by patients after trauma are
337 extremely complex, with few, if any patients following the proposed ideal pathway put forward by the British
338 Society of Rehabilitation Medicine¹⁴. Although individual services aim to deliver effective rehabilitation, the
339 lack of communication between acute and community services has an impact on the continuity of care
340 being provided.

341 There are several well-established pathways, particularly for people with neurological injuries, however
342 there are clear gaps in service provision for those with musculoskeletal injuries and amputations. There is
343 a consistent lack of vocational rehabilitation and psychological services across the major trauma networks,
344 and in areas where they do exist, the waiting lists are too long to provide timely support. Although some

345 of the issues within the pathway are common knowledge among trauma stakeholders, there is limited
346 evidence explicitly highlighting the disparity in service provision across different regions of the UK.

347 Our study supports prior UK studies with traumatic injury patients, which highlighted the lack of
348 psychological discussion, support and signposting for trauma patients²⁶, and gaps identified when
349 transitioning from hospital to community²⁷. Previous research also corroborates our findings in that clinical
350 decisions post-trauma are limited by insufficient resources, gaps in communication, conflicting
351 organisational priorities and unrealistic patient expectations²⁸, and highlights the value of effective multi-
352 disciplinary input and co-ordinated care²⁹. However, this study systematically explored these issues and
353 the extent of current provision gaps in five UK major trauma centres, providing a more detailed map of
354 current service provision that no prior research has achieved to date.

355 The present work also highlights the geographical nature of the gaps and how these impact on service
356 access. This study contributes to the evidence gap in understanding UK service provision across the
357 pathways and identifies geographical areas and services that require more funding. Until awareness is
358 raised about geographical areas across the UK with limited service provision and service gaps, it is unlikely
359 that change will occur and thus, the system will not improve. In addition, this work may contribute to the
360 understanding of international rehabilitation services with similar integrated systems to the UK NHS,
361 highlighting areas that may require more funding or support, or potentially inform pathway development in
362 other complex healthcare systems³⁰.

363 Crossing boundaries (i.e. across healthcare, social care, industry, employment sector) and
364 multidisciplinary delivery of rehabilitation is important³¹, particularly when providing vocational and
365 psychological support^{7, 10, 32, 33}. However, there still appears to be a lack communication and continuity of
366 care when patients are discharged from an acute setting. Although a known issue among clinicians and
367 reported across the literature^{26, 27, 29, 34}, our findings suggest that problems still exist. The introduction of
368 the Rehabilitation Prescription in 2013 aimed to improve communication along the pathway and ensure
369 that all information concerning injury management (including long-term goals) is transferred across all
370 relevant services/sectors. The 2019 NSCASRI report stated that even though the Rehabilitation
371 Prescription was completed for 89% patients, the mandated data collection was limited (physical,
372 cognitive/mood, psychosocial needs) providing little useful information about rehabilitation needs³⁵. An

373 updated version of the Rehabilitation Prescription was released in 2019 and hopes to address this gap in
374 continuity of care following discharge, by requiring a summary of rehabilitation needs on leaving the acute
375 setting³⁶.

376 Geographical barriers are an issue within the current rehabilitation pathway, and service provision tends
377 to become more limited the further a patient is located from a major trauma centre. Some major trauma
378 centres have up to two-hour repatriation distances and trauma networks can have catchment areas of up
379 to six million people, it is not surprising therefore that current pathways differ from the 'ideal' British Society
380 of Rehabilitation Medicine pathway. However, clinical guidelines suggest that all trauma patients should
381 have access to timely and appropriate rehabilitation, including vocational rehabilitation and psychological
382 support³⁷.

383 Not only is there limited vocational rehabilitation service provision across the major trauma networks, there
384 are long waiting lists in areas where there is good support. This means that early and timely rehabilitation
385 after trauma is not always feasible. Evidence supports the benefit of early vocational rehabilitation, which
386 should be delivered as soon as possible post-trauma²⁰⁻²⁵. The importance of timely psychological support
387 post-trauma is also recognised in the literature^{38, 39} and patients should have access to these services to
388 reduce long-term psychological problems. Occupational therapists and other allied health professionals
389 may benefit from training to increase confidence in addressing vocational and psychological issues.
390 However, services and resources need to be available in order that any problems identified can be
391 addressed.

392 This study had several strengths and provides new evidence to highlight gaps in current service provision
393 post-traumatic injuries. We interviewed a wide range of stakeholders across a variety of trauma networks
394 and obtained a broad perspective of the current pathways across five diverse (i.e. geographically,
395 socioeconomically, and ethnically) trauma networks. To ensure pathway maps were as accurate as
396 possible, they were amended as necessary following stakeholder engagements and their development
397 was an iterative process. We also drew on clinical guidelines to identify missing information and guide
398 questioning when finalising our diagrams against all stakeholder feedback. However, there were also some
399 limitations. We did not manage to recruit any commissioners or employers, and only spoke to a small
400 number of carers, meaning that we were unable to obtain their perspectives on the rehabilitation pathway.

401 In summary, while there are many examples of rehabilitation identified especially for specific injury groups
402 (e.g. traumatic brain and spinal injuries), our research shows also there are many gaps in service
403 provision, which were more pronounced for other injury groups (e.g. musculoskeletal injuries and
404 amputations) and for patients located further from major trauma centres. The gaps and/or inconsistencies
405 in care were especially problematic in relation to vocational rehabilitation and psychological services
406 across the major trauma networks. Guidelines and literature consistently recommend a multidisciplinary
407 approach to rehabilitation; however, it appears that the system is not as co-ordinated as it could be.

408

409 Rehabilitation services in the UK (and likely in other countries) have developed piecemeal, usually in
410 response to specific identified problems such as stroke, spinal cord injury, amputations. This means the
411 system is fragmented and has not developed with a strong theoretical framework, nor has it developed in
412 a patient-centred way. Consequently, there is a complex set of individual services which address specific
413 injury types or problems, but rarely consider the multifaceted rehabilitation needs of a patient. In contrast,
414 patients who have suffered major trauma often present with a broad range of problems which usually
415 require input from multiple individual services. This means that patients frequently have problems for which
416 there is no identified specific service, leading to issues and poor rehabilitation support. A timely example
417 is patients with long-term rehabilitation needs following COVID-19, in which individuals may require
418 pulmonary rehabilitation, but may also need additional input relating to emotional and psychological
419 problems, and possibly fatigue and cognitive issues. Given the complexity of the rehabilitation pathway, it
420 is unlikely a patient will be able to access support for all issues in a timely manner.

421 Further research is required to map vocational rehabilitation provision and identify service gaps across all
422 major trauma networks in the UK. This should be informed by interviews with a wider range of
423 stakeholders, including carers, employers and commissioners. Research is also required to evaluate the
424 use of the Rehabilitation Prescription and its impact on vocational rehabilitation and psychological support
425 received by trauma patients. Commissioners and providers of rehabilitation services should use our
426 findings to assess how well services are meeting patient need and ensure provision of services addressing
427 the gaps we identified.

428

429 **Clinical messages**

430

431 1. Rehabilitation pathways followed by patients after trauma are extremely complex, with few, if any
432 patients following an 'ideal' pathway.

433 2. There is a lack of vocational rehabilitation and psychological support, particularly for individuals with
434 musculoskeletal injuries.

435 3. Continuity of care on discharge from acute to community services is hampered by a lack of
436 communication.

437

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444
445 **Author contributions**

446 JK contributed to the main writing of the paper, with additional input from all authors. JK and KB conducted all
447 interviews and focus groups, JK and ST conducted workshops. Data analysis was conducted by JK and KB,
448 then reviewed by KR and ST. JK visually mapped all trauma pathways. All authors critically reviewed the final
449 version of the manuscript for publication. All authors read and approved the final manuscript.

450
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452 None declared.

453
454
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460 of Health and Social Care.

461
462 **Supplementary Material**

463 Included are the appendices discussed in this paper: (1) summary of published and online resources used
464 to inform mapping of pathways (2) mapping of trauma rehabilitation pathway in trauma network 1, (3)
465 mapping of trauma rehabilitation pathway in trauma network 2, (4) mapping of trauma rehabilitation
466 pathway in trauma network 3, (5) mapping of trauma rehabilitation pathway in trauma network 4, (6)
467 mapping of trauma rehabilitation pathway in trauma network 5.

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Table 1: Characteristics of participants

Participant type	Injury/profession	Number	% total (n=106) †
Trauma survivor	Amputation	1	1
	Brain Injury	6	6
	Orthopaedic	10	9
	Poly-trauma (including brain injury)	2	2
	Spinal injury	2	2
Carer	Partner with orthopaedic injury	1	1
	Partner with traumatic injury	1	1
Healthcare provider	Case manager	3	3
	Clinical psychologist	10	9
	Emergency doctor/consultant	4	4
	General Practitioner	4	4
	Occupational physician	1	1
	Occupational psychologist	1	1
	Occupational therapist	26	25
	Physiotherapist	5	5
	Psychiatrist	1	1
	Rehabilitation doctor/consultant	12	11
	Speech and language therapist	1	1
	Trauma rehabilitation coordinator	1	1
	Trauma practitioner	4	4
	Trauma psychologist/psychotherapist	2	2
	Other stakeholder	Clinical researcher	1
Disability employment advisor		3	3
Solicitor		2	2
Trauma charity volunteer/coordinators		2	2

† percentages rounded to nearest whole number, hence does not sum to 100%

Table 2: Summary of CATWOE definitions

CATWOE	Definition	Relevance to research aim
Customers	Patients receiving usual care, or the beneficiaries of the system.	Trauma survivors, family members or other stakeholders (e.g. employers) benefitting from usual care rehabilitation and vocational support.
Actors	People delivering rehabilitation and providing care.	Service providers (therapists, psychologists, occupational health, GPs, rehabilitation consultants, occupational health, physicians) providing the vocational rehabilitation or supporting a person in their return to work.
Transformations	Changes occurring as a result of usual care and additional services.	Communication between therapist and employer, or patient and employer to initiate the return to work process. Actions taken by key stakeholders.
World View	Context in which the transformation is meaningful, evaluation and knowledge of services.	Views, beliefs and opinions of those involved in the return to work process such as the patient, therapist and employer. The influence the key stakeholders have on the process.
Owners	Who the service is answerable to or funded by, who could stop changes from occurring.	Those that could affect the success of a return to work, in most cases those commissioning services.
Environmental context	Contextual, political and physical factors that may influence services.	The context in which the return to work process needs to occur. Potential environmental and contextual barriers (e.g. geography, resources) in respect of service provision, workplace or support.

Figure 1: The ‘ideal’ rehabilitation pathway following major traumatic injury taken from the BSRM core standards¹⁴. Patients flow through the system from acute care to community care, sometimes requiring more specialist care at a level 1 or 2 inpatient unit.

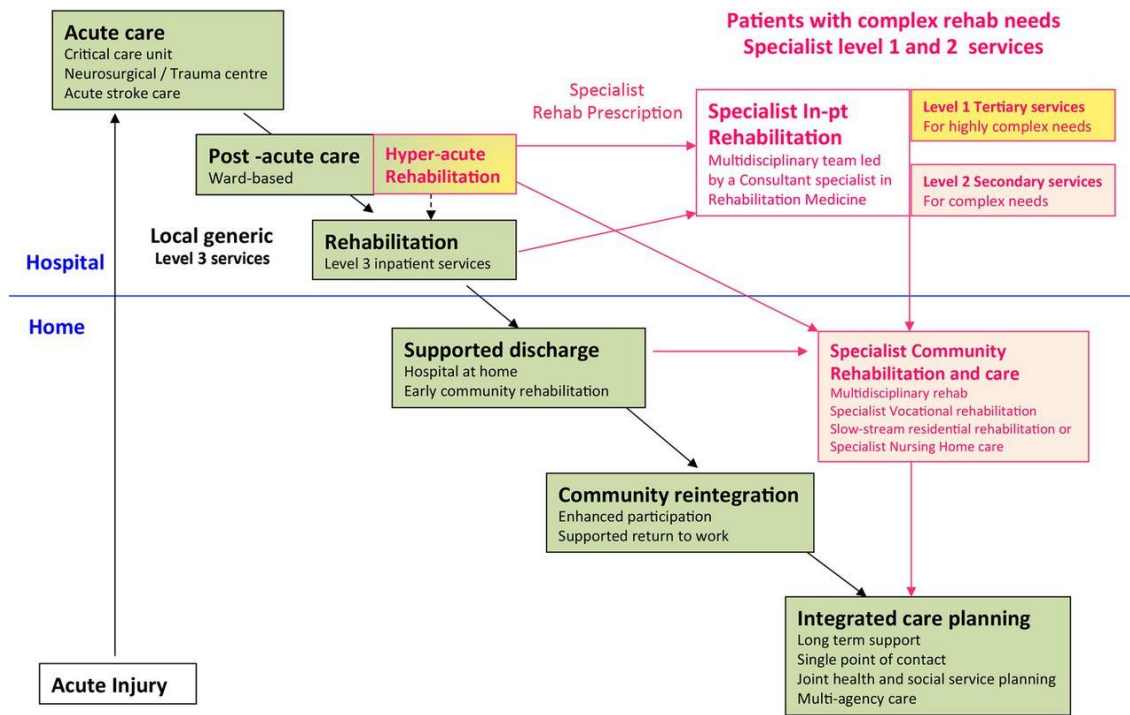
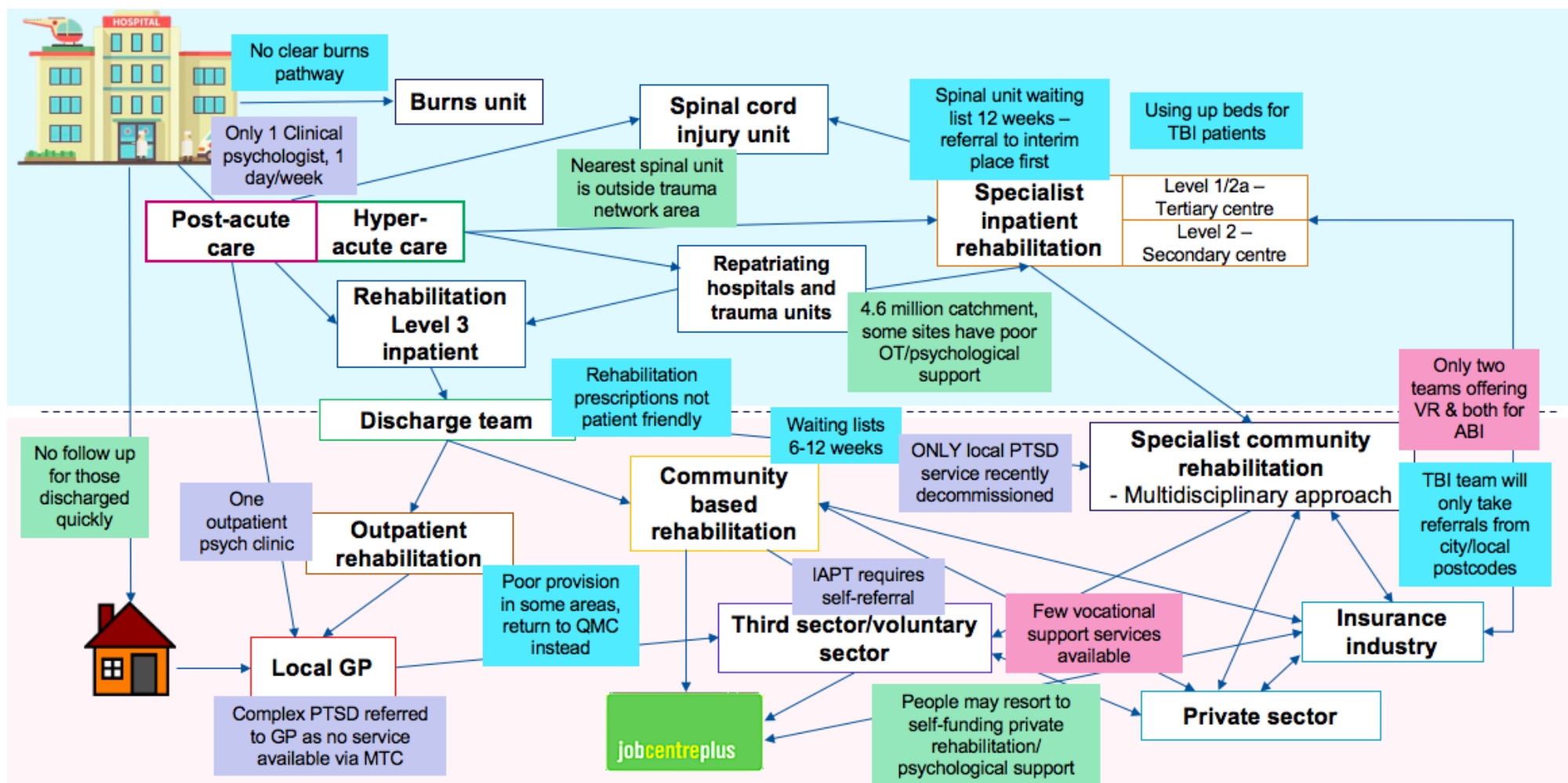


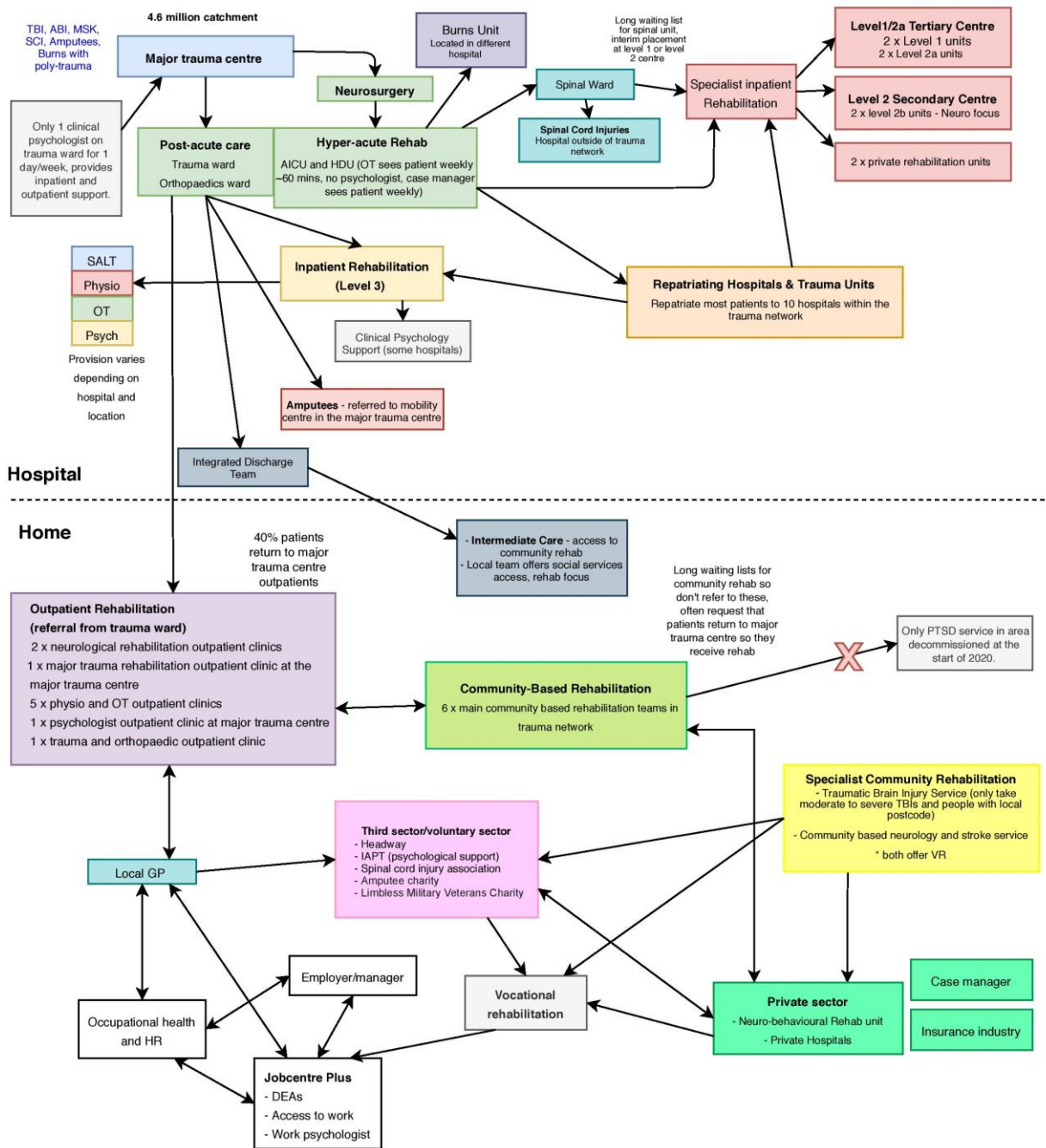
Figure 2: The 'reality' of the trauma pathway; example of rehabilitation pathway, highlighting the current issues. (ABI: Acquired Brain Injury; GP: General Practitioner; IAPT: Improving Access to Psychological Therapies; MTC: Major Trauma Centre; TBI: Traumatic Brain Injury; PTSD: Post-Traumatic Stress Disorder; VR: Vocational Rehabilitation) ** We intend for this figure to be presented as an interactive component, so that the issues in the coloured boxes appear when reader hovers over the different rehabilitation services.



Appendix 1: Summary of resources used

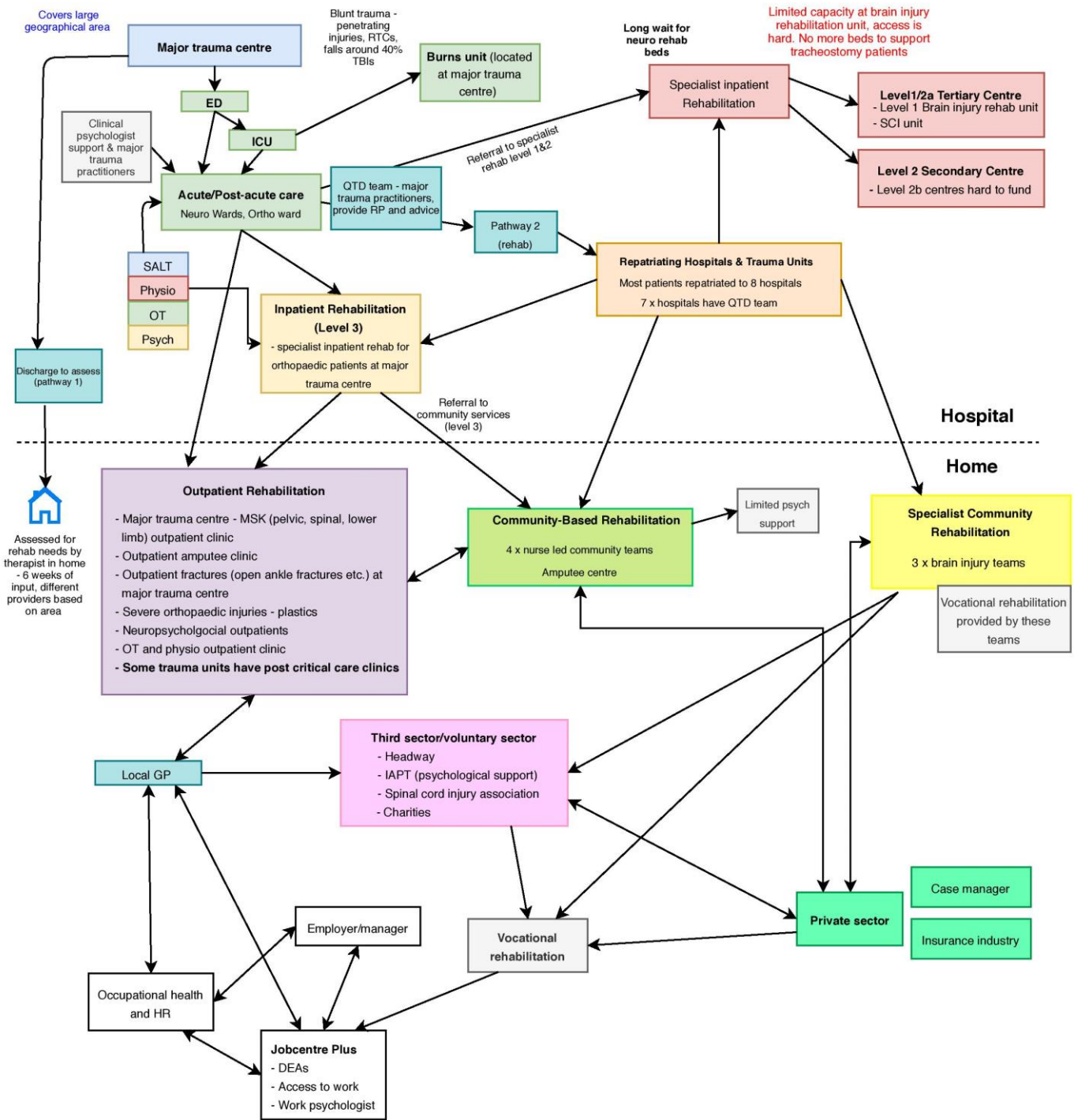
Resource	Reference (link where appropriate)
British Society of Rehabilitation Medicine. Specialist Rehabilitation in the Trauma pathway: BSRM core standards. 2018	British Society of Rehabilitation Medicine. Specialist Rehabilitation in the Trauma pathway: BSRM core standards. November 2018.
British Society of Rehabilitation Medicine. Rehabilitation for patients in the acute care pathway following severe disabling illness or injury: BSRM core standards for specialist rehabilitation. 2014	British Society of Rehabilitation Medicine. Rehabilitation for patients in the acute care pathway following severe disabling illness or injury: BSRM core standards for specialist rehabilitation. 2014. London: British Society of Rehabilitation Medicine
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Final report of the National Clinical Audit of Specialist Rehabilitation following major Injury. 2019	NCASRI. Final report of the National Clinical Audit of Specialist Rehabilitation following major Injury. 2019. London: Northwick Park Hospital
First report of the National Clinical Audit of Specialist Rehabilitation following Major Injury. 2016	NCASRI. First report of the National Clinical Audit of Specialist Rehabilitation following Major Injury. 2016. London: Northwick Park Hospital.
Second report of the National Clinical Audit of Specialist Rehabilitation following major Injury. Overcoming the Challenges. 2017	NCASRI. Second report of the National Clinical Audit of Specialist Rehabilitation following major Injury. Overcoming the Challenges. . 2017. London: Northwick Park Hospital.
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Appendix 2: Mapping of Rehabilitation Pathways in Trauma Network 1



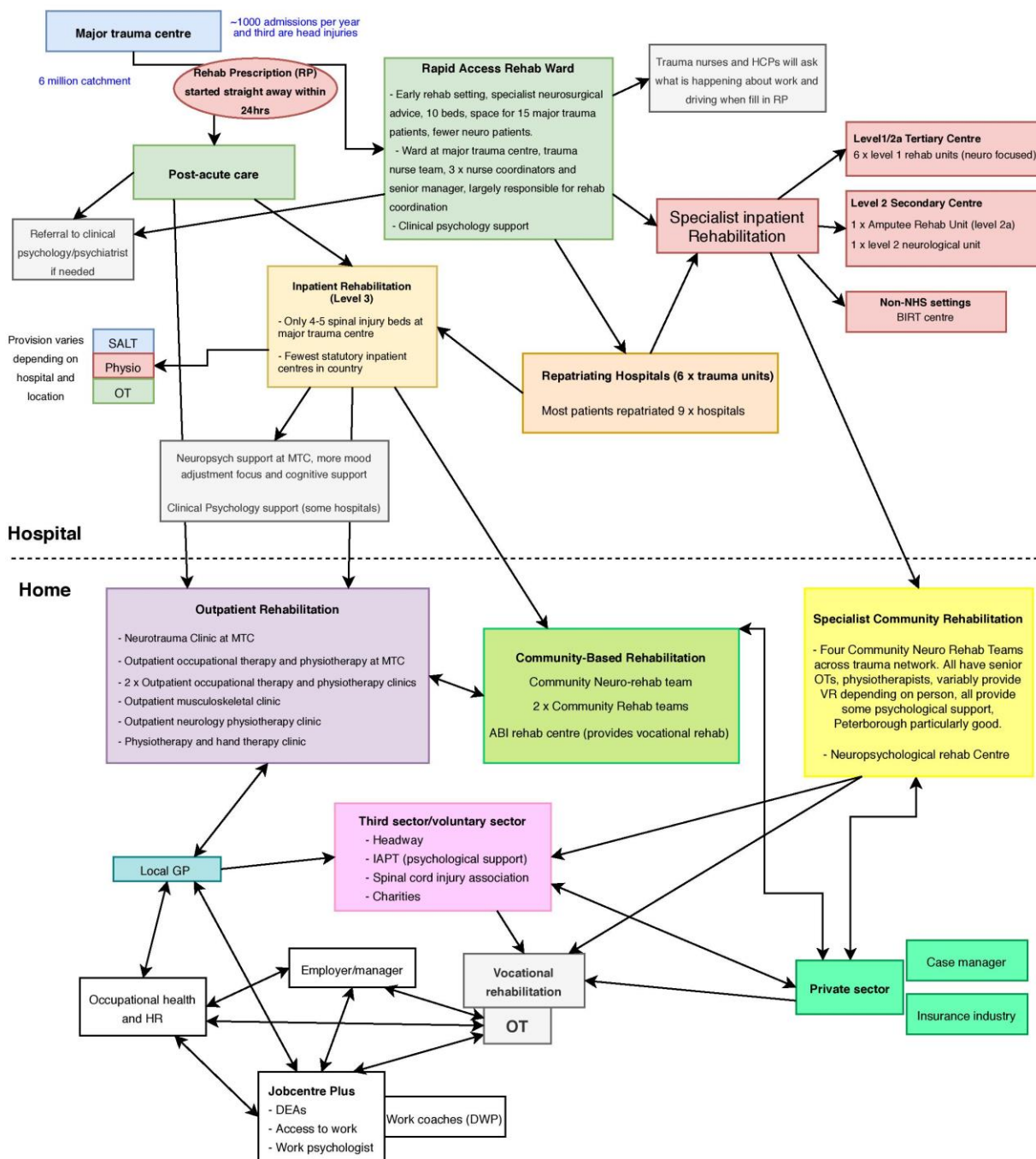
ABI: Acquired Brain Injury; AICU: Adult Intensive Care Unit; DEA: Disability Employment Advisor; GP: General Practitioner; HDU: High Dependency Unit; HR: Human Resources; IAPT: Improving Access to Psychological Therapies; OT: Occupational Therapy; MSK: Musculoskeletal; Physio: physiotherapy; Psych: Clinical psychologist/psychological support; PTSD: Post-Traumatic Stress Disorder; Rehab: Rehabilitation; SALT: Speech and Language Therapy; SCI: Spinal Cord Injury; TBI: Traumatic Brain Injury; VR: Vocational Rehabilitation

Appendix 3: Mapping of Rehabilitation Pathways in Trauma Network 2



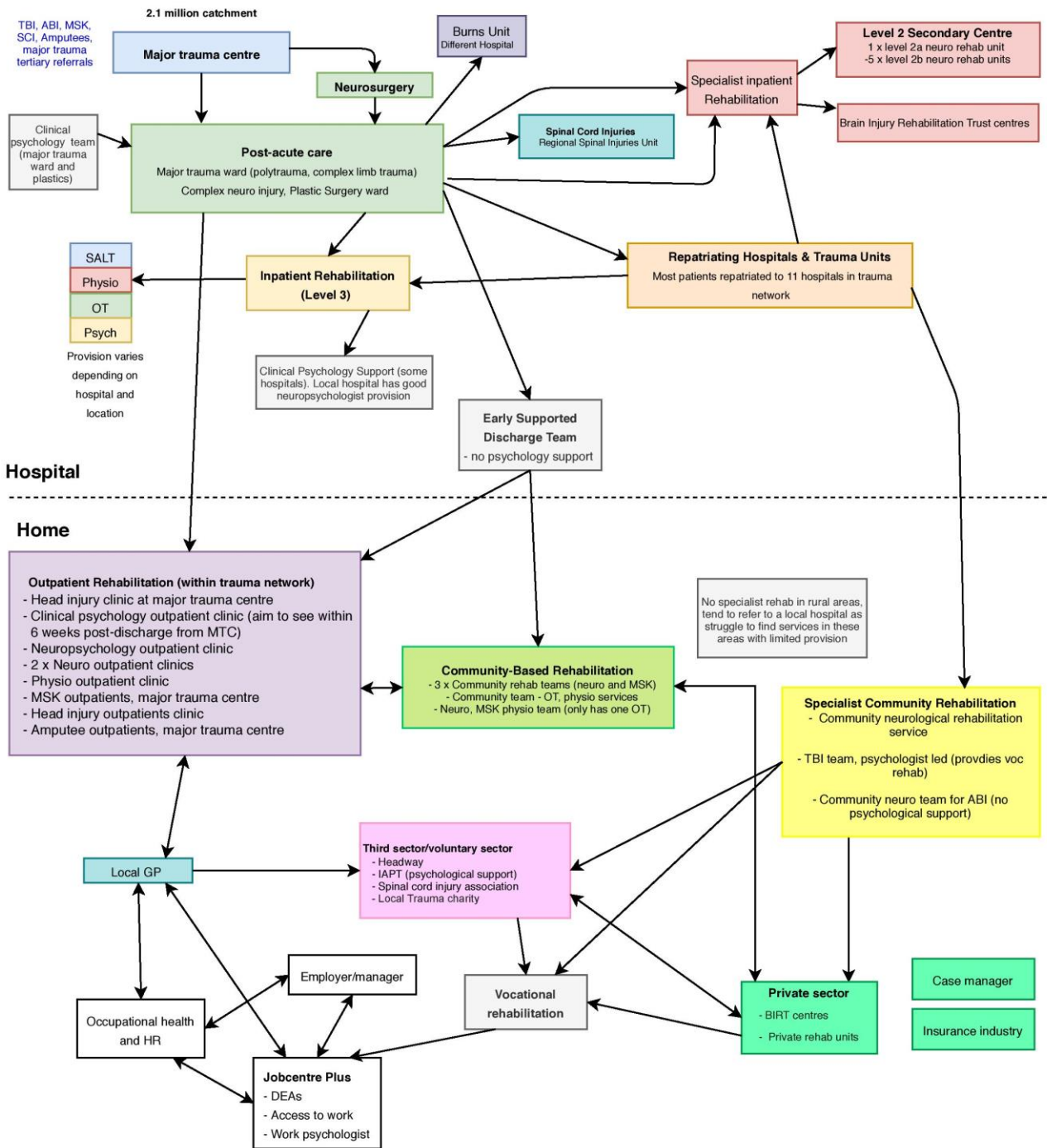
Disability Employment Advisor; ED: Emergency Department; GP: General Practitioner; HR: Human Resources; IAPT: Improving Access to Psychological Therapies; ICU: Intensive Care Unit; Ortho: Orthopaedic; OT: Occupational Therapy; Physio: physiotherapy; Psych: Clinical psychologist/psychological support; Rehab: Rehabilitation; RP: Rehabilitation Prescription; RTC: Road Traffic Collision; QTD: Quality Trauma Discharge; SALT: Speech and Language Therapy; SCI: Spinal Cord Injury; TBI: Traumatic Brain Injury

Appendix 4: Mapping of Rehabilitation Pathways in Trauma Network 3



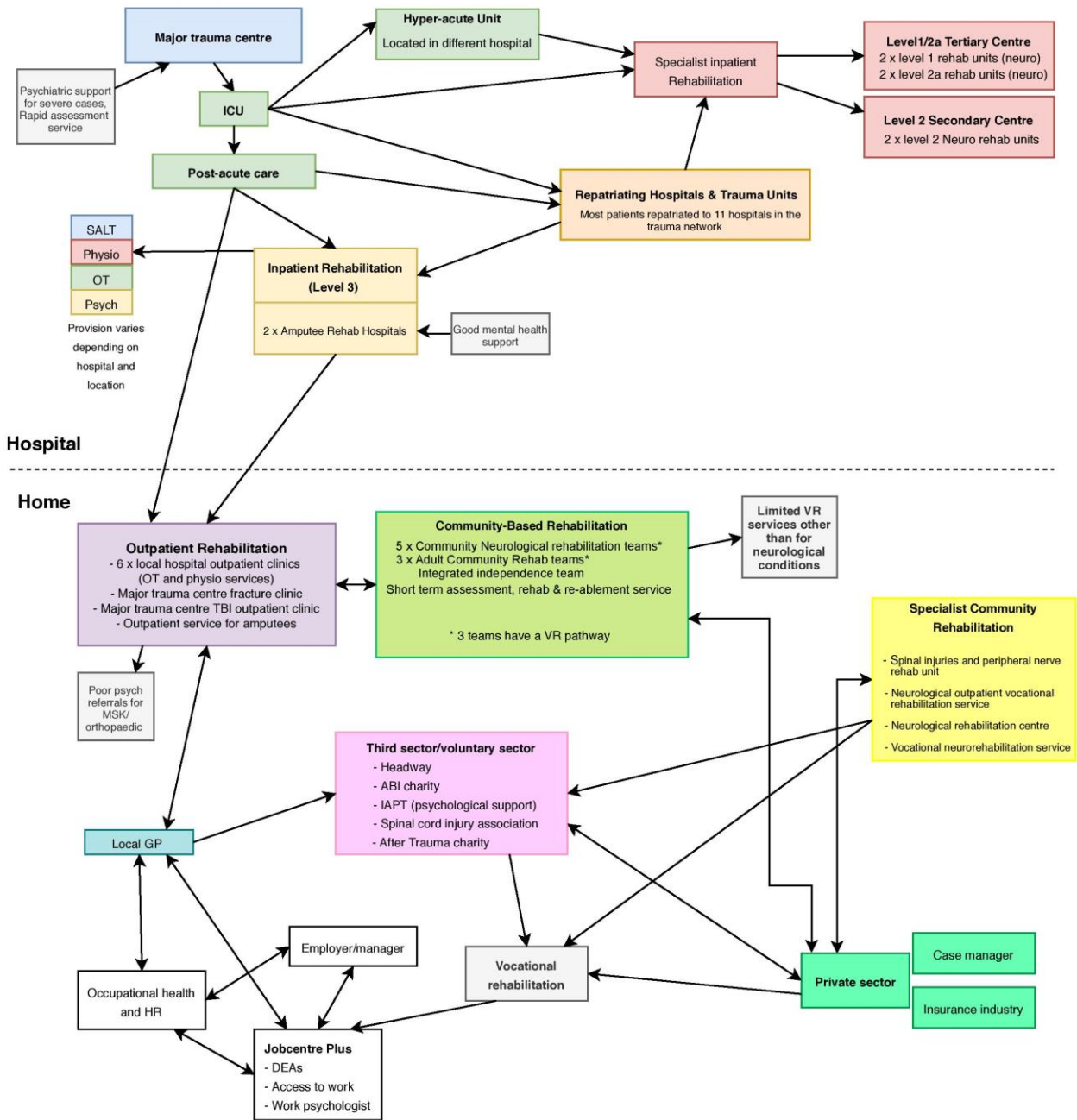
DEA: Disability Employment Advisor; DWP: Department for Work and Pensions; GP: General Practitioner; HCPs: Healthcare Professionals; HR: Human Resources; IAPT: Improving Access to Psychological Therapies; MTC: Major Trauma Centre; OT: Occupational Therapy; Physio: physiotherapy; Rehab: Rehabilitation; RP: Rehabilitation Prescription SALT: Speech and Language Therapy; VR: Vocational Rehabilitation

Appendix 5: Mapping of Rehabilitation Pathways in the Trauma Network 4



ABI: Acquired Brain Injury; DEA: Disability Employment Advisor; GP: General Practitioner; HR: Human Resources; IAPT: Improving Access to Psychological Therapies; OT: Occupational Therapy; MSK: Musculoskeletal; MTC: Major Trauma Centre; Physio: physiotherapy; Psych: Clinical psychologist/psychological support; PTSD: Post-Traumatic Stress Disorder; Rehab: Rehabilitation; SALT: Speech and Language Therapy; SCI: Spinal Cord Injury; TBI: Traumatic Brain Injury

Appendix 6: Mapping of Rehabilitation Pathways in Trauma Network 5



ABI: Acquired Brain Injury; DEA: Disability Employment Advisor; GP: General Practitioner; HR: Human Resources; IAPT: Improving Access to Psychological Therapies; ICU: Intensive Care Unit; OT: Occupational Therapy; Physio: physiotherapy; Psych: Clinical psychologist/psychological support; Rehab: Rehabilitation; SALT: Speech and Language Therapy; SCI: Spinal Cord Injury; TBI: Traumatic Brain Injury; VR: Vocational Rehabilitation