

1 **EAACI Guideline on management of adolescents**
2 **and young adults with allergy and asthma**

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**ADOLESCENT
AND YOUNG ADULT
TASK FORCE** | 
EAACI
EUROPEAN ACADEMY OF ALLERGY
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74 adult, allergy.

75

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77 **ABSTRACT**

78 Adolescent and young adult (AYA) patients need additional support while they experience the
79 challenges associated with adolescence. Furthermore, they need specific training to learn the
80 knowledge and skills required to self-manage their allergies and/or asthma. Transitional care
81 is a complex process which should address the psychological, medical, educational and
82 vocational needs of AYA. The European Academy of Allergy and Clinical Immunology (EAACI)
83 has developed a clinical practice guideline to provide evidence-based recommendations for
84 healthcare professionals to support the transitional care of AYA with allergy and/or asthma.
85 This guideline was developed by a multi-disciplinary working panel of experts and patient
86 representatives based on two recent systematic reviews. It sets out a series of general
87 recommendations on operating a clinical service for AYA, which include: (i) starting transition
88 early (11-13 years), (ii) using a structured, multidisciplinary approach, (iii) ensuring AYA fully
89 understand their condition and have resources they can access, (iv) active monitoring of
90 adherence and (v) discussing any implications for further education and work.

91 Specific allergy and asthma transition recommendations include (1) simplifying medication
92 regimes and the use of reminders; (2) focusing on areas where AYA are not confident and
93 involving peers in the training of AYA patients; (3) identifying and managing psychological and
94 socioeconomic issues impacting disease control and quality of life; (4) enrolling the family in
95 assisting AYA to undertake self-management and (5) encouraging AYA to let their friends
96 know about their allergies and asthma. These recommendations may need to be adapted to
97 fit into national healthcare systems.

98

99 **Abbreviations**

100 AGREE II - Appraisal of Guidelines for Research & Evaluation

101 AYA- Adolescent(s)and young adult(s)

102 CBT- Cognitive behavioural therapy

103 EAACI – European Academy of Allergy and Clinical Immunology

104 HCP- Healthcare professional(s)

- 105 HEADSS -Home, Education/ Employment, peer group, Activities, Drugs, Sexuality, Suicide/
106 depression) assessment
- 107 HCP – healthcare professionals
- 108 HRQL – health related quality of life
- 109 MI- Motivational interviewing
- 110 QOL- Quality of life
- 111 TF – Task Force
- 112
- 113

DRAFT

114 INTRODUCTION

115 Adolescents and young adults (AYA) represent a large group of patients with allergy and/or
116 asthma. Their medical care is complicated by the biological and psycho-social changes that
117 occur over adolescence. As AYA gain increasing autonomy, they also have to become more
118 socially and financially independent, whilst their primary relationships switch from family to
119 peer-based interactions. It is now acknowledged that these changes encompass a much
120 longer period than previously thought¹ so this guideline will focus on a 11-25 year age range.
121 During this time, this complex context may have an impact on the symptoms associated with
122 allergy and/or asthma and, more significantly, on how they are managed. The critical
123 objective is for AYA to acquire the knowledge, skills and confidence that are required to
124 become independent, competent and expert adult patients. This process is known as

Box 1. Glossary

Adolescents and young adults: patients with allergy and/or asthma aged 11-25 years

Adolescents and young adult-centred care: medical care that is focused on the needs of the adolescent and young adult, the specific format will depend on the developmental level of the patient

Cognitive behavioural therapy: psychological approach to changing people's beliefs and behaviours by focusing on the interaction between thoughts, images, beliefs, emotions, physical symptoms and behaviours.

Developmentally-appropriate: format takes into account the developmental level of the patient

Health literacy: ability to obtain, read, understand and use healthcare information in make appropriate healthcare decisions including following treatment plans.

Health related quality of life: quantification of the impact of illness on physical, mental, emotional and social life of a patient.

Motivational interviewing: psychological approach that aims to help an individual develop motivation to make positive decisions and achieve specific goals.

Multi-systemic approach: psychological, family-based intervention adapted for the treatment of poor illness management.

Patient activation measures: assessment of patient's knowledge, skill and confidence for managing their health and healthcare.

Transition: process of empowering adolescent patients into becoming competent, expert adult patients.

Transfer: moving from paediatric to an adult healthcare system.

Transition readiness assessment tool: questionnaire completed by the patient or healthcare professional to assess their competency with self-management of their allergy and asthma (e.g. 'ready, steady, go' or hospital's own document)

Transition report: detailed written medical report to adult colleague summarising the paediatric care.

Self-management: decisions and behaviours that a patient with allergy and asthma takes to manage their health conditions.

Stakeholders: people or groups of people have an interest in the area.

125 transition (Box 1) and entails much more than the simple transfer of a patient from paediatric
126 to adult care. The process of transition is also important when an allergy clinic caters for all
127 age groups. If effectively learned and utilised, constructive self-management skills will serve
128 to support patients throughout their adult lives to reach better health outcomes. We know
129 from a recent European survey that healthcare professionals (HCP) find AYA to be a
130 challenging group to manage.² To understand how to approach this age group, one has to
131 understand what is happening during adolescence.

132 **What is happening during adolescence?**

133 Research in developmental psychology and neuroscience reveals that adolescence is a
134 sensitive period of social-affective development, characterized by biological, neurological,
135 and social changes. In postnatal brain development, the maximum density of grey matter is
136 reached first in the primary sensorimotor cortex, and the prefrontal cortex matures last.³ So
137 during adolescence, there is an imbalance between systems supporting reactivity and
138 regulation. Prefrontal areas are still developing until late adolescence (>18–21 years), while
139 hypersensitive reward systems have already evolved, creating a disparity between emotions
140 and control.

141 Development from conception onwards is vulnerable to environmental influences with long-
142 lasting impact and this is also true during adolescence. Experience may affect not only the
143 number of brain cells - and the number of connections among them - but also the way these
144 connections are "wired".³ For example, significant fear-eliciting experiences, particularly in
145 middle childhood and early adolescence, can disrupt the typical development of stress
146 regulation as well as learning, memory, and social behaviour.^{4,5}

147 The 'back to front' nature of adolescent development has long been understood as
148 accounting for typical adolescent behaviour patterns, particularly risk-taking, however more
149 recent research has suggested a complex picture. Adolescent decision-making is optimized
150 for attaining specific developmental goals and some processes that inform decision-making
151 are uniquely amplified during adolescence including learning from direct experience, reward
152 reactivity and tolerance of ambiguity.

153 Behavioural economics has shown that risk-taking is not a simple process, and is not only
154 affected by attitudes toward known risks but also by attitudes toward unknown or ambiguous
155 situations, in which the likelihood of positive and negative outcomes are not known.⁶ It is not
156 that adolescents choose to engage in risks, but, rather, they are willing to gamble when they
157 lack complete knowledge. When adolescents meaningfully understand a risky situation, they
158 are even more risk-averse than adults.⁶

159 In addition, adolescent decision-making typically occurs in busy environments that often
160 involve complex motivations. Prominent motivations at this age, which can compete and
161 conflict with one another, include maintaining status with peers, achieving goals in academic,
162 athletic, or other areas, finding independence and maintaining harmony within the family.

163 **The guideline for managing adolescents and young adults**

164 This guideline has been prepared by the European Academy of Allergy and Clinical
165 Immunology's (EAACI) Task Force on Adolescents and Young Adults. It aims to assist HCP to
166 manage patients in the 11-25 year age group with allergic conditions (including chronic
167 urticaria and atopic dermatitis) and asthma. In addition, the Task Force aims to identify gaps
168 in knowledge and implementation, unmet needs and potential future perspectives. The
169 primary audience for this guideline is clinical allergists (specialists and subspecialists),
170 physicians from other related disciplines, nurses, dieticians, social workers and psychologists
171 working across a range of primary, secondary, and tertiary care settings. Healthcare
172 managers, research funding bodies and health policy makers may also find this guideline
173 useful. The development of the guideline has been informed by two formal systematic
174 reviews^{7,8} with systematic review principles being used to identify additional evidence, where
175 necessary.

176 **METHODOLOGY**

177 This Guideline was generated using a structured Appraisal of Guidelines for Research &
178 Evaluation (AGREE II) approach^{9,10} (see online supplement – appendix 1). The process started
179 in January 2018 with a web-based discussion about the process and the key clinical areas to
180 address, followed by face-to-face meetings and regular web conferences in which HCP and
181 lay representatives participated.

182 **Ensuring appropriate stakeholder involvement**

183 Members of the EAACI Task Force (TF) on Adolescents and Young Adults from 10 European
184 countries represented a range of disciplinary and clinical backgrounds, including allergists
185 (specialists and subspecialists), paediatricians, psychologists, primary care, dermatologists,
186 otolaryngologists, nurses and patient representatives. Additionally, a survey of stakeholders
187 was undertaken in June 2019 to understand how adolescents and young adults are currently
188 managed and the challenges faced by their HCP.²

189 **Systematic reviews of the evidence**

190 Three key questions were addressed: (i) What are the challenges and specific needs of
191 adolescents and young adults with allergic conditions, including asthma, food allergy and
192 anaphylaxis, allergic rhinitis, atopic dermatitis, chronic urticaria, allergic gastrointestinal
193 disease, as well as those with complex multisystem allergic disease? (ii) What specific
194 strategies have proven useful to improve self-management and wellbeing in this population?
195 (iii) What generic approaches are helpful when managing adolescents and young adults? The
196 first two were pursued through two formal systematic reviews (SRs) of the evidence with a
197 cut-off date of February 10, 2019.^{7,8} The final question was assessed by a systematic review
198 (SR) of the evidence-based adolescent and young adult guidelines from the last 5 years with
199 a cut-off date of June 21, 2019. The TF members continued to track evidence published after
200 our systematic review cut-off date and, where relevant, studies were considered by the TF
201 chairs.

202

Box 2. Assigning levels of evidence and strength of recommendations

Level of evidence

Level I	Systematic reviews, meta-analysis, randomized controlled trials
Level II	Two groups, non-randomized studies (e.g., cohort, case-control)
Level III	One group, non-randomized (e.g., before and after, pre-test, and post-test)
Level IV	Descriptive studies that include analysis of outcomes (single-subject design, case series)
Level V	Case reports and expert opinion that include narrative literature, reviews, and consensus statements

Grades of recommendation

Grade A	Consistent level I studies
Grade B	Consistent level II or III studies or extrapolations from level I studies
Grade C	Level IV studies or extrapolations from level II or III studies
Grade D	Level V evidence or troublingly inconsistent or inconclusive studies at any level

Strength of recommendations

Strong	Evidence from studies at low risk of bias
Moderate	Evidence from studies at moderate risk of bias
Weak	Evidence from studies at high risk of bias

Recommendations are phrased according to the grade of recommendation:

- Grade A: “is recommended”
- Grade B: “can be recommended”
- Grade C: “may be recommended”
- Grade D: “may be considered”

Approach adapted from Oxford Centre for Evidence-based Medicine—Levels of Evidence and Grades of Recommendations. The adaptation involved providing an assessment of the risk of bias, based on the Cochrane risk of bias tool, of the underpinning evidence and highlighting other potentially relevant contextual information plus basing recommendation phrases on the grade.

203

204 **Formulating recommendations**

205 The TF members graded the strength and consistency of the key findings from the SRs.^{7,8}

206 These were used to formulate evidence-based recommendations for clinical care based on

207 the relative balance between potential benefits, side effects and risks.¹¹ (Box 2). This involved

208 formulating clear recommendations with the strength of evidence underpinning each

209 recommendation (Box 2). For many recommendations, there was only level V evidence

210 available. To ensure that these recommendations were robust, a modified Delphi approach

211 was used to achieve consensus within the task force (see online supplement). The TF aimed

212 to minimise bias at every step. TF members identified the resource implications of
213 implementing the recommendations, barriers, facilitators, potential approaches to the
214 implementation of each recommendation and suggested audit criteria to help with assessing
215 organizational compliance.

216 **Peer review and public comment**

217 The draft Guideline was externally peer-reviewed by invited experts from a range of
218 professional backgrounds. The draft was also made available on public domain on the EAACI
219 web site for a 3-week period in February 2020 to allow a broader array of stakeholders to
220 comment. All feedback was considered by the TF members and, where appropriate, revisions
221 were made. Further feedback should be addressed to the corresponding author. Additionally,
222 adolescents and young adults and their parents/carers were invited to consider the
223 importance that they attached to each draft recommendation during the development of the
224 guideline (for further details see online supplement).

225 **Identification of evidence gaps**

226 The process of developing this guideline has identified a number of evidence gaps which were
227 prioritized (Table 8).

228 **Editorial independence and managing conflict of interests**

229 This Guideline was funded and supported by EAACI. The funder did not have any influence on
230 the guideline production process, on its contents or on the decision to publish. TF members'
231 conflicts of interest were declared and taken into account by the TF chairs as
232 recommendations were formulated.

233 **Updating the Guideline**

234 EAACI plans to update this Guideline in 2025 unless there are important advances before
235 then.

236 **GENERAL TRANSITION (Table 1)**

237 Eight guidelines focusing on the transition of AYA with juvenile-onset rheumatic arthritis^{12,13},
238 coeliac disease¹⁴, gastroenterological conditions^{15,16}, liver diseases¹⁷, young people using
239 health or social care services¹⁸ and AYA with special health care needs¹⁹ were identified from
240 the last five years. Most of the evidence stemmed from expert opinion derived from clinical
241 experience or qualitative studies reviewed systematically; very few randomized controlled
242 trials were referenced.

243 **Starting transition**

244 Preparation for transition may be considered from early adolescence (11-13 years) in
245 accordance with the patient's developmental stage (Grade D).¹³⁻¹⁹ This will allow AYA to
246 gradually acquire new knowledge about their disease and develop self-management skills,
247 allowing them to take increasing responsibility for their medical care. It is generally agreed
248 that the optimal timing for initiation of the transition process cannot be based on
249 chronological age. An individualised, flexible approach is required. The following factors might
250 be considered by HCPs to determine the ideal age to start the transition process: mental and
251 physical development, disease activity, health literacy, adherence to treatment, autonomy in
252 disease management, family's socioeconomic circumstances and school format.

253 Transition readiness questionnaires are tools which consist of a list of desirable skills and
254 educational targets that AYA should ideally meet before transfer to adult care.^{13,15,17,19} There
255 is a lack of validated readiness assessment tools for AYA with allergy and/or asthma but several
256 generic tools are available such as Transition Readiness Assessment Questionnaire²⁰, "Ready,
257 Steady, Go"²¹ and TR(x)ANSITION Scale²². HCP may consider using one throughout the
258 transition process to track progress and identify areas where AYA need more help to build
259 knowledge and understanding, autonomy and self-management skills (Grade D).

260 **Involving the AYA, family and other HCP**

261 Collaboration and engagement of all stakeholders are essential for a successful and smooth
262 transition process. Transition can be complex and more difficult in patients with multiple
263 allergic diseases. It is important that the family are involved in supporting AYA self-

264 management, thereby encouraging independence. During the transition process, HCPs may
265 consider helping AYA (with their parents/caregivers) to understand their allergy and asthma,
266 possible complications, treatment rationale (including medication name, dosing, possible side
267 effects), effective management strategies and how to recognise higher risk symptoms (Grade
268 D).^{12,15,16,18,19} Important skills for AYA to learn are how to make appointments, identify when
269 and whom to contact in case of relapse, how to negotiate and understand the transition
270 process and how to access the support available. AYA should ideally be offered portable,
271 accessible information in the form of leaflets, web-pages, or audio for disabled AYA. It may be
272 also helpful for AYA to have their own personal transition plan, developed together with a HCP
273 and written in a form of a 'roadmap' towards agreed short and long term goals and desired
274 outcomes for transition. As adolescents are generally characterised by low levels of adherence
275 to therapy, HCP may consider monitoring this more closely during the transition process
276 (Grade D).^{12,14-17} It has been shown that AYA are more likely to follow treatment plans and
277 attend adult service medical appointments when they have a good knowledge of their disease
278 and the reasons for treatment^{23,24} and good family support.²⁵

279 **Wider aspects to consider**

280 Another important aspect that HCP may consider covering during the transition process is
281 developing skills related to self-management of allergy and/or asthma, within current and
282 potential future education or work (Grade D).^{12,15,18,19} Other area for discussion may be life
283 skills, future health concerns, educational and employment goals, independent living and
284 housing options, financial needs, psychosocial aspects, mental health, drugs and alcohol,
285 healthy sexuality and reproduction. HEADSS is a helpful framework for such discussions.²⁶
286 Other options for communication between HCP and AYA, such as web-based or mobile
287 technologies, can be recommended to improve the effectiveness of the transition process
288 (Grade B).^{15,17,18}

289 **Integrated regional approach involving paediatric and adult services**

290 For optimal outcomes, a structured, multidisciplinary transition programme with a shared
291 regional or network protocol developed by HCP, AYA, and parents/carers may be considered
292 (Grade D).^{12,13,15,17-19} This could include age-appropriate written information. Several

293 guidelines have suggested that regular meetings between paediatric and adult HCP improve
294 the effectiveness of the transition programme (Grade D).^{16,17} If transfer to another clinical
295 service is required, a transition report should be prepared covering the AYA's medical history,
296 treatments, emergency care plan, follow-up, comorbidities and any other relevant
297 information. Furthermore, an integrated transition programme is needed with input from
298 paediatric and adult providers and primary care, ideally as part of the well-coordinated
299 multidisciplinary team. This may include a period of overlap between these services to help
300 build relationships and establish effective adult care and management (Grade D).¹²⁻¹⁹
301 Feedback from the adult to the paediatric clinic and primary care about AYA's attendance and
302 any changes in management is essential for continuity of the medical care and flow of
303 information between all HCPs involved in the individual's care.

304 **Training and audit**

305 To achieve a good transition pathway, HCPs need training to help them understand the
306 developmental aspects of AYAs, the transition process, and how to engage AYA in behavioural
307 change (Grade C).^{12,13,19} It may be useful to have a lead HCP to coordinate the transition
308 process and training as well as being the contact person for AYA and parents/carers. Lastly,
309 regular audit of a transition service may be recommended to assess key performance
310 indicators and improve service provision (Grade C).^{15,18,19} Audits should involve AYAs and
311 families, policy and decision makers, administrators, researchers, HCPs and government
312 agencies.

313

314 **Table 1. Generic recommendations for adolescents and young adults with allergy and/or asthma**

Generic recommendations (Grade, Evidence level)	Other considerations	References*
Preparation for transition may be considered from early adolescence (11-13 years) in accordance with the patient's developmental stage (D, IV-V)	HCP may want to consider the following when deciding when to start the transition process: mental and physical development, disease activity, health literacy, adherence to treatment, autonomy in disease management and family's socioeconomic circumstances and school format.	Foster ¹³ ; Elli ¹⁶ ; CAPHC ¹⁹ ; Vajro ¹⁷ ; NICE ¹⁸ ; Brooks ¹⁵ ; Ludvigsson 2016 ¹⁴
For a transition model to be effective, the following may be considered for inclusion:		
- the use of a structured, multidisciplinary transition programme within the clinic/healthcare unit (D, I-V)	Shared regional protocol agreed with HCP, AYA, parents/careers, HCP and regularly updated at least every 5 years. This could include age-appropriate written information and structured transition communication/reports between all paediatric and adult HCP. It may be helpful to have a lead person to coordinate the transition process and be a contact person for HCP, AYA and parents/carers.	Calvo, 2015 ¹² ; Foster, 2016 ¹³ ; Brooks ¹⁵ ; CAPHC ¹⁹ ; NICE ¹⁸ ; Vajro ¹⁷
- informing AYA and parents/caregivers about allergy and/or asthma as well as the transition processes and the support available in a form that is appropriate for their developmental stage (D, I-V)	HCP may want to consider including the following information: purpose of transfer to an adult setting; location of available adult centres, disease characteristics, treatments (including side effects), how to recognize alarm symptom, how to assist AYAs to take on their own care and support available. Ideas for formats: leaflets, web-page, audio for disabled AYA. It may be helpful for AYA to have their own personal transition plan ^{17,19} .	Brooks ¹⁵ ; Calvo ¹² ; Elli ¹⁶ ; CAPHC ¹⁹ ; NICE ¹⁸
- a checklist of skills and knowledge to assess AYA readiness for transition (D, I-V)	Tools can be used several times throughout the transition process in order to identify which areas of AYA self-management and well-being need to be addressed and improved. There are no specific allergy and asthma tools but generic ones are available: Transition Readiness Assessment Questionnaire ²⁰ , "Ready, Steady, Go" ²¹ and TR(x)ANSITION Scale ²² .	CAPHC ¹⁹ ; Vajro ¹⁷ ; Brooks ¹⁵ ; Foster ¹³
-more active monitoring of adherence to treatment through the transition process (D, I-V)	Adherence may benefit from targeted specific educational and organisational interventions, e.g. more frequent appointments ¹⁵ .	Calvo ¹² ; Brooks ¹⁵ ; Vajro ¹⁷ ; Ludvigsson ¹⁴ ; Elli ¹⁶
-a period of overlap between paediatric and adult care providers before AYA is transferred, then feedback from the adult to the paediatric clinic about their	Where AYA care needs to be moved to another service clinic, AYA medical information (ideally in the form of a transition report) should be transferred to the adult medical service. Where possible, AYA should be seen in a joint paediatric-adult clinic, AYA should ideally see the same HCP in adults' services for at least the first 2 attended appointments after transfer ¹⁸ .	Calvo ¹² ; Foster, 2016 ¹³ ; Elli ¹⁶ ; CAPHC ¹⁹ ; NICE ¹⁸ ; Ludvigsson ¹⁴ ; Brooks ¹⁵ ; Vajro ¹⁷

attendance and any changes in management (D, I-V)		
- regular meetings between paediatric and adult care providers (D, I-V)	Particular focus should be placed on more complex patients. Meetings could be virtual. Process could be informed by areas of the assessment tools e.g. adherence, disease activity outcomes, HEADSS ²⁶ .	Elli ¹⁶ ;Vajro ¹⁷
Other options for effective communication between HCP and AYA can be recommended (eg web-based, mobile technologies) (B, I-V)	Options may include web-based communication boards and digital communication tools such as text.	Vajro ¹⁷ ;Brooks ¹⁵ ; NICE ¹⁸
Discussion of self-management of AYA allergy and/or asthma within current and potential future college, university, work or social environments may be considered (D, I-V)	Areas that HCP may want to consider discussing lifestyle, future health concerns, educational and employment goals, independent living and housing options, financial needs, psychosocial, mental health, sexuality and reproduction.	Calvo ¹² ; CAPHC ¹⁹ ; NICE ¹⁸ ; Brooks ¹⁵
Specific training in transitional and AYA care may be recommended for all HCP involved in transition process (C, II-V)	Training in generic transition process, disease-specific and developmentally-appropriate care (e.g. clinical experience, e-learning, workshops) as part of the continuing professional development.	Calvo ¹² ; Foster ¹³ ; CAPHC ¹⁹
Regular audit of a transition service may be recommended to assess key performance indicators and improve service provision (C, I-V)	Audit should involve AYA and families, policy and decision makers, administrators, researchers, HCP and government agencies.	Brooks ¹⁵ ; CAPHC ¹⁹ ; NICE ¹⁸

315 *Recommendations: Foster 2017¹³, juvenile-onset rheumatic diseases; Ludvigsson 2016¹⁴, coeliac disease, Brooks 2017¹⁵, chronic digestive diseases; Vajro
316 2018¹⁷, liver; NICE 2015¹⁸, young people using health or social care services; Calvo 2015¹²; rheumatic patients with childhood onset; Elli 2015¹⁶,
317 gastroenterological patients; CAPHC 2016¹⁹, AYA with special health care needs.

318 AYA, adolescents and young adults; HCP, healthcare professionals; NICE, National Institute for Health and Care Excellence; CAPHC, Canadian Association of
319 Paediatric Health Centres, HEADSS (Home, Education/ Employment, peer group, Activities, Drugs, Sexuality, Suicide/ depression) assessment.

320 .

321 **TRANSITION SPECIFIC TO ALLERGIC CONDITIONS AND/OR ASTHMA**

322 Recommendations specific to allergic conditions and/or asthma were developed by the Task
323 Force based on the two underpinning systematic reviews.^{7,8}

324 **Improving adherence (Tables 2, 4 and 5)**

325 There are numerous data documenting poor adherence to therapy during adolescence. This
326 is therefore an important issue to consider. There is weak evidence to show that simplifying
327 medication regimes, such as the use of a single inhaler combining inhaled corticosteroid and
328 long-acting β 2 agonists, may be recommended to improve adherence (Grade C)(Table 2).²⁷
329 Several studies indicate that low self-efficacy (confidence in performing a specific activity) is
330 related to poor medication adherence, both in AYA with asthma and/or food allergy.^{28,29,30-33}
331 One controlled study showed that text reminders to take medication could improve
332 medication adherence in AYA with asthma³⁴; however, the number of participants was small
333 and this finding needs to be confirmed by larger studies. Other types of reminders, such as
334 prompts to take medication, mobile applications and web-based applications, monitors or
335 routines can be recommended to improve adherence, symptom control and quality of life
336 (Grade B)(Table 2).³⁵⁻³⁸ One study with a large sample looked at the effect of cognitive
337 behavioural therapy (CBT) using a multi-systemic approach on functional asthma outcomes
338 in adolescents. The results showed a positive effect on asthma treatment adherence, as well
339 as on asthma knowledge, self-management and symptom control (Grade B)(Table 4).³⁹⁻⁴²
340 Finally, data suggest that amending family routines to give AYA time to fit in their therapy
341 may be recommended to improve adherence with medication in AYA (Grade C)(Table 5).^{43,44}

342 **Table 2. Adherence recommendations for adolescents and young adults with allergy and/or asthma**

Simplifying medication regimes may be recommended to improve adherence (Grade C, Evidence level IV)		
<i>Strength of recommendation:</i> Weak recommendation with evidence coming from a single study involving participants with asthma from 22 years of age. ²⁷	<i>Other considerations:</i> Evidence comes from the use of combined corticosteroid and long-acting bronchodilator inhalers for asthma but is likely to be generalizable.	<i>References:</i> Axelsson ²⁷ .
Medication reminders, mobile applications and web-based applications, monitors or routines can be recommended to improve adherence, symptom control and quality of life (Grade B, Evidence level I-IV)		
<i>Strength of recommendation:</i> Weak recommendation for smartphone-based health applications, medication reminders or monitors as only suggested by qualitative studies. ^{35,36,38} Recommendation for the use of a specific web-application (MyMediHealthApp) is moderate since efficacy proven by a controlled trial. ³⁴	<i>Other considerations:</i> A smartphone-based personalized health app, medication reminders or monitors were suggested in qualitative studies. All studies focused on asthma but likely to also be applicable to allergy.	<i>References:</i> Naimi ³⁵ , Blaakman ³⁶ , Koster ³⁸ , Johnson ³⁴ .

343 AYA, adolescents and young adults.

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346 **Optimising self-management (Table 3)**

347 Empowering AYA with self-management skills can help them become autonomous expert
348 patients, minimising their dependency on parents and HCP. It is therefore essential that AYA
349 have the knowledge and skills to ensure they constructive self-manage their allergies and/or
350 asthma. Focusing consultations on areas where AYA say they are not confident may be
351 recommended to improve self-management including adherence (Grade C).²⁸⁻³³ Barriers to
352 successful self-management such as poor symptom perception and failure to take
353 responsibility need to be addressed.⁷ Facilitators to self-management which could be
354 employed are the use of routines, simple treatment regimes, better knowledge, a positive
355 attitude and support from family, friends and school/college.⁷

356 To facilitate self-management, a personal action plan may be recommended to assist AYA in
357 self-managing their allergy and/or asthma (Grade C).^{29,31,45,46} Plans should be developed with
358 the AYA and parents/carers. They could be smartphone-based.⁴⁶

359 Peer-led interventions are recommended to improve asthma-related quality of life, asthma
360 knowledge, and to reduce asthma-related doctor visits and school absence (Grade A).⁴⁷⁻⁵¹
361 Adolescents are likely to mirror the behaviour of their peers. To date, these peer-led
362 interventions have been demonstrated in asthma randomised controlled asthma trials; they
363 may also be useful for other allergic conditions.

364 AYA with allergy and/or asthma are frequently excluded from activities, which may have an
365 impact on their developing social skills. Consideration should be given to supporting the AYA,
366 family and the wider community to allow AYA to be included in social events (Grade D).⁵²⁻⁵⁵
367 This may involve focusing on sports that are less likely to exacerbate asthma (e.g. swimming)
368 or undertaking sport at times when symptoms are less likely to be triggered (e.g. avoiding
369 cold mornings). Ensuring that the menu for school trips or parties does not contain relevant
370 allergens such as peanuts and tree nuts will be helpful for some AYA; it is therefore important
371 that AYA have the communication skills to inform organisers about their allergy. Additionally,
372 educating teachers, club staff, and other parents about allergy/or and asthma is important as
373 mistaken beliefs can present a barrier to effective communication and integration in social
374 contexts.^{52,55}

375 Motivational interviewing (MI) can be recommended to improve asthma symptoms and
376 quality of life (Grade B).⁵⁶ MI has been widely used in medicine and other settings in this age
377 group. The approach seeks to increase motivation to change behaviours and then encourages
378 the AYA to set goals for themselves. Training is required for HCP to effectively utilise MI.

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Table 3. Self-management recommendations for adolescents and young adults with allergy and/or asthma

Focusing consultation on areas where AYA say they are not confident may be recommended to improve self-management including adherence (Grade C, Evidence level IV)		
<i>Strength of recommendation:</i> Weak recommendation based on low risk of bias in cross-sectional ^{28,30} and qualitative studies ^{29,31-33} . These included AYA with both asthma ^{28,33} and food allergy ²⁹⁻³² .	<i>Other considerations:</i> Barriers to self-management associated with poor self-efficacy should be identified so that specific measures can be taken to overcome these. ⁷	<i>References:</i> Rhee ²⁸ , Saleh-Langenberg ³⁰ , Jones ³¹ , Jones ²⁹ , Macadam ³² , Holley ³³
Formulation of a personal action plan with the AYA and their family to enable them to self-manage their allergy and asthma may be recommended (Grade C, Evidence level 1-IV)		
<i>Strength of recommendation:</i> Weak to moderate recommendation based on high risk of bias in one randomized controlled trial ⁴⁶ and on low risk bias in cross-sectional studies ^{29,31,45} . These included AYA with both asthma ⁴⁶ and food allergy ^{29,31,45} .	<i>Other considerations:</i> Smartphone based personalized action plan may lead to improvement in asthma control test ⁴⁶ . The plan should be regularly reviewed.	<i>References:</i> Perry ⁴⁶ , Jones ²⁹ , Jones ³¹ , Warren ⁴⁵
Peer-led interventions are recommended to improve asthma related quality of life, asthma knowledge, and to reduce asthma related doctor visits and school absence (Grade A, Evidence level I)		
<i>Strength of recommendation:</i> Strong recommendation based on low ^{47,51} and moderate risk of bias ⁴⁸⁻⁵⁰ interventional studies focusing on AYA with asthma. Three studies assessed the impact of the Triple A programme ^{47,48,51} .	<i>Other considerations:</i> Peers here are older AYA from similar backgrounds, either with or without asthma, trained to 'teach' allergic teens. This is also likely to be useful for other allergic conditions.	<i>References:</i> Al-Sheyab ⁴⁷ , Gibson ⁴⁸ , Rhee ⁴⁹ , Rhee ⁵⁰ , Shah ⁵¹
Supporting the AYA, family and the wider community to allow the AYA inclusion in social events (e.g. sports, celebrations, holidays) may be considered (Grade D, Evidence level IV)		
<i>Strength of recommendation:</i> Weak recommendation based on low risk of bias in a cross-sectional study ⁵⁵ and qualitative studies ⁵²⁻⁵⁴ . These included AYA with either asthma ⁵³⁻⁵⁵ or food allergy ⁵² .	<i>Other considerations:</i> Aim for better participation, less bullying and gaining fitness. For example, there are sports, such as swimming, that less likely to trigger asthma. Adopting specific strategies may allow AYA with food allergy or asthma to safely participate in trips, parties and other social events.	<i>References:</i> Winn ⁵⁵ , Mackenzie ⁵² , Mammen ⁵⁴ , Mammen ⁵³
Motivational interviewing can be recommended to improve asthma symptoms and quality of life (Grade B, Evidence level I)		
<i>Strength of recommendation:</i> Moderate recommendation based on one randomised controlled asthma trial ⁵⁶ . Motivational interviewing has been demonstrated to be effective across many areas and is likely to also be helpful with allergy.	<i>Other considerations:</i> Motivational interviewing includes strategies to increase motivation, shared decision making and goal setting.	<i>Reference:</i> Seid ⁵⁶

382 AYA, adolescents and young adults.

383 **Addressing psychological issues (Table 4)**

384 Many AYA with allergy and/or asthma have co-existing psychological issues, including anxiety,
385 depression, suicidal ideation, and relational difficulties.^{33,57-74} These problems may magnify
386 the complexities of self-management, care coordination and treatment planning in AYA with
387 allergy and/or asthma. Therefore, the identification and management of psychological issues
388 impacting disease control and health-related quality of life may be recommended (Grade B).

389 It is known that the social context of a person's life determines the risk of exposure, as well
390 as their susceptibility, the course and outcome of illness.^{75,76} Socioeconomic factors and
391 stressful life events can impact disease control^{34,77-81} and HRQL in allergic diseases^{64,70,82,83}.
392 Therefore, the identification and management of socioeconomic issues and stressful life
393 events impacting disease control and HRQL may be recommended (Grade C).

394 Where AYA are struggling to successfully self-manage their asthma, psychological
395 interventions using a CBT based or multi-systemic therapy approach can be recommended to
396 improve asthma knowledge, improve adherence, self-management and symptom control
397 (Grade B).³⁹⁻⁴² This is based on a small number of randomised controlled asthma trials. Similar
398 approaches are likely to be helpful where allergy is the key problem.

399 **Table 4. Psychosocial recommendations for adolescents and young adults with allergy and/or asthma**

Identification and management of psychological issues impacting disease control and health related quality of life can be recommended (Grade B, Evidence level II-III)		
<i>Strength of recommendation:</i> Moderate recommendation based on low risk of bias in quantitative cross-sectional ^{57,62,63,65-73} and quantitative cohort studies ⁶⁴ . These included AYA with asthma ^{57,62-64,68,71-73} , atopic dermatitis ^{65-67,69} and food allergy ⁷⁰ .	<i>Other considerations:</i> Many AYA with asthma and allergy have associated psychological issues. Tools such as HEADSS ²⁶ or YouthCHAT ^{84,85} may be helpful in identifying problems that can then be addressed and managed ⁸⁵ in an appropriate way.	<i>References:</i> Bruzzeze ⁵⁷ , Bruzzeze ^{72,73} , Ferro ⁶⁴ , Halvorsen ⁶⁵ , Kim ⁶⁶ , Lee ⁶⁷ , Lu ⁶⁸ , Noh ⁶⁹ , Polloni ⁷⁰ , Shankar ⁷¹ , Hullmann ⁶³ .
Identification and management of socioeconomic issues and stressful life events impacting disease control and health related quality of life may be recommended (Grade C, Evidence level II-IV)		
<i>Strength of recommendation:</i> Moderate recommendation based on low risk of bias in quantitative cross-sectional ^{69,81,82} , quantitative cohort ^{64,79} and quantitative case series studies ⁸³ . AYA had asthma ^{79,81-83} , atopic dermatitis ⁶⁹ and food allergy ⁶⁴ .	<i>Other considerations:</i> Examples include factors that may impact on quality of life including divorce, bankruptcy, bereavement and recent severe allergic reactions. ^{69,82,83} Potential financial barriers should be explored in young adults.	<i>References:</i> Ferro ⁶⁴ , Hedman ⁸² , Amaral ⁸³ , Noh ⁶⁹ , Stridsman ⁸¹ , Sundel ¹⁷⁹ .
Psychological interventions using a cognitive behavioural therapy based or multi-systemic therapy approach can be recommended to improve adherence, asthma knowledge, self-management and symptom control (Grade B, Evidence level I)		
<i>Strength of recommendation:</i> Moderate recommendation due to specific population ^{39,41,42} based on low to intermediate risk of bias in one randomized controlled trial ^{39,41,42,66} and a randomized pilot trial ⁴⁰ . Psychological interventions can be considered for AYA who are struggling to successfully self-manage their asthma.	<i>Other considerations:</i> Evidence for asthma knowledge, self-management and symptom control, mainly involving African American AYA with asthma in one study ^{39,41,42} . It is possible that findings may be extrapolated to other conditions. However, more studies are needed.	<i>References:</i> Naar ⁴¹ , Ellis ³⁹ , NaarKing ⁴² , Bruzzeze ⁴⁰ .

400 AYA, adolescents and young adults; HEADSS (Home, Education/ Employment, peer group, Activities, Drugs, Sexuality, Suicide/ depression) assessment.

401 **Obtaining support (Table 5)**

402 Supportive relationships have shown to have a positive impact on the management and
403 control of asthma and/or allergic disease and in the overall well-being of AYA. Effective
404 communication and fostering positive views about treatment can improve self-management,
405 adherence, asthma control and quality of life.^{33,35,38,43,44,53,58,86-89} An unsupportive family
406 atmosphere has been associated with poor outcomes.⁸⁶ Adolescents tend not to report
407 asthma symptoms to their parents and care-givers. Enrolling the family in assisting the AYA
408 to undertake self-management of their asthma and allergy may be recommended (Grade
409 C).^{33,35,38,43,44,53,58,86-89} This can be gradually achieved over time, as appropriate to the age of
410 the AYA. Simple modifications to the family's routines to create time to take treatment may
411 assist with adherence to therapy.^{43,44}

412 From early adolescence onwards, along with growing independence, relationships de-
413 centralise from the core family to peers, friends and other social networks. Social comparison
414 and being part of the group becomes increasingly important. As a result, the AYA may feel
415 embarrassed about their allergy and/or asthma due to fear of being perceived as different
416 from their peers. To prevent this, it may be recommended to encourage AYA to let their
417 friends know about their allergy and/or asthma and how they can help in an emergency
418 (Grade C).^{29,31,32,45,59} Friends may be invited to clinic or practical workshops where they can
419 be provided with hands-on training in symptom recognition, the use of adrenaline auto-
420 injectors and other aspects of emergency management of allergy and asthma.^{29,31,32,45,59}

421 Promoting allergy and/or asthma awareness (e.g. triggers and treatment) among peers/ co-
422 workers and teachers/ managers to support the AYA patient with self-management may be
423 recommended (Grade C).^{33,45,61,62,90} Information about the nature of the allergic conditions,
424 possible triggers and correct treatment may change their self-perception, and the perceptions
425 of others, and enable improvements in self-management. Increased awareness may also help
426 reduce allergy- and/or asthma-related bullying in schools and online.^{45,62,90}

427 Teenagers like to use applications on their mobiles and look for information on the internet;
428 moreover patients have reported finding online support networks helpful.<sup>29,31,33,38,44,45,58-
429 63,87,88</sup> Signposting AYA to high quality reliable online resources about allergy and/or asthma

430 (eg websites, moderated forums) where they can obtain age-appropriate information and
431 advice may be recommended (Grade C).

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432 **Table 5. Support recommendations for adolescents and young adults with allergy and/or asthma**

Enrolling the family in assisting the AYA to take on the self-management of their allergy and asthma may be recommended (Grade C, Evidence level IV)		
<p><i>Strength of recommendation:</i> Moderate recommendation based on low to moderate risk of bias in qualitative^{33,35,44,53,88} and observational studies^{38,43,58,86,87,89}.</p> <p>These included AYA with both asthma^{33,35,38,43,44,53,86,87,89} and food allergy^{58,88}.</p>	<p><i>Other considerations:</i> Support the family to slowly empower the AYA to take on more self-management as appropriate to the individual.</p> <p>Ask the AYA how they would like their parents/carers to be involved throughout their transition and help them develop confidence in working with the adult's services¹⁸. Give AYA the chance to raise any concerns and queries separately from their parents/ carers. This may take more clinic time.</p> <p>Adherence may be improved if the family's routines are modified to assist AYA self-management activities^{43,44}.</p>	<p><i>References:</i> Bruzzese⁸⁹, Bruzzese⁴³, Holley³³, Koster³⁸, Mammen⁵³, Naimi³⁵, Rhee⁸⁶, Rhee⁸⁷, Steensgaard⁵⁸, Stewart⁸⁸, Wamboldt⁴⁴.</p>
Encouraging AYA to let their friends know about their allergy and asthma and how to manage emergencies may be recommended (Grade C, Evidence level IV)		
<p><i>Strength of recommendation:</i> Moderate recommendation based on low to moderate risk of bias in qualitative^{32,59} and observational studies^{29,31,45}. These included AYA with both asthma³², anaphylaxis⁵⁹ and food allergy^{29,31,45}.</p>	<p><i>Other considerations:</i> Provide practical training in symptoms recognition, the use of adrenaline autoinjectors and other aspects of emergency management for friends.</p> <p>Some AYA may want to bring a friend to the clinic for support.</p>	<p><i>References:</i> Gallagher⁵⁹, Jones²⁹, Jones³¹, Macadam³², Warren⁴⁵.</p>
Promoting allergy and asthma awareness (e.g. triggers and treatment) among peers/ co-workers and teachers/ managers to support the AYA patient with self-management may be recommended (Grade C, Evidence level IV)		
<p><i>Strength of recommendation:</i> Moderate recommendation as based on low risk of bias in qualitative^{33,61} and one observational study⁴⁵. These included AYAs with both asthma³³ and food allergy^{45,61}.</p>	<p><i>Other considerations:</i> Efforts should be made to reduce asthma and allergy related bullying especially in schools^{45,62,90} and online⁶².</p>	<p><i>References:</i> Fong⁹⁰, Gibson-Young⁶², Holley³³, Monks⁶¹, Warren⁴⁵.</p>
Signposting AYA to high quality online resources about allergy and asthma (websites, moderated forums) where they can obtain age-appropriate information and advice may be recommended (Grade C, Evidence level IV)		
<p><i>Strength of recommendation:</i> Moderate recommendation based on low to moderate risk of bias qualitative^{33,44,59-61} and observational studies^{29,31,38,45,58,62,63,87,88,91}.</p> <p>These included AYA with both asthma^{33,38,44,60,62,87,88}, anaphylaxis⁵⁹, allergy⁹¹ and food allergy^{29,31,45,58,61,63}.</p>	<p><i>Other considerations:</i> Patients consider online supportive networks to be helpful.</p> <p>Peer support groups may be helpful, for example, voluntary- and community-sector organisations, such as condition specific support groups or charities^{13,18}. Social networks via virtual platforms or electronic</p>	<p><i>References:</i> Bruzzese⁴³, Gallagher⁵⁹, Gibson-Young⁶², Hullmann⁶³, Holley³³, Jones²⁹, Jones³¹, Jonsson⁶⁰, Koster³⁸, Monks⁶¹, Rhee⁸⁷,</p>

	communication may be helpful ^{13,18} . Moderation of the group is desirable to ensure that interactions within the group are positive.	Stewart ⁸⁸ , Steensgaard ⁵⁸ , Suorsa ⁹¹ 2016, Warren ⁴⁵ Wombald ⁴⁴ .
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433 AYA, adolescents and young adults.
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435 **DISCUSSION, GAPS IN THE EVIDENCE AND FUTURE PERSPECTIVES**

436 **Discussion**

437 The EAACI Task Force on Adolescents and Young Adults has developed an evidence-based,
438 clinical practice guideline to help HCP to manage AYA with allergy and/or asthma.
439 Adolescence can be a critical time for AYA as they need to become independent, expert adult
440 patients, successfully self-managing their chronic conditions. This can be seen as a challenge
441 but also as an opportunity for HCP. This is because neurodevelopmentally, adolescents are
442 naturally eager to become more autonomous and are able to learn new skills quickly and
443 easily. The guideline sets out a series of general recommendations focused on how to run a
444 clinical service for AYA.

445 Key recommendations are to consider starting transition early (11-13 years), using a
446 structured, multidisciplinary approach (involving both paediatric and adult clinics where
447 applicable); ensuring AYA fully understand their condition(s) and have resources that they can
448 access; discussing any implications for self-management in real-world contexts such as further
449 education/work and actively monitoring adherence. Specific allergy and/or asthma transition
450 recommendations are categorised according to improving adherence, optimising self-
451 management, addressing psychological issues and obtaining support. Highlights include
452 simplifying medication regimes and the use of reminders; focusing on areas where AYA are
453 less confident; involving peers in training AYA patients; identifying and managing
454 psychological and socioeconomic issues impacting disease control and quality of life; enrolling
455 the family in assisting AYA to take on self-management and encouraging AYA to let their
456 friends know about their allergy and asthma.

457 **How to implement transition**

458 Transition needs to be implemented in a joint approach from paediatric and adult services.
459 The process is simpler where if the allergy service caters for all age groups but a separate AYA
460 clinic is still required to ensure that a transition care process can be put into in place. As most
461 HCP have receive minimal specific training on how to manage this age group, this is likely to
462 require additional staff training (Table 6). Some of the likely barriers and strategies facilitated
463 to delivering a transition service for AYA are detailed in Table 7.

Box 3. Practical considerations to delivering an adolescent and young adult clinic

- Ensure that the AYA service is a joint activity between paediatric and adult services
- Use an adolescent and young adult centred approach
- See AYA on their own for part of the clinic
- Ensure that the AYA is an active participant in the consultation
- Talk through barriers to self-management with the AYA and help them to come up with solutions, e.g. alarms on mobile phone to remind them to take medication
- Education directed at AYA (and their peers) rather than their parents/carers
- Enrol family to support AYA to take on self-management of their allergy and asthma
- Encourage AYA to let their friends know about their allergy and asthma
- Utilise peer support groups
- Role play managing an allergic reaction or asthma attack
- Practice with dummy adrenaline autoinjector / asthma inhaler
- Use a personalised written management plan – AYA may find it easier to keep it as a photo on their mobile phone

A list of resources :

- Centre for Health Care Transition Improvement. Got transition program. 2014. Available at: <https://www.gottransition.org/resources/index.cfm> (last accessed 18th January 2020).
- ON TRAC (Transitioning Responsibly to Adult Care). Available at: <http://ontracbc.ca/> (last accessed 18th January 2020).
- Good 2 Go Transition Program. Available at: <http://www.sickkids.ca/patient-family-resources/resource-navigation-service/transitioning-to-adult-care/index.html> (last accessed 18th January 2020).
- Checklist for readiness: <http://www.sickkids.ca/PDFs/good2go/41196-Patient%20readiness%20checklist.pdf> (last accessed 12 February 2020)
- Nagra A, McGinnity PM, Davis N, et al. Implementing transition: Ready Steady Go. Archives of Disease in Childhood - Education and Practice 2015;100:313-320.

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467 **Recommendations for policy and training**

468 This guideline has important implications for policy makers, managers and commissioners of
469 both child- and adult-centred care in allergy and/or asthma patients. The recommendations
470 could be implemented at a patient, family and society level, through education, training,
471 resources and service delivery design.⁹² Commissioners need to focus on and understand the
472 important components of integrated AYA care that can be shown to improve outcomes.⁹³
473 Self-management is a core component of transition. It is associated with cost savings, a more
474 sustainable health system with less utilisation of health services and subsequent easing of
475 workforce pressures⁹⁴. Promoting self-management is in line with international health policy
476 aims which support a 'life course approach and people empowerment'.⁹⁵

477 **Gaps in the evidence**

478 Our systematic review summarises the sizable amount of evidence for the challenges
479 experienced by AYA with allergy/or and asthma⁷. The evidence gaps are predominately in
480 relation to intervention strategies for allergy as the systematic review only found
481 interventional asthma studies⁸. Evidence is urgently needed to help determine the best
482 format for an AYA transition clinic and for the most effective and cost-effective interventional
483 strategies for allergy and asthma (Table 8).

484 **Conclusions**

485 The EAACI Task Force on Adolescents and Young Adults presents recommendations to
486 support the development of a transition clinic for adolescents and young adults with allergy
487 and/or asthma. This should support HCP to help AYA develop into competent and confident
488 adult patients who can successfully self-manage their allergy and/or asthma. Special
489 emphasis is placed on the difference between transition and transfer. Transitional care is
490 required even when AYA are managed in an allergy clinic dealing with all age groups. While it
491 is possible to make evidence-based recommendations, the evidence for some is minimal.
492 Larger, well designed, randomised controlled trials are required in this area. If optimal care is
493 delivered for AYA, they should become expert adult patients with the knowledge and skills to
494 manage their allergy and/or asthma throughout their lives.

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496 **Table 6. Implementation: barriers, facilitators, audit criteria and resource implications**

Recommendation areas	Barriers to implementation	Facilitators to implementation	Audit criteria	Resource implications
Implementation of a structured, multidisciplinary transition programme involving paediatric and adult HCP for 11-25 year age group	Organisation challenges reorganising service to deliver a paediatric/ adult clinic.	Training for staff, checklist of skills and knowledge for AYA patients, regular meetings between adult and paediatric teams, audit process.	Existence of a 11-25 year transition clinic.	Some initial investment may be required to reorganise the clinical service.
Medication reminders, mobile applications and web-based applications, monitors or routines to improve adherence, symptom control and quality of life	Convincing families to change their routines. Expense of information technology applications or monitors.	The use of alarm functions on devices such as mobile phones.	Adherence to therapy.	Simple changes to routines to facilitate adherence or the use of alarm functions on devices such as mobile phones are inexpensive. Separate mobile or web-based applications would be expensive.
Focusing consultation on areas where AYA say they are not confident to improve self-management including adherence	Changing HCP approach which focuses on a set approach to history taking in clinic.	Training for HCP so they understand the mindset of AYA and behavioural change approaches.	Survey of AYA patients to assess their confidence in self-management.	Resources for training HCP.
Formulation of a personal action plan with the AYA and their family to enable them to self-manage their allergy and asthma	Time to develop patient specific self-management plans.	Generic personal action plans that can be personalised to the needs of specific patients.	Possession of personal action plan by individual patients.	Time to develop patient specific self-management plans.
Peer-led interventions to improve asthma related quality of life, asthma knowledge and to reduce asthma related doctor visits and school absence	Resistance and expense of involving peers in training AYA. Availability of peers who have the same condition.	Education of HCP about the benefit of peer-led interventions.	Asthma related quality of life and control after peer-led interventions.	Expense of involving peers in training AYA.
Supporting the AYA, family and the wider community to allow the AYA inclusion in social events	Resistance from teachers, sport club leader and others in the community.	Education of teachers, sport club leader and others in the community as to how to safely manage the risks	Access to social events by patients with allergy and asthma.	Costs associated with training and education.

		associated with allergy and asthma.		
Motivational interviewing to improved asthma symptoms and quality of life	Lack of time and expertise.	Training for HCP and knowledge about how improved self-management can reduce further healthcare utilisation.	Asthma related quality of life and control after use of motivational interviewing.	Expense of training and increased clinic time, initially.
Identification and management of psychological and socioeconomic issues impacting disease control and health related quality of life	Lack of time in clinic to identify and assist in managing these.	Training in AYA care and awareness of importance of psychological and socioeconomic issues.	Survey of psychological and socioeconomic issues.	Cost of additional clinic time. Access to a psychologist within the allergy service.
Psychological interventions using a cognitive behavioural therapy based or multi-systemic therapy approach to improve adherence, asthma knowledge, self-management and symptom control	Lack of time and expertise.	Training for HCP and knowledge about how improved self-management can reduce further healthcare utilisation.	Health related quality of life and symptom control after use of these psychological interventions.	Expense of training and increased clinic time, initially. Access to a psychologist within the allergy service.
Enrolling the family in assisting the AYA to take on the self-management of their allergy and asthma	Inflexible family routines and lack of time.	Involvement of families in clinic and explanation of benefits of their support.	Health related quality of life and symptom control after use of these psychological interventions.	Cost of possible additional clinic time.
Encouraging AYA to let their friends know about their asthma and allergy and how to manage emergencies	AYA embarrassment and concern that they will be seen as different.	Explanation that friends will be interested in helping them.	Survey of the involvement in friends in supporting self-management.	Cost of possible additional clinic time. Plus resources directed at friends.
Signposting AYA to high quality online resources about allergy and asthma where they can obtain age-appropriate information and advice may be recommended	Information on websites or from forums that provided an inaccurate picture of allergy and asthma.	High quality websites or moderated forums that can inform and support AYA with allergy and asthma.	Survey the use of website and moderated forum.	Costs associated with developing and maintaining websites and moderated forums.

497 AYA: adolescent and young adult. HCP: healthcare professionals.

498 **Table 7. Training requirements for HCP working with AYA with allergy and asthma**

Knowledge	Skills
An understanding of AYA development including physical, psychological, cognitive and emotional aspects	Skills and knowledge to address emotional, mental health and social issues
An understanding of the lifestyle of AYA such as education, vocation, employment, work, sports, recreation and future vision	Skills to assess adherence and assist AYA to improve this
An understanding of AYA relationships both inside and outside the family	Skills and knowledge to recognise and deliver behavioural change for common risk-taking behaviours in the adolescence and young adulthood
A knowledge of allergic diseases and asthma management in the adolescence and young adulthood	Communication skills (with parents/carers and AYA), promotion of self-management and shared decision making

499 AYA: adolescents and young adults.

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503 **Table 8. Research gaps in the management of adolescent and young adults with allergy and asthma**

Research gap	Plan to address	Priority
Effectiveness and cost-effectiveness of different transition formats for allergy and asthma – should include patient and parent perspectives with quantitative and qualitative outcomes	Cluster randomised controlled studies focused on different clinic formats with a process evaluation to assess which components are most important	High
Effectiveness and cost-effectiveness of educational interventions for AYA with allergy and asthma	Randomised controlled trials with a process evaluation to assess which components are most important	High
Effectiveness and cost-effectiveness of motivational interviewing for allergy and asthma	Randomised controlled trials	High
Effectiveness and cost-effectiveness of psychological interventions (eg CBT) for allergy and asthma	Randomised controlled trials	High
Smart phone applications or other information technology interventions to improve self-management in AYAs with allergy and asthma	Large randomised controlled trials as follow on from current small pilot studies ³⁸	High
The best time for the transfer of responsibilities of care for each facet to management	Cross sectional studies looking at competence to deliver each facet of management at different ages	Medium
Development and validation of disease-related knowledge/ transition readiness tools for AYA with allergy and asthma	Projects using standard questionnaire development and validation principles	Medium
Most effective way of training HCP in AYA management	Randomised controlled trials of different training modalities with a process evaluation to assess which components are most important	Medium
Value of personal actions plans for AYA to improve outcomes in allergy	Randomised controlled trials	Medium
Value of patient activation measures in allergy	Randomised controlled trials	Medium
Role of the identification and management of psychological and socioeconomic issues in AYA to improve health related quality of life and disease control	Randomised controlled trials with a process evaluation to assess which components are most important	Low
Strategies to successfully enrol AYA friends to support self-management	Qualitative studies to develop an intervention with small follow on pilot study	Low

504 AYA: adolescents and young adults. CBT: cognitive behavioural therapy. HCP: healthcare professionals.

505

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517

518 **AUTHOR CONTRIBUTIONS**

519 Guideline concept and design: G.R., M.V-O., KK. Acquisition of data including search, all
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521 important intellectual content, all authors. Obtained funding, G.R., M.V-O.

522

523 **CONFLICT OF INTEREST**

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525 Research into the challenge associated with asthma during adolescents. FT reports being a
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527

528

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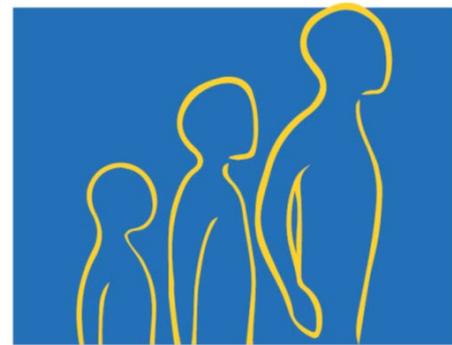
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DRAFT

1 **EAACI Guideline on management of adolescents**
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95 **METHODS**

96 **Search for generic recommendations on transition from paediatric to adult medical services**

97 This was designed to retrieve evidence-based papers about general transition of adolescents and
98 young adults from pediatric to adult medical services. The search strategy was developed on OVID
99 MEDLINE and then adapted for other databases. The following databases were searched Medline
100 (OVID), Embase (OVID) and Psychinfo. Databases were searched for guidelines published within five
101 years until June 21, 2019. Additional references were identified by searching the references cited in
102 the evidence-based papers.

103 Inclusion criteria

104 Study design included papers (e.g. guidelines, position papers and statements, consensus, clinical
105 protocols, clinical pathways, practice parameters, policy statements) which reported evidence-based
106 recommendations on the general transition of adolescents and young adults (11-25 years) from
107 pediatric to adult medical services.

108 Exclusion criteria

109 The following were excluded: abstracts, reviews, discussion papers, non-research letters and
110 commentaries, editorials, randomized controlled trials, cross-sectional studies, cohort studies, case
111 reports and series. In addition, non-English, evidenced-based papers were not reviewed.

112 Selection

113 Paper titles were independently checked by two reviewers according to the above selection criteria
114 and categorized as included, not included or unsure. Any discrepancies were resolved through
115 discussion and, if necessary, a third reviewer (MVO) was consulted. Full text copies of potentially
116 relevant papers were examined by two reviewers for eligibility, with discrepancies again resolved
117 through discussion involving if necessary, a third reviewer (MVO).

118 Quality assessment strategy

119 All guidelines had different methodological approach and in order to assess evidence level and grade
120 of the recommendations, the study design of each study included in the evidence-based papers was
121 independently assessed by two reviewers. Any discrepancies were resolved by discussion or a third
122 reviewer (MVO).

123 Medline search strategy

124 1. adolescent/

125 2. young adult/

126 3. (teen* or adolescen*).mp. [mp=title, abstract, original title, name of substance word,
127 subject heading word, floating sub-heading word, keyword heading word, organism
128 supplementary concept word, protocol supplementary concept word, rare disease
129 supplementary concept word, unique identifier, synonyms]

130 4. (young adj (adult* or people or person)).mp. [mp=title, abstract, original title, name of
131 substance word, subject heading word, floating sub-heading word, keyword heading word,
132 organism supplementary concept word, protocol supplementary concept word, rare disease
133 supplementary concept word, unique identifier, synonyms]

134 5. pediatrics/

135 6. (pediatric* or paediatric*).mp. [mp=title, abstract, original title, name of substance word,
136 subject heading word, floating sub-heading word, keyword heading word, organism
137 supplementary concept word, protocol supplementary concept word, rare disease
138 supplementary concept word, unique identifier, synonyms]

139 7. 1 or 2 or 3 or 4 or 5 or 6

140 8. transition to adult care/

141 9. (hand-over or handoff or transfer* or transition*).mp. [mp=title, abstract, original title,
142 name of substance word, subject heading word, floating sub-heading word, keyword heading
143 word, organism supplementary concept word, protocol supplementary concept word, rare
144 disease supplementary concept word, unique identifier, synonyms]

145 10. 8 or 9

146 11. 7 and 10

147 12. exp clinical pathway/

148 13. exp clinical protocol/

149 14. exp consensus/

- 150 15. exp consensus development conference/
151 16. exp consensus development conferences as topic/
152 17. critical pathways/
153 18. practice guideline/ or clinical handover/ or clinical pathway/ or clinical protocol/ or
154 consensus development/ or good clinical practice/ or nursing care plan/ or nursing protocol/
155 19. guidelines as topic/
156 20. exp practice guideline/
157 21. practice guidelines as topic/
158 22. health planning guidelines/
159 23. (guideline or practice guideline or consensus development conference or consensus
160 development conference, NIH).pt.
161 24. (position statement* or policy statement* or practice parameter* or best
162 practice*).ti,ab,kw.
163 25. (standards or guideline or guidelines).ti,kw.
164 26. ((practice or treatment* or clinical) adj guideline*).ab.
165 27. (CPG or CPGs).ti.
166 28. consensus*.ti,kw.
167 29. consensus*.ab. /freq=2
168 30. ((critical or clinical or practice) adj2 (path or paths or pathway or pathways or
169 protocol*)).ti,ab,kw.
170 31. recommendat*.ti,kw.
171 32. 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27
172 or 28 or 29 or 30 or 31
173 33. 11 and 32
174 34. limit 33 to english language
175 35. limit 34 to yr="2014 -Current"

177 Embase search strategy

1. adolescent/

2. young adult/

3. (teen* or adolescen*).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word]

4. (young adj (adult* or people or person)).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word]

5. pediatrics/

6. (pediatric* or paediatric*).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word]

7. 1 or 2 or 3 or 4 or 5 or 6

8. transition to adult care/

9. (hand-over or handoff or transfer* or transition*).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word]

10. 8 or 9

11. 7 and 10

12. exp clinical pathway/

13. exp clinical protocol/

14. exp consensus/

15. exp consensus development conference/

16. exp consensus development conferences as topic/
17. critical pathways/
18. practice guideline/ or clinical handover/ or clinical pathway/ or clinical protocol/ or consensus development/ or good clinical practice/ or nursing care plan/ or nursing protocol/
19. guidelines as topic/
20. exp practice guideline/
21. practice guidelines as topic/
22. health planning guidelines/
23. (guideline or practice guideline or consensus development conference or consensus development conference, NIH).pt.
24. (position statement* or policy statement* or practice parameter* or best practice*).ti,ab,kw.
25. (standards or guideline or guidelines).ti,kw.
26. ((practice or treatment* or clinical) adj guideline*).ab.
27. (CPG or CPGs).ti.
28. consensus*.ti,kw.
29. consensus*.ab. /freq=2
30. ((critical or clinical or practice) adj2 (path or paths or pathway or pathways or protocol*)).ti,ab,kw.
31. recommendat*.ti,kw.
32. 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31
33. 11 and 32
34. limit 33 to english language
35. limit 34 to yr="2014 -Current"

179 Psychinfo search strategy

180 1. (young N (adult* OR person OR people)) OR teen* OR adolescen*

181 2. pediatric* OR paediatric*

182 3. 1 OR 2

183 4. ("hand-over" OR handoff OR transfer* OR transition*) AND "Transition to Adult"

184 5. 3 AND 4

185 6. DE "Treatment Guidelines" OR DE "Reporting Standards" OR DE "Clinical Governance"

186 7. guideline* OR consensus OR "critical pathway*" OR ("position statement*" OR "policy
187 statement*" OR "practice parameter*" OR "best practice*") OR standard* OR ((critical or
188 clinical or practice) N2 (path OR paths OR pathway OR pathways OR protocol)) OR
189 recommendation*

190 8. 6 OR 7

191 9. 5 AND 8

192 10. Limiters - Published Date: 01.01.2014-31.06.2019; English

193

194 **Delphi process among members of the task force**

195 Delphi methodology

196 We conducted an online, 3-round Delphi survey among members of the Task Force which
197 aimed to receive anonymous comments for each D level recommendation and achieve a
198 consensus among panel of experts. It involved a feedback process in which comments
199 obtained during one round were returned to the participants during the next round. The level
200 of agreement was set at 80% for acceptance.

201 Data collection

202 The on-line survey was held between 12th November and 30th November with the third round
203 involving a teleconference on 5th December 2019.

204 In the first round, Task Force members were asked to rate each recommendation on the basis
205 of inclusion in the guideline (yes/no) and give their comments. In the second round, all
206 recommendations including those not reaching 80% consensus were included for further
207 comments. The third round was conducted via a webconference where all recommendations
208 had been discussed and further alterations were made as required. Agreement was reached
209 for each recommendation with exception of one which was dropped.

210

211 **Survey of adolescents and young adults with allergy and asthma and their parents/carers**

212 Participants

213 We invited AYA with allergy and asthma and their parents/carers across Europe who were
214 able to read English, Dutch, Danish, German, Spanish, Portuguese, Italian or Russian to
215 participate in the survey.

216 Data collection

217 The survey was distributed through national allergy and asthma patients organisations in
218 Europe (UK, The Netherlands, Italy, Portugal, Spain, Ireland, Germany, Russia, Denmark) via a
219 link to the survey in SurveyMonkey. In addition, the survey was advertised on social media
220 (e.g. Facebook, Twitter) and in clinics. Before accessing the questionnaire, potential
221 respondents were informed about the study's purpose, organisation conducting the survey
222 and average time required to complete the survey. The survey was conducted between x
223 February and y February 2020.

224 The questionnaire

225 The anonymized survey consisted of 24 questions which consisted of two parts: minimal
226 demographic information (AYA or parent, age, gender, allergic diseases) and opinions on the
227 level of importance of each recommendation. Participants were asked to rank the level of
228 importance for each recommendation using 5-point Likert scale: 1 "Not important," 2 "Slightly
229 Important," 3 "Fairly important" 4 "Important," and 5 "Very Important," plus a "No opinion"
230 option. The level of importance was set at an average score of at least 2 for acceptance. The

231 questionnaire was adapted to the lay audience, translated into eight languages (English,
232 German, Spanish, Portuguese, Italian, Danish, Dutch and Russian) and backtranslated into
233 English to ensure validity and accuracy. An option for other free-text response was permitted
234 in each question.

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AGREE II criteria	Section
DOMAIN 1. SCOPE AND PURPOSE	
1. The overall objective(s) of the guideline is (are) specifically described.	Last paragraph of background
2. The health question(s) covered by the guideline is (are) specifically described.	Last paragraph of background
3. The population (patients, public, etc.) to whom the guideline is meant to apply is specifically described	Last paragraph of background
DOMAIN 2. STAKEHOLDER INVOLVEMENT	
4. The guideline development group includes individuals from all relevant professional groups.	Methodology - Ensuring appropriate stakeholder involvement
5. The views and preferences of the target population (patients, public, etc.) have been sought.	Methodology - Ensuring appropriate stakeholder involvement & Peer review and public comment
6. The target users of the guideline are clearly defined.	Last paragraph of background
DOMAIN 3. RIGOUR OF DEVELOPMENT	
7. Systematic methods were used to search for evidence.	Methodology - Systematic reviews of the evidence
8. The criteria for selecting the evidence are clearly described.	Details given in the systematic review publications and online supplement
9. The strengths and limitations of the body of evidence are clearly described.	General transition and Specific allergy and asthma transition
10. The methods for formulating the recommendations are clearly described.	Methodology - Formulating recommendations and Box 2
11. The health benefits, side effects, and risks have been considered in formulating the recommendations.	Methodology - Formulating recommendations and Box 2
12. There is an explicit link between the recommendations and the supporting evidence.	Tables 1-5
13. The guideline has been externally reviewed by experts prior to its publication.	Methodology - Peer review and public comment
14. A procedure for updating the guideline is provided.	Methodology - Updating the guidelines
DOMAIN 4. CLARITY OF PRESENTATION	
15. The recommendations are specific and unambiguous.	Tables 1-5
16. The different options for management of the condition or health issue are clearly presented.	Tables 1-5
17. Key recommendations are easily identifiable.	Abstract and Summary, Gaps in the evidence and Future perspectives - Summary
DOMAIN 5. APPLICABILITY	
18. The guideline describes facilitators and barriers to its application.	Table 6

19. The guideline provides advice and/or tools on how the recommendations can be put into practice.	Box 3, Table 6
20. The potential resource implications of applying the recommendations have been considered.	Table 6
21. The guideline presents monitoring and/or auditing criteria.	Table 6
DOMAIN 6. EDITORIAL INDEPENDENCE	
22. The views of the funding body have not influenced the content of the guideline.	Methodology - Editorial independence and managing conflict of interests
23. Competing interests of guideline development group members have been recorded and addressed.	Methodology - Editorial independence and managing conflict of interests and Conflicts of interests

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