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1 **SPECIALISED CLINICAL SERVICES FOR YOUNG PEOPLE AT CLINICAL HIGH**
2 **RISK FOR PSYCHOSIS IN ENGLAND: NATIONAL AUDIT**

3
4 **Andrés Estradé^a, Tom John Spencer^{b,c}, Andrea De Micheli^{a,c}, Silvia Murguia^d, Umberto**
5 **Provenzani^e, Philip McGuire^b, Paolo Fusar-Polj^{a,c,e,f}**

6
7 **Affiliations:**

8 ^aEarly Psychosis: Interventions and Clinical-detection (EPIC) Lab, Department of Psychosis Studies, Institute of
9 Psychiatry, Psychology & Neuroscience, King's College London, London, United Kingdom

10 ^bDepartment of Psychosis Studies, Institute of Psychiatry, Psychology and Neuroscience, King's College, London,
11 United Kingdom

12 ^cOASIS service, South London and Maudsley NHS Foundation Trust, London, United Kingdom

13 ^dTower Hamlets Early Detection Service (THEDS), East London NHS Foundation Trust, London, United Kingdom

14 ^eDepartment of Brain and Behavioral Sciences, University of Pavia, Pavia, Italy

15 ^fNational Institute for Health Research, Maudsley Biomedical Research Centre, South London and Maudsley London,
16 United Kingdom

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25 **Corresponding author:** Andrés Estradé, andres.estrade_vaz@kcl.ac.uk

26 **ABSTRACT**

27 **Introduction:** Indicated primary prevention of psychosis is recommended by NICE clinical
28 guidelines, but implementation research on Clinical High Risk for Psychosis (CHR-P) services is
29 limited.

30 **Methods:** Electronic audit of CHR-P services in England, conducted between June-September
31 2021, addressing core implementation domains: service configuration, detection of at-risk
32 individuals, prognostic assessment, clinical care, clinical research, and implementation
33 challenges, complemented by comparative analyses across service model. Descriptive statistics,
34 Fisher's exact test and Mann-Whitney U tests were employed.

35 **Results:** 24 CHR-P clinical services (19 cities) were included. Most (83.3%) services were
36 integrated within other mental health services; only 16.7% were standalone. Across 21 services,
37 total yearly caseload of CHR-P individuals was 693 (average: 33; range: 4-115). Most services
38 (56.5%) accepted individuals aged 14-35; the majority (95.7%) utilised the Comprehensive
39 Assessment of At Risk Mental States (CAARMS). About 65% of services reported some provision
40 of NICE-compliant interventions encompassing monitoring of mental state, cognitive-behavioural
41 therapy (CBT), and family interventions. However, only 66.5% and 4.9% of CHR-P individuals
42 actually received CBT and family interventions, respectively. Core implementation challenges
43 included: recruitment of specialised professionals, lack of dedicated budget, and unmet training
44 needs. Standalone services reported fewer implementation challenges, had larger caseloads
45 ($p=0.047$) and were more likely to engage with clinical research ($p=0.037$) than integrated
46 services.

47 **Discussion:** While implementation of CHR-P services is observed in several parts of England,
48 only standalone teams appear successful at detection of at-risk individuals. Compliance with
49 NICE-prescribed interventions is limited across CHR-P services and unmet needs emerge for
50 national training and investments.

51

52 INTRODUCTION

53 Schizophrenia affects about 20 million people globally and is a top leading cause of health-related
54 disability(1), with associated economic costs ranging from 0.02% to 1.65% of the gross domestic
55 product(2) and severe disruption to the personal life of those affected(3). Schizophrenia-spectrum
56 and other primary psychotic disorders have an estimated mean lifetime prevalence of 9.57 per
57 1000(4), and often begin during adolescence and young adulthood (meta-analytic peak age of
58 onset at 20.5 years(5)). Following a first-episode of psychosis (FEP), current antipsychotic
59 treatments are limited at improving the causes, pathophysiology and course of schizophrenia(6).
60 In consequence, primary indicated interventions (i.e. targeted at individuals with attenuated signs
61 or symptoms of psychosis) have been incorporated into clinical practice to improve long-term
62 outcomes from an earlier clinical stage(7–10). Preventive strategies became feasible following
63 the introduction of the ‘at-risk mental state’ (ARMS) or ‘clinical-high risk state’ for psychosis (CHR-
64 P) constructs(11,12). Individuals meeting criteria for CHR-P are young (typically 14-35 years(10)),
65 accumulate various known risk factors(13–15), and experience a deterioration in functioning(16)
66 and neurocognition(17) as well as ‘attenuated psychotic symptoms’ (APS)(18) or ‘brief limited
67 intermittent psychotic symptoms’ (BLIPS)(19–21). The CHR-P criteria is robustly associated with
68 an enhanced risk of developing a psychotic disorder (OR: 9.32)(13) peaking at 2 years
69 (cumulative risk: 0.25) following the initial assessment and continuing to slowly increase over time
70 to a cumulative risk of 0.35 at 10 years(22,23). Deficits in social cognition (17,24), comorbid
71 mental health issues such as anxiety and depression(25), and suicidal ideation(26) are prominent
72 among CHR-P individuals. Over the long term, non-transitioning CHR-P individuals are affected
73 by mental health problems or decreased functioning(27–29), including premature death(23), at
74 higher rates than general population.

75 The CHR-P paradigm has extended across the world(30) through the implementation of
76 specialised clinics that provide assessment, clinical monitoring, and interventions to CHR-P
77 individuals(31), often within a non-stigmatizing community setting(32). Regional or national
78 networks of CHR-P services have been established in England(33), Italy(34), Switzerland(35) and
79 the United States(36,37). CHR-P services can operate as ‘standalone’ teams working
80 independently from other generic mental health services, as ‘integrated’ teams within broader
81 services, for example within early intervention services for psychosis also offering care to FEP
82 individuals, or under a ‘hub and spoke’ model, which have been described elsewhere(38).
83 Preventive care implemented by CHR-P clinic is contingent on detection of CHR-P individuals:
84 this process is non-systematic, and determined by referrals upon suspicion of psychosis

85 risk(31,33). In this context, help-seeking behaviours among young people at-risk of psychosis is
86 typically triggered not only by APS, but more likely by psychosocial dysfunction or affective
87 symptoms(39).

88 Overall, the CHR-P represents one of the most established preventive paradigms in clinical
89 psychiatry(10), having impacted national(40–43) and international(44) clinical guidelines. In the
90 UK, the National Institute for Health and Care Excellence (NICE)(41,42) recommended for young
91 individuals at-risk for psychosis the provision of early assessment, regular monitoring of
92 symptoms and functioning, alongside with individual cognitive-behavioural therapy (CBT), with or
93 without family therapy, and support for comorbid mental health conditions, while antipsychotic
94 medications are not recommended. However, earlier reports found inconsistencies among HCR-
95 P services in the capacity to meet NICE-recommended interventions(45). The 2016 and 2020
96 Access and Waiting time Standards(46) ratified the importance of implementing CHR-P services
97 nationwide but did not regulate how these services should be configured. Similar heterogeneity
98 in service provision and delivery for CHR-P individuals is typically observed worldwide(30,31).
99 The aim of this study is to systematically analyses the implementation extent of CHR-P services
100 across England, focusing on core implementation domains including service configuration,
101 detection of at-risk individuals, prognostic assessment, clinical care, clinical research(10), and
102 implementation challenges.

103 **METHODS**

104 ***Survey procedure***

105 An electronic audit of CHR-P services was developed, based on previous collaborative work
106 conducted by the Pan-London Network for Psychosis-Prevention (PNP)(33), leveraging current
107 clinical guidelines(41,42) and global healthcare research (30,31,47). The audit was implemented
108 using REDCap electronic data capture tools(48), hosted at King's College London. Email
109 invitations were sent in May 2021 to CHR-P services and early intervention services taking care
110 of individuals with a FEP, regional leads and other stakeholders. Dissemination of the audit was
111 further supported by networking with NHS England and several early interventions networks and
112 clinical academic sites in the England. Follow-up emails were sent in July 2021 and September
113 2021 to services not replying or providing incomplete responses. Overall, 107 early intervention
114 services from 48 distinct NHS Trusts were targeted. Only services with a CHR-P clinical
115 component were asked to complete the audit.

116 ***Recorded variables***

117 The audit included a combination of closed, multiple-choice, or open questions distributed across
118 core implementation domains: a) service configuration: b) detection of at-risk individuals; c)
119 prognostic assessment; d) clinical care; e) clinical research (eTable 1). In addition, f)
120 implementation challenges across the above domains were evaluated via open-ended questions.

121 **Data analysis**

122 Data was analysed with descriptive statistics using IBM's Statistical Package for the Social
123 Sciences (SPSS) v.27 software, including frequencies for categorical variables, and mean,
124 standard deviation (SD) and median for continuous variables. Comparative analyses were
125 conducted to stratify findings according to service configuration (i.e., integrated vs standalone vs
126 hub and spoke), including key variables belonging to the detection of at-risk individuals (outreach
127 and service promotion activities, online presence, availability of self-referral, caseload of CHR-P
128 individuals), prognostic assessment (systematic collection of outcome measures, regularly
129 collected outcomes), clinical care (duration of service provision, NICE-compliant intervention
130 package, psychosocial interventions, service users and other stakeholders' involvement), clinical
131 research (involvement in clinical research, interest in expanding or incorporating clinical research)
132 domains. Core implementation challenges reported in open-ended question were coded into
133 common categories and included in comparative stratified analyses. Comparative analyses were
134 conducted using Fisher's exact test for categorical variables, and Mann-Whitney *U* test for
135 continuous variables. All *p* values given are two-tailed and significance was set to $p=0.05$. A visual
136 representation of the geographical distribution of the participating services was done using an
137 online application (Maptive; <https://www.maptive.com>).

138 **RESULTS**

139 **Service configuration**

140 In total, 24 services from 19 English cities and 16 National Health Service (NHS) trusts
141 participated in the study between the 18th of June and 2nd of September 2021 (eFigure 1, eTable
142 2). This sample represents 22.4% of all targeted early intervention services for psychosis in
143 England, and 33.3% of all corresponding NHS Trusts. Most CHR-P clinical teams (83.3%) were
144 integrated within other mental health services, and only (16.7%) were standalone services (Table
145 1). There were no hub and spoke services. Over half of the services (66.7%) described their
146 catchment areas as presenting higher-than-average levels of economic deprivation (e.g.
147 unemployment, homelessness), and about half of services as presenting higher-than-average
148 levels of substance use (54.2%), crime and violence (50%), and ethnic minority populations

149 (50%). Regarding workforce composition, services reported an average of 5.7 (SD: 2.8) and a
150 median of 6 professional roles (Table 1): case managers or coordinators were present in 73.7%
151 of services, followed by administrative support roles (68.4%), psychiatrists and CBT practitioners
152 (63.2% each), clinical psychologists (58.9%), and nurses and occupational or vocational workers
153 (42.1% each). The remaining professional roles (e.g. assistant psychologist, mental health
154 support worker, team leader, trainee psychiatrist, social worker, family therapist, and other roles)
155 were present in 26% of services or less (Table 1).

156 ***Detection of at-risk individuals***

157 Out of 20 services, 15 (75%) reported the presence of regular outreach and service promotion
158 activities (Table 2). Mental health awareness and promotion for professionals (55%) and
159 community organisations (45%), and intensive networking with local or community stakeholders
160 (45%), were the three activities most frequently reported. The full list of outreach activities is
161 available in Table 2 and appear highly heterogeneous. In addition, 42.9% of services reported
162 having a service-dedicated website, 28.6% social media presence, and 38.1% reported no online
163 presence (Table 2). Most services (95.2%) allowed for self-referrals (Table 2). The total yearly
164 (i.e. last 12 months) caseload of CHR-P individuals across 21 services was 693, and the average
165 yearly caseload was 33 (range: 6-115), with a median value of 15 (Table 2). Most services (78.3%)
166 indicated that the caseload of CHR-P service users was not capped at any given time (Table 2).
167 Among the services with a capped caseload, the average maximum number of CHR-P service
168 users was 23 (range: 15-33) (Table 2). In addition, over half of services (65.2%) reported their
169 willingness to expand the caseload of CHR-P service users in the future.

170 ***Prognostic assessment***

171 Over half of services (56.5%) included service users aged 14-35 years, followed by 14-65 years
172 (13.0%) and 18-35 years (8.7%) (Table 3). Five services (21.7%) accepted users up to 65 years
173 of age. All services accepted users based on the presence of a CHR-P status, as defined by the
174 Comprehensive Assessment of At-Risk Mental States (CAARMS) (95.7%) or Structured Interview
175 for Prodromal Syndromes (SIPS) (4.3%) (Table 3). In addition, 21.7% of services accepted users
176 meeting criteria for DSM-5 Attenuated Psychosis Syndrome. In addition, most services (90%)
177 report the systematic collection of outcomes measures and achievements. The top six more
178 frequent outcomes include service user engagement or satisfaction (95% of services), followed
179 by family or carer satisfaction, general quality of life or wellbeing, and improvement in social

180 functioning (75% each), and psychosis transition rates and improvement in occupational
181 functioning (70% each). The full list of outcomes is available in Table 3.

182 ***Clinical care***

183 Duration of service provision was of 24 months across most services (33.3%), followed by 36
184 months (22.2%), 12 months (22.2%), 18 months (16.7%) and 6 months (5.6%) (Table 4).
185 Regarding NICE-compliant psychosocial interventions, 65% of services report the provision (as
186 yes/no answer) of some clinical monitoring plus NICE-standard CBT plus NICE-standard family
187 therapy, 30% of clinical monitoring plus NICE-standard CBT, and 5% clinical monitoring plus
188 NICE-standard family therapy. The full list of offered psychosocial interventions is available in
189 Table 4. However, among 10 services with available data, the actual yearly proportion of CHR-P
190 individuals receiving CBT was 66.5%; among 12 services, only 4.9% of the yearly caseload
191 received family-oriented interventions (Table 4). Approximately half of CHR-P services (47.4%)
192 involved service users, 26.3% family members or carers, and 15.8% past beneficiaries in various
193 service operations or activities (Table 4), including service promotion and development (40% of
194 services each), service evaluation and staff recruitment (30% each), service delivery (25%), and
195 research planning or promotion (10%) (Table 4).

196 ***Clinical research***

197 Approximately half of services (47.8%) were involved in clinical research, and most (91.3%) were
198 in principle interested in expanding or incorporating clinical research (eTable 3). Research into
199 evidence-based preventive interventions was felt particularly needed (55% of services). Other
200 areas considered in need of further research included addressing long-term outcomes of CHR-P
201 service users and the identification of users in need of extended care (20% of services), improving
202 accuracy of psychosis risk assessments (20%) and access and engagement with services (15%),
203 and research into different service models (20%). The full list of areas considered in need of
204 further research is available in eTable 3.

205 ***Implementation challenges***

206 This section summarises the most frequent implementation challenges reported by CHR-P
207 services across core implementation domains (full list available in eTable 4). In terms of service
208 configuration, the recruitment of specialised roles (66.7% of services), lack of dedicate funding
209 for the CHR-P pathway (58.3%), high staff turnover (25%) and insufficient funding for staff training
210 (25%) were the four most common implementation challenges. Regarding detection of at-risk

211 individuals, limited resources were key challenges for both expanding current service outreach
212 activities (50%) and increasing the current number of referrals (33.3%). Regarding the prognostic
213 assessment domain, the need for training opportunities in psychosis risk assessment was
214 reported by 37% of services, followed by the need to enhance the accuracy of current psychosis
215 risk assessments (20.8%). Common implementation challenges related to clinical care included
216 the need for training in clinical intervention skills (41.7%), low engagement with virtual
217 interventions and digital poverty among users (33.3%), higher than recommended caseloads
218 (25%), and limited resources to meet the national preventive targets (25%). Finally, among 12
219 services not involved in clinical research, implementation challenges included insufficient time or
220 personnel (83.3%), insufficient funding (75%), insufficient training or skills (66.7%) and research
221 not being considered a priority (41.7%).

222 ***Comparative analysis of integrated vs standalone services***

223 This section summarises comparative analyses between integrated and standalone services. In
224 terms of detection of at-risk individuals (Table 2), there were no differences regarding intensity of
225 regular outreach and service promotional activities. Similarly, no significant differences were
226 found for online presence and availability of self-referrals between. However, standalone services
227 reported a significantly higher yearly caseload of CHR-P individuals than integrated services
228 (average: 63 vs 28, $p=0.047$) (Table 2). Notably, among integrated services with available data
229 ($n=14$), CHR-P individuals represented only 14.4% of all yearly caseload (vs 87.5% in 3
230 standalone services), because these teams were more frequently providing care to FEP
231 individuals. In terms of regularly evaluated outcomes, no statistical differences were found
232 between integrated and standalone services (Table 2). Regarding interventions and provision of
233 care (Table 4), there were no differences with respect to the provision of NICE-compliant
234 interventions packages. In terms of specific psychosocial interventions and service users and
235 other stakeholders' involvement activities, there was only a higher provision of group
236 psychotherapy ($p=0.032$) across standalone services. Standalone services were also more likely
237 to conduct clinical research than integrated services ($p=0.037$). Finally, integrated services were
238 more likely to report lack of dedicated budget as a core implementation challenge ($p=0.020$) as
239 well as to report more severe implementation challenges.

240 **DISCUSSION**

241 To our best knowledge this analysis represents one of the largest national audits of CHR-P
242 services worldwide. Research into established CHR-P services can help inform decision making

243 for current and future CHR-P services in the United Kingdom and overseas. This is a particularly
244 pressing need as various regions prepare to extend coverage of early psychosis services, such
245 as Scotland's Mental Health Strategy 2017-2027(49). As such, in this section we offer a
246 discussion and recommendations for CHR-P services (summarised in eTable 5).

247 In terms of service configuration, this report provides an in-depth overview of 24 CHR-P services
248 across 19 English cities and 16 NHS trusts, representing 22.4% of all targeted early intervention
249 services for psychosis and 33.3% of NHS Trusts in England. In 2020/2021, the coverage of CHR-
250 P within 154 early intervention services was limited to 41-68% of services across all age
251 groups(50). One core finding in this domain is that most (83%) CHR-P services in our sample
252 were integrated as an adjunct component of broader mental health teams, particularly FEP
253 services. A similar proportion of integrated vs standalone CHR-P services (80.4% vs 19.6%,
254 respectively) can also be found globally(31). Integrating CHR-P teams in other mental health
255 services is likely to penalize the provision of preventive care to CHR-P individuals as time and
256 clinical resources are directed towards the most unwell users(33). These observations have been
257 fully corroborated by our comparative analysis of core domains across service configuration, as
258 detailed below. Importantly, most CHR-P services have been implemented in areas with higher
259 levels of socioeconomic deprivation, highlighting a window of opportunities for impacting core
260 social factors determining the onset of psychosis(13). In a recent review study, we highlighted
261 that CHR-P services have the potential to deliver several public-health preventive approaches for
262 the local community that target these factors(47). Regarding role composition, CHR-P services
263 require the synergy of a diverse team of professionals responsible for conducting specialised
264 assessments, delivering psychosocial and pharmacological treatments, implementing outreach
265 and service promotion activities and, potentially, coordinating and conducting clinical
266 research(31–33). CHR-P services were therefore multidisciplinary, with a median of 6 distinct
267 roles per service. However, this also translated in difficulties for the recruitment of specialised
268 roles, a core implementation challenge affecting CHR-P services regardless of their service
269 model. In addition, implementation challenges relating to this domain, particularly among
270 integrated services, included the lack of dedicated funding for the CHR-P pathway that affect
271 human resources and training. Overall, a stand-alone service model with dedicated funding and
272 resources appears as the preferable option as indicated by evidence from well-established
273 services(32,33). A standalone model allows, among other, for more effective outreach and
274 service-user intake, and overall quality of clinical care to CHR-P individuals. However, securing
275 funding from commissioners is challenging and partly dependant on socioeconomic and political
276 factors on a local and national level. New or developing services can benefit from available

277 guidelines developed by more experienced services when producing their business case(51). On
278 the other hand, alternative service models, such as integrated or 'hub and spoke', are more
279 prevalent in developing countries with incipient implementation of early psychosis services and
280 limited funding opportunities(52).

281 Detecting at-risk individuals is the first rate-limiting step for the large-scale implementation of the
282 CHR-P paradigm(10), which is then followed by assessing psychosis risk (53) and delivering
283 indicated phase specific evidence-based interventions(54). Detection of CHR-P individuals is
284 typically non-systematic(55), and dependant on the availability of means and resources within
285 each service. For example, we clearly observed heterogeneous outreach campaigns that were
286 not standardised across the nation. This resulted in a highly variable recruitment capacity, with a
287 median yearly caseload of only 15 individuals per CHR-P service and a total national yearly
288 recruitment capacity of 693 CHR-P individuals. Assuming a yearly number of 6,833 new cases of
289 psychotic disorders in England (2022 estimate for ages 16-35, <https://www.psymaptic.org/>), and
290 a likelihood of developing FEP from a CHR-P of 20% (at 2 years)(22) it is evident that to date, the
291 preventive capacity of the CHR-P paradigm is still largely unexploited in England, with numerous
292 young people putatively presenting with CHR-P features remaining undetected. Implementation
293 challenges relating to this domain were corroborated by the observation that over half of services
294 in our sample reported lack of recruitment capacity due to high demand or dedicated funding.
295 Limited recruitment capacity of CHR-P services across England might constitute a core barrier
296 for the identification of subjects who might benefit from specialised support. Inefficient recruitment
297 strategies result in only 5%(56) to 12%(57) of users receiving care for a FEP having previously
298 been offered support during the CHR-P stage. In the future, novel automatic detection methods
299 based on individualised transdiagnostic(58–60) or poly-environmental(61,62) risk calculators, as
300 well as e-detection strategies aimed at the general population(63), can help narrow the detection
301 gap(53). In comparative analyses, the yearly caseload of CHR-P individuals in standalone
302 services doubled that of integrated services. This, coupled with CHR-P individuals representing
303 a minority of people receiving direct clinical care within integrated services, indicates that
304 standalone services are more successful at detecting at-risk individuals. In addition, it highlights
305 how preventive efforts risk becoming diluted among CHR-P services where the clinical care is
306 embedded with other patient populations. Until novel solutions for the detection of at-risk
307 individuals become suitable for real-world implementation, recruitment strategies should be
308 resource-efficient and ensure adequate levels of pre-test risk enrichment(55,64). Outreach can
309 include a combination of active and passive strategies, including internet-based platforms with
310 self-referral options. For active outreach, collaborative relationships should be established with

311 key local stakeholders, with a priority given to clinical services working with adolescents and
312 young adults, given the higher pre-test psychosis risk among clinical samples(10).

313 Regarding prognostic assessment, our results are consistent with previous studies reporting 13-
314 15 to 30-35 years as the most frequent age inclusion criteria for CHR-P service in England(45)
315 and globally(31). In our sample, however, 21.7% of CHR-P services provided coverage for people
316 up to 65 years of age, a higher proportion than previously reported for global CHR-P services(31),
317 likely reflecting recent national guidance requiring lifespan early interventions for psychosis(46).
318 However, while the 15-35 age range corresponds with the epidemiological period of increased
319 risk for psychosis onset, age older than 35 acts as a protective factor(13). Therefore, extending
320 provision of CHR-P care to people over 35(46,50) is not supported by epidemiological evidence.
321 Furthermore, CHR-P assessment instruments have been validated for the 14-35 age range(65).
322 Therefore, no valid CHR-P assessment tools for older age groups exist. Unmet training needs in
323 assessment skills, and the need to enhance the accuracy of current psychosis risk assessment
324 instruments, emerged as core implementation challenges in this domain. On a commissioning-
325 level, the implementation of virtual learning programmes can be a far-reaching and cost-efficient
326 solution for training needs in psychosis risk assessment. Another interesting finding is that most
327 CHR-P services indicated some systematic collection of clinical outcomes, although there was no
328 consistency in the way outcomes were selected. Limited resources for collecting and processing
329 outcomes, coupled with the need for shared guidelines for outreaching and better integration with
330 current data capture system, were also common barriers. For example, standalone CHR-P
331 services that leverage electronic health records have been successful in completing complex and
332 long-term automatic follow-up of at-risk individuals, addressing real-world outcomes and clinical
333 needs(23). In addition, regional networks of CHR-P services(33) can facilitate the harmonisation
334 of core outcomes through collaborative efforts. In comparative analysis, we observed no
335 significant differences for regularly evaluated outcomes. However, almost 40% of the integrated
336 services did not report systematically monitoring transition risk, a core outcome within the CHR-
337 P and psychosis prevention paradigm(10). Overall, systematic collection of clinical outcomes is
338 key to monitoring service performance(51). Key clinical outcomes for CHR-P include not only
339 transition risk, but also measures of overall functioning and service user satisfaction(31).
340 Moreover, resource-constrained services should prioritise the 14-35 age range, the period of
341 highest psychosis risk, for maximum impact and efficiency.

342 In terms of clinical care, reported duration of service provision in our sample was of 18 months or
343 less (44.5% of services), 24 months (33.3%), or 36 months (22.2%). This duration of care often

344 does not seem sufficient to adequately cover the period of increased transition risk, which
345 continues increasing from 20% at 2 years to 29% at 4 years to 35% at 10 years(22). Notably, a
346 rebound increase in the risk of psychosis has been observed soon after the discharge from CHR-
347 P teams at 2 years(22). Extending standard care beyond the 2-year period is further supported
348 by the presence of other-than-transition long-term poor mental health outcomes among CHR-P
349 individuals, including admission into a mental health hospital, initiation of psychotropic treatment,
350 and increased risk of premature death(23). Furthermore, transition risk varies substantially across
351 the different CHR-P clinical subgroups(66), with BLIPS individuals showing the highest risk and
352 unmet needs(19–21,66–70). Consequently, a revised CHR-P paradigm based on the stratification
353 between CHR-P subgroups, might be a more efficient alternative(6,71). We also found that 65%
354 of CHR-P services reported offering a NICE-compliant interventions package encompassing
355 regular monitoring of mental state, NICE-standard CBT, and NICE-standard family therapy.
356 However, this finding was based on a categorical response (yes/not) that did not address the
357 extent and granularity of preventive care implemented in each site. When this was investigated,
358 only 65.5% and 4.9% of CHR-P individuals were offered CBT or family interventions, respectively.
359 This clearly represents a suboptimal threshold of implementation for preventive care.
360 Concernedly, several sites did not have data on preventive care offered and more than half of
361 those namely offering CBT or family therapy were unable to provide the specific number of service
362 users receiving these interventions. These findings might reflect the operational challenges that
363 CHR-P services face when effectively delivering treatments *vis-à-vis* limited capacity and
364 implementation challenges, as well as the limited efficacy of the recommended psychological
365 interventions(7,54,72–75). Unmet training needs in clinical intervention skills were a core
366 implementation challenge. Low service user engagement with virtual interventions in the context
367 of the COVID-19 outbreak, and limited capacity alongside higher than recommended caseloads
368 or increasing demand were also reported. These obstacles combine with challenges related to
369 budget and workforce, representing a barrier for the widespread compliance with national
370 commissioning guidance(46). Alongside NICE-recommended interventions, CHR-P services
371 reported the provision of several needs-based interventions related to occupational, practical, and
372 social requirements. Notably, standalone services in our sample were more likely to offer group
373 psychotherapy ($p=0.032$). Based on the most up-to-date clinical and epidemiological evidence,
374 the European College of Neuropsychopharmacology Network on the Prevention of Mental
375 Disorders and Mental Health Promotion has suggested a cautious approach centred on need-
376 based interventions and psychotherapy (CBT or integrated psychological interventions) titrated
377 on the specific risk profile across clinical subgroups and the individual's values and

378 preferences(10). However, the provision of needs-based interventions is inconsistent and not
379 widespread across CHR-P services. In addition, as indicated by the limited coverage of CBT and
380 family therapy, complex psychosocial interventions can fail to be delivered to many service users.
381 Overall, standard duration of clinical care and monitoring should extend to a recommended
382 minimum of 3 years, to cover the period of increased transition risk(22), and risk of other severe
383 real-world outcomes(23). Finally, a more efficient use of clinical resources can be achieved by
384 titrating interventions based on individual risk profiles (i.e. transition risk according to CHR-P
385 clinical subgroups, symptoms severity, and functional impairment) and individual preferences.

386 In terms of clinical research, standalone CHR-P services are most successful, being more likely
387 to participate in clinical research than integrated services ($p=0.037$). In fact, only one in three
388 integrated services reported involvement in clinical research (vs all standalone services). As with
389 previous domains, lack of capacity and funding were core barriers among integrated services for
390 conducting clinical research in psychosis prevention. In addition, research is often not considered
391 a priority. This is unsurprising, as limited resources in integrated services need to be distributed
392 across preventive efforts and the provision of care to more urgent cases. Standalone services, on
393 the other hand, can focalise resources into psychosis prevention-related projects. This is
394 illustrated by the OASIS service in South London, which has attracted £50 million grant income
395 during the 2010-2022 period and produced high-impact research outputs, as reflected by almost
396 6,000 OASIS-related citations by March 2020(32). Both within the United Kingdom(33) and
397 overseas(34,35), regional or national networks of CHR-P and FEP services continue to be
398 established. The creation or expansion of regional networks can act as a gateway for emerging
399 services into research activities, by leveraging resources, research initiatives, and expertise of
400 better-established ones. Finally, the harmonisation of clinical outcome measures across CHR-P
401 services would be an important step towards improved research.

402 One limitation is the use of a convenience sampling strategy. Therefore, we do not claim our
403 results to be representative of all CHR-P services worldwide. Nonetheless, we extend a previous
404 report of a London-based network of CHR-P services(33) to incorporate services in the South and
405 North of the England. Also, the reduced number of standalone services in our sample resulted in
406 small statistical power. As such, our comparative analyses should be considered exploratory,
407 requiring future replication through higher-powered studies. Finally, the period for data collection
408 overlapped with the COVID-19 pandemic, which often disrupted normal operations of NHS
409 secondary mental health services(76,77). As a result, some of our results might not accurately
410 reflect the normal operations of CHR-P services during the pre-pandemic period.

411 **CONCLUSION**

412 While implementation of CHR-P services is observed in several parts of England, only standalone
413 teams appear successful at detection of at-risk individuals. Compliance with NICE-prescribed
414 interventions is limited across CHR-P services and unmet needs emerge for national training and
415 investments.

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Table 1. Service configuration

Workforce composition	All services, n (%)
<i>Service model</i>	24 (100)
Integrated	20 (83.33)
Standalone	4 (16.67)
Hub and spoke	0
 <i>Role composition</i>	 19 (100)
Case manager or care coordinator	14 (73.68)
Administrative support	13 (68.42)
Psychiatrist	12 (63.16)
CBT therapist	12 (63.16)
Clinical psychologist	11 (58.89)
Nurse	8 (42.11)
Occupational or vocational worker	8 (42.11)
Assistant psychologist	5 (26.32)
Mental health support worker	5 (26.32)
Team leader	5 (26.32)
Trainee psychiatrist	4 (21.05)
Social worker	4 (21.05)
Family therapist	2 (10.53)
Other roles ^a	3 (15.79)
Average number of roles per service (SD)	5.68 (2.81)
Median number of roles per service	6.00

^aIncluded roles (services): CBT therapist trainee (1), carer liaison worker (1), clinical lead (1), keyworker (1), research worker (1). CBT, Cognitive-behavioural therapy; CHR-P, Clinical high-risk state for psychosis; NICE, National institute for Health and Care Excellence; SD, Standard deviation.

Table 2. Detection of at-risk individuals

Outreach and service promotion	All services, n (%)	Integrated, n (%)	Standalone, n (%)	Statistics^a
<i>Report regular outreach and service promotion activities</i>	20 (100)	16 (100)	4 (100)	<i>Fisher's exact test (p value)</i>
Yes	15 (75)	11 (68.75)	4 (100)	0.53
Mental health awareness and promotion for professionals	11 (55)	8 (50)	3 (75)	0.59
Intensive networking with local or community stakeholders	9 (45)	5 (31.25)	4 (100)	0.26
Mental health awareness and promotion for community organisations	9 (45)	6 (37.5)	3 (75)	0.29
Training in early psychosis detection skills	7 (35)	3 (18.75)	4 (100)	0.007
Psychoeducation workshops aimed at the general population	5 (25)	3 (18.75)	2 (50)	0.25
Mental health awareness and promotion for general population	4 (20)	2 (12.5)	2 (50)	0.16
Print media (e.g. brochures, posters, newsletters)	4 (20)	3 (18.75)	1 (25)	1.00
Media presence (e.g. TV, radio)	2 (10)	2 (12.5)	0 (0)	1.00
Roadshows and presence in public events	2 (10)	1 (6.25)	1 (25)	0.37
Stigma reduction activities/anti-stigma campaigns	2 (10)	1 (6.25)	1 (25)	0.37
Student internships	2 (10)	1 (6.25)	1 (25)	0.37
On-site screening	1 (5)	0 (0)	1 (25)	0.20
No	5 (25)	5 (31.25)	0	.
<i>Online presence</i>	21 (100)	17 (100)	4 (100)	<i>Fisher's exact test (p value)</i>
Service-specific website	9 (42.86)	6 (35.29)	3 (75)	0.27
Social media presence	6 (28.57)	3 (17.65)	3 (75)	0.053
None of the above	8 (38.10)	7 (41.18)	1 (25)	1.00
<i>Availability of self-referral</i>	21 (100)	17 (100)	4 (100)	<i>Fisher's exact test (p value)</i>
Yes	20 (95.24)	16 (94.12)	4 (100)	1.00
No	1 (4.76)	1 (5.88)	0	.
Caseload	All services, n (%)	Integrated, n (%)	Standalone, n (%)	Statistics^a
<i>Is the caseload of CHR-P individuals capped at any given time?</i>	23 (100%)	19 (100%)	4 (100)	<i>Fisher's exact test (p value)</i>
Yes	5 (21.7%)	5 (26.32%)	0	0.54 ^a
Average number of CHR-P service users	23 (range: 15-33)	23 (range: 15-33)	4 (100)	.
No	18 (78.3%)	14 (73.68%)		.
<i>Intent or interest to increase caseload capacity for CHR-P individuals</i>	23 (100%)	19 services	4 services	<i>Fisher's exact test (p value)</i>
Yes	15 (65.22%)	14 (73.68%)	1 (25%)	0.10 ^a
No	8 (34.78%)	5 (26.32%)	3 (75%)	.

<i>Yearly caseload^b of CHR-P or suspected-CHR-P individuals</i>	<i>21 services</i>	<i>18 services</i>	<i>3 services</i>	<i>Mann-Whitney U test</i>
Total	693	504	189	.
Average	33 (SD: 30.66)	28 (SD: 29.12)	63.00 (SD: 24.88)	<i>Z = -2.014, p = 0.047</i>
Range	4-115	4-115	36-85	.
Median	15	15	68	.
<i>Proportion of CHR-P individuals in yearly caseload^b</i>				
Total yearly caseload	.	<i>14 services</i> 3,063	<i>3 services</i> 216	.
Total CHR-P individuals in yearly caseload (percentage over total)	.	441 (14.40)	189 (87.5)	.

CHR-P, Clinical high-risk state for psychosis; SD, Standard deviation. ^aComparison of integrated vs standalone services (there were no hub and spoke services). ^bLast 12 months. Bold indicates statistically significant values.

Table 3. Prognostic assessment

Intake criteria	All services, n (%)	Psychosis risk assessment			All services, n (%)
<i>Age intake criteria</i>	23 (100)	<i>Psychosis screening prior to initial assessment</i>			22 (100)
14-35 years	13 (56.52)	Yes			13 (59.1)
14-65 years	3 (13.04)	Telephone			9 (69.23)
18-35 years	2 (8.70)	Face-to-face assessment			6 (46.15)
14-18 years	1 (4.35)	Online			3 (23.08)
15-65 years	1 (4.35)	No			9 (40.9)
16-25 years	1 (4.35)	<i>Instrument for the assessment of psychosis risk</i>			23 (100)
16-30 years	1 (4.35)	CAARMS			22 (95.65)
18-65 years	1 (4.35)	SIPS/SOPS			1 (4.35)
<i>Psychosis risk clinical diagnosis^a</i>	23 (100)	<i>Trauma screening tool</i>			23 (100)
CHR-P status ^b	23 (100)	Yes			7 (30.4)
DSM-5 Attenuated Psychosis Syndrome	5 (21.74)	No			16 (69.4)
Not meeting criteria for PANNS	2 (8.70)				
Outcome measures	All services, n (%)	Integrated, n (%)	Standalone, n (%)	Statistics^c	
<i>Are outcomes measures and achievements systematically reviewed?</i>	20 (100)	16 (100)	4 (100)	<i>Fisher's exact test (p value)</i>	
Yes	18 (90)	14 (87.5)	4 (100)	1.00	
No	2 (10)	2 (12.5)	0	.	
<i>Regularly evaluated outcomes for CHR-P individuals</i>	20 (100)	16 (100)	4 (100)	<i>Fisher's exact test (p value)</i>	
Service user engagement or satisfaction with service	19 (95)	15 (93.75)	4 (100)	1.00	
Family or carer satisfaction with service	15 (75)	11 (68.75)	4 (100)	0.53	
General quality of life or wellbeing	15 (75)	12 (75)	3 (75)	1.00	
Improvement in social functioning	15 (75)	13 (81.25)	2 (50)	0.55	
Psychosis transition rates	14 (70)	10 (62.5)	4 (100)	0.27	
Improvement in occupational functioning	14 (70)	12 (75)	2 (50)	0.25	
Symptomatic persistence, improvement and remission	13 (65)	10 (62.5)	3 (75)	1.00	
Improvement in comorbid mental health conditions	13 (65)	11 (68.75)	2 (50)	0.59	
Number of users entering employment or education	11 (55)	8 (50)	3 (75)	0.59	
Time to receiving treatment	10 (50)	8 (50)	2 (50)	1.00	
Number of referrals to service	7 (35)	6 (37.5)	1 (25)	1.00	
Hospitalisation	6 (30)	5 (31.25)	1 (25)	1.00	
Physical health	6 (30)	6 (37.5)	0 (0)	0.27	
Other outcomes regarding service operation	4 (20)	4 (25)	0 (0)	0.54	

CAARMS, Comprehensive Assessment of At-Risk Mental States; CHR-P, Clinical high-risk state for psychosis; PANNS, Positive and Negative Syndrome Scale; SIPS, Structured Interview for Prodromal Syndromes; SOPS, Scale of Prodromal Symptoms. ^aNot mutually exclusive. ^bCAARMS, SIPS/SOPS. ^cComparison of integrated vs standalone services (there were no hub and spoke services).

Table 4. Clinical care

Service provision	All services, n (%)	Integrated, n (%)	Standalone, n (%)	Statistics ^a
<i>Duration of service provision (including monitoring)</i>	18 (100)	14 (100)	4 (100)	<i>Mann-Whitney U test</i>
36 months	4 (22.22)	4 (28.57)	0	.
24 months	6 (33.33)	2 (14.29)	4 (100)	.
18 months	3 (16.67)	3 (21.43)	0	.
12 months	4 (22.22)	4 (28.57)	0	.
6 months	1 (5.56)	1 (7.14)	0	.
Average (SD)	22 (9.43)	21.43 (10.71)	24 (0)	$Z = -0.877, p = 0.44^a$
<i>NICE-compliant intervention packages</i>	20 (100)	16 (100)	4 (100)	<i>Fisher's exact test (p value)</i>
Monitoring of mental state + CBT + family therapy	13 (65)	10 (62.5)	3 (75)	1.00
Monitoring of mental state + CBT	6 (30)	5 (31.25)	1 (25)	1.00
Monitoring of mental state + family therapy	1 (5)	1 (6.25)	0	1.00
<i>Offered individual psychosocial interventions</i>	20 (100)	16 (100)	4 (100)	<i>Fisher's exact test (p value)</i>
Monitoring of mental state	20 (100)	15 (93.75)	4 (100)	1.00
Psychoeducation (service-users)	19 (95)	15 (93.75)	4 (100)	1.00
NICE-standard CBT for psychosis	19 (95)	15 (93.75)	4 (100)	1.00
CBT-informed interventions	18 (90)	14 (87.5)	4 (100)	1.00
Psychoeducation (family/carers)	16 (80)	12 (75)	4 (100)	0.54
Crisis work	16 (80)	13 (81.25)	3 (75)	1.00
Other individual psychotherapy	14 (70)	10 (62.5)	4 (100)	0.27
NICE-standard family therapy	14 (70)	11 (68.75)	3 (75)	1.00
Occupational or employment support	14 (70)	11 (68.75)	3 (75)	1.00
Housing or benefits support	14 (70)	10 (62.5)	4 (100)	0.27
Recovery-oriented case management	13 (65)	9 (56.25)	4 (100)	0.25
Family work and support	12 (60)	9 (56.25)	3 (75)	0.62
Social functioning (e.g., social skills training)	10 (50)	8 (50)	2 (50)	1.00
Educational/academic support	10 (50)	8 (50)	2 (50)	1.00
Mental Health Act work	8 (40)	6 (37.5)	2 (50)	1.00
Substance misuse work	6 (30)	5 (31.25)	1 (25)	1.00
Recreational group activities	6 (30)	4 (25)	2 (50)	0.55
Daily living skills training	5 (25)	5 (31.25)	0 (0)	0.53
Peer-support	4 (20)	4 (25)	0 (0)	0.54
Group psychotherapy	2 (10)	0 (0)	2 (50)	0.032

Provision of NICE-standard interventions in yearly^b caseload	n (%)	Yearly caseload of CHR-P individuals, n	Yearly CHR-P individuals receiving interventions, n (%)	
<i>All services</i>	20 (100)	.	.	
NICE-standard CBT offered	9 (45)	261	181 (69.35)	
NICE-standard CBT offered but data unavailable	10 (50)	.	.	
NICE-standard CBT not offered	1 (5)	11	.	
Total services with available data	10 (50)	272	181 (66.54)	
<i>All services</i>	20 (100)	.	.	
NICE-standard family therapy offered	6 (30)	140	16 (11.43)	
NICE-standard family therapy offered but data unavailable	8 (40)	.	.	
NICE-standard family therapy not offered	6 (30)	187	.	
Total services with available data	12 (60)	327	16 (4.89)	
Service users and other stakeholders' involvement	All services, n (%)	Integrated, n (%)	Standalone, n (%)	Statistics^a
<i>Service users and other stakeholders' involvement</i>	19 (100)	15 (100)	4 (100)	<i>Fisher's exact test (p value)</i>
Service users	9 (47.37)	6 (40)	3 (75)	0.30
Family members or carers	5 (26.32)	4 (26.67)	1 (25)	1.00
Past beneficiaries	3 (15.79)	1 (6.67)	2 (50)	0.10
Any of the above	10 (52.63)	7 (46.67)	3 (75)	0.58
Limited to FEP	1 (5.26)	1 (6.67)	0	.
<i>Activities incorporating service user involvement</i>	20 (100)	16 (100)	4 (100)	<i>Fisher's exact test (p value)</i>
Service promotion	8 (40)	5 (40)	3 (75)	0.26
Development of services or products	8 (40)	6 (37.5)	2 (50)	1.00
Service evaluation	6 (30)	3 (18.75)	3 (75)	0.061
Staff recruitment	6 (30)	4 (25)	2 (50)	0.55
Service delivery	5 (25)	3 (18.75)	2 (50)	0.25
Research planning or promotion	3 (10)	1 (6.25)	2 (50)	0.088

CBT, Cognitive behavioural therapy; CHR-P, Clinical high-risk state for psychosis; FEP, First-episode of psychosis; NICE, National institute for Health and Care Excellence; SD, Standard deviation. ^aComparison of integrated vs standalone services (there were no hub and spoke services). Bold indicates statistically significant values. ^bLast 12 mont

