

Original Article



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Physician's experience on managing asthma in adolescents: results of the International AMADO (Asthma Management in ADOlescents) survey

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ABSTRACT

Background: Worldwide prevalence of asthma seems to be increasing in adolescents, but limited data is available regarding the management of asthma in this age group.


Objective: Therefore, we conducted an international survey focused on physicians who manage asthma in order to understand how Asthma Management in ADOlescents (AMADO) is currently performed.

Methods: The AMADO survey is a web-based global survey of physician's attitudes towards the management of asthma in adolescents, circulated for 17 weeks. The survey had an anonymous and voluntary standard. The questionnaire consisted in 27 questions covering the training background of respondents, difficulties in diagnosis, and in management of asthma in adolescents.

Results: Two hundred forty-four responses were received from 46 countries, from all continents. Most (65%) of participants indicated allergy as being their main specialty. The majority of participants (62%) had more than 5 years of clinical practice, but 62% have no

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Conflict of Interest

The authors have no financial conflicts of interest.

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formal training in management of adolescents with asthma. Most of participants (96%) indicated having at least one case of asthma in adolescents per month. 60% of respondents mentioned that the asthmatic adolescents only had the consultation due to the family imposition. All respondents mentioned having difficulties in the management of asthma in adolescents due to patient poor adherence. Overall, 44% of participants have no specific health care resources for adolescents in their departments. Main suggestions from the participants were: optimization of time and personalized communication to these cohort, and standardization of multidisciplinary actions to improve adherence to asthma control treatment. **Conclusion:** Management of asthma in adolescents is still a challenge in clinical practice. The results from this survey helped us to identify the key issues to improve clinical outcomes in the future. This survey is the first step of the international AMADO initiative, which intends to optimize diagnosis and control of asthma and prevent avoidable deaths.

Keywords: Adolescence; Asthma; Management; Prevention; Survey

INTRODUCTION

Asthma is one of the most common chronic diseases in the world, affecting about 339 million people around the world, and its prevalence is rising [1]. It is characterized by recurrent attacks of breathlessness and wheezing, which vary in severity and frequency from person to person [2]. According to the International Study of Asthma and Allergies in Childhood, asthma symptoms are more common in high-income countries. Low and middle-income countries also have high levels of asthma symptoms prevalence. Asthma is indicated to be more severe in low and middle-income country than in high-income countries and represents one of the most relevant causes of deaths in adolescents. An optimal asthma control is the only way to prevent avoidable deaths due to this condition.

Asthma and allergic conditions prevalence is reported to be increasing worldwide, as well as their complexity and severity in children and young adults, who are bearing the greatest burden of these trends. Following the global tendency, asthma in adolescents has increased in prevalence over the past 2 decades and became a major public health challenge in industrialized countries. It affects about 7%–10% of adolescents in many western countries [3] and is one of the most common chronic diseases in this age group. Nevertheless, limited data is available regarding the management of asthma in this age group.

Adolescence, which covers the period between 10 and 19 years, according to the World Health Organization [4], is a critical time during life. Many physical and psychosocial changes occur quickly and can affect the health and well-being. It is during this transition period between childhood and adulthood that individuals face difficulties in the diagnosis and management of some conditions, such as asthma. The responsibilities of asthma caring are gradually transferred from the parent to the adolescent [5].

If asthma occurs during adolescence, it can be difficult to recognise and treat [6]. Adolescents often have poor knowledge about asthma or sometimes deny their illness if asthma evolves since childhood. They underevaluate their symptoms in relation to adulthood baseline and this behaviour may contribute to low medication adherence [7]. Usually, adolescents do not want asthma to be the focus of their daily lives; they wish to be considered “normal” within friends and are afraid of showing vulnerability due to asthma symptoms [8].

In this study, we evaluated the Asthma Management in ADOlescents (AMADO) through an online survey among health professionals worldwide in order to understand the key issues, which should be improved to achieve quality care of these patients.

MATERIALS AND METHODS

The AMADO survey is a web-based global survey of physician's attitudes towards the management of asthma in adolescents, internet-based and circulated for 17 weeks. The survey had an anonymous and voluntary standard.

A web-based questionnaire was constructed in three parts (Supplementary material):

- (I) part 1 about characteristics of the answering: age, gender, localisation, profession, speciality, number year of practice, estimation of number of adolescents seen per week, how do they generally were presented in consultation:
- (II) part 2 about diagnosis of asthma in adolescents: if there are difficulties on managing adolescent with asthma; if they come in consultation because they think they have asthma; frequency of asthma diagnostic suspicion or exacerbation in a teenager; if the answering has any specific training in caring adolescents with asthma
- (III) part 3 about management of adolescent with asthma: appropriate moment to detect asthma; difficulties and reason in follow-up asthma in adolescent; age in which adolescent (or child) is able to take his inhaled treatment; if the answering use therapeutic education service and if no what is the reason; medical treatment of asthma in adolescent; management of indoor air pollution.

The final version of the questionnaire consisted in 27 questions covering the training background of respondents, difficulties in diagnosis, and management of asthma in adolescent. The full questionnaire is available as annex and the online version has been built up in English at the online Google platform. It has been validated by the coauthors and beta-tested, before sending it out. We launched an introduction letter containing a link (Internet address) to the online questionnaire that was unique to each participating member. Two reminders were sent (Jun 2019 and July 2019) and all the respondents were given 90 days to reply. The audience for this survey counted with participants from the professional networks of the coauthors.

No ethical consent was required since the survey had volunteer and anonymous context.

The results were reported and analyzed by the geographic origin of responders, according to the world regional areas classification. For descriptive statistics and graphic representations, Excel software was used. For the multiple response questions, the absolute and relative frequency (expressed in %) of each response was reported in tabular form, with confidence intervals of 95%. The similar open answer questions have been clustered in order to produce summary statistics similar to those taken in the multiple responses. The chi-square test was used to analyze a potential association between the results and the geographic origin of responders and between the results and the current professional position (research vs clinical activity).

RESULTS

We received a total of 244 completed surveys from 46 countries (**Table 1**): Africa/Middle-East (AME: 13 [5%]), Asia-Pacific-Russia (APR: 18 [7%]), Europe (EU: 132 [54%]), Latin-America (LA: 70 [29%]), and North America (NA: 11 [4%]) (**Table 1**). Most of the participants (66%) aged between 30 and 50 years and were female (65%). Almost majority of participant (46%) worked at hospital, 39% in private condition and 21% in public (**Table 1, Fig. 1**).

Table 1. Characteristics of respondents of the AMADO survey

Characteristic	Total	AME (N=13, 5%)	APR (N=18, 7%)	EU (N=130, 54%)	LA (N=69, 29%)	NA (N=11, 5%)
Countries		Algeria Israel Lebanon South-Africa Egypt Morocco Tunisia	Thailand Vietnam Australia Japan Pakistan South Korea Singapore	Romania France Serbia Italy Portugal Belgium Bulgaria Croatia Poland Germany Greece Luxembourg Netherlands Moldavia Spain Sweden UK Ukraine Georgia	Brazil Mexico Argentina Dominican Republic Ecuador Venezuela El Salvador Honduras Paraguay Peru	USA
Age of respondents (yr)	235 Responses					
20–29	25 (10.6)	1 (8)	2 (11)	14 (11)	7 (10)	1 (9)
30–39	101 (43.0)	5 (38)	7 (39)	55 (42)	29 (42)	5 (45)
40–49	56 (23.8)	3 (23)	4 (22)	30 (23)	16 (23)	3 (27)
50–59	32 (13.6)	2 (16)	2 (11)	17 (13)	9 (13)	2 (18)
60–69	19 (8.1)	1 (8)	1 (6)	10 (8)	6 (9)	1 (9)
70–79	2 (1.0)	0 (0)	0 (0)	1 (1)	1 (1)	0 (0)
Sex of respondents	228 Responses					
Male	80 (35.0)	4 (31)	6 (33)	43 (33)	23 (33)	4 (36)
Female	148 (65.0)	8 (61)	10 (55)	80 (61)	43 (62)	7 (63)
Main speciality	247 Responses					
Allergist	150 (62.0)	7 (54)	7 (39)	84 (64)	47 (68)	8 (73)
Paediatrician	40 (17.0)	1 (8)	4 (22)	11 (8)	5 (7)	0 (0)
General practice	30 (12.0)	1 (8)	2 (11)	24 (18)	1 (1)	0 (0)
Pulmonologist	27 (11.0)	2 (16)	2 (11)	5 (4)	1 (1)	3 (27)
Number years of practice	203 Answers					
2 to 5 yr	52 (22.0)	3 (23)	4 (22)	24 (18)	18 (26)	3 (27)
6 to 10 yr	42 (18.0)	2 (16)	2 (11)	26 (20)	10 (14)	2 (18)
10 to 20 yr	55 (23.0)	5 (38)	5 (28)	33 (25)	10 (14)	2 (18)
>20 yr	51 (21.0)	1 (8)	5 (28)	29 (22)	14 (20)	2 (18)
Professional setting of respondents	237 Responses					
Public setting (public hospital, university hospital)	110 (46)	6 (44)	8 (44)	58 (44)	32 (46)	6 (54)
Private setting (private hospital, private office)	94 (40)	5 (38)	7 (39)	50 (38)	27 (39)	5 (45)
Undergraduate	20 (8)	1 (2)	1 (2)	11 (8)	6 (9)	1 (9)
Other	13 (6)	0 (0)	1 (2)	7 (5)	4 (5)	1 (9)

Values are presented as number (%).

AMADO, Asthma Management in ADOlescents; AME, Africa/Middle-East; APR, Asia-Pacific-Russia; EU, Europe; LA, Latin-America; NA, North America.

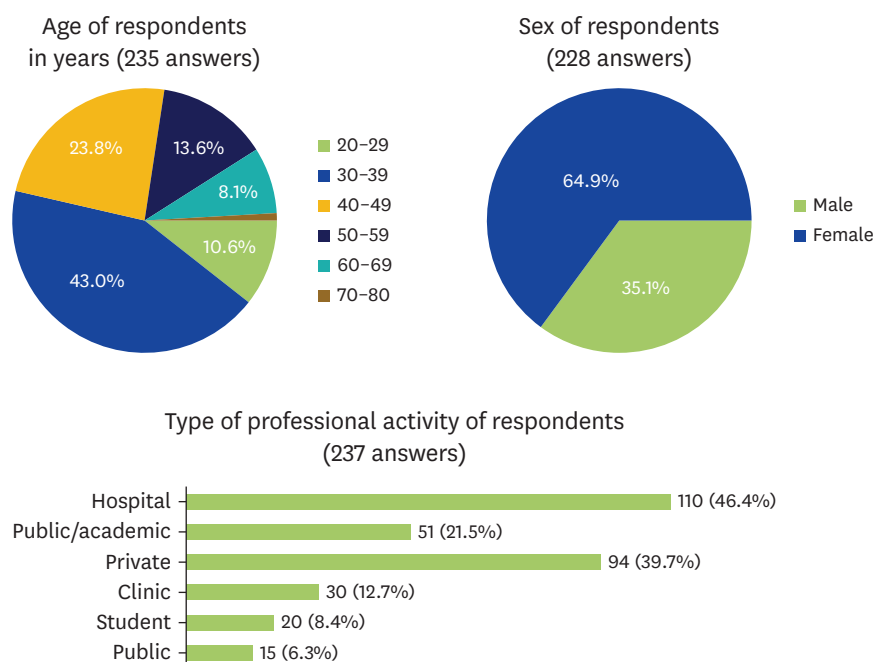


Fig. 1. Demographic data of respondents to the AMADO (Asthma Management in ADolescents) survey.

Most of the participants indicated allergy (62%) as their main specialty followed by paediatrics (16%), general practice (12%), and pulmonologist (11%) (Table 2). Respondents were equitably divided into 2–5, 6–10, 10–20, and more than 20 years of practice (about 20% each) (Table 2). Almost half of participant (47%) observed less than 10 adolescent per week (Table 3). Almost all time (95%) adolescent came with their parent in consultation. Respondents indicated that they usually did not have specific health care resources for adolescents (77%) and adolescents were generally transferred to adult services at the age of 18 (57%) (Table 3).

Almost majority of cases (43%) often had an adolescent consulting because he/she thought he/she had asthma (Table 3). In 87% cases, family circle was the reason why they went for a consultation and in 20% cases social network or friends (21%) were the reason (Fig. 2).

Almost all respondents had less than 10 asthma cases per month. About 30% of participants started performing bronchial provocation challenge with methacholine in adolescents over 14 years. Almost two-thirds of participants have never had any specific training in caring adolescents with asthma (Table 4). Rhinitis symptoms have been indicated as the main reason for the suspicion of asthma in this population (62%). Other situations in which the doctors investigate asthma were during an acute infection symptom (33%) and treatment of a chronic illness (25%) (Fig. 3).

Almost all participants had sometime difficulties in follow-up of asthma in adolescent (Table 4), and adherence to the treatment was the main difficulty in the follow-up of these patients (Fig. 4). The 2 main reasons leading difficulty of managing asthma in adolescent were socio-economic problems (58%) and family problems (45%) (Table 4).

About a third of respondents indicated that therapeutic education, multidisciplinary approach, and optimization in the communication as the main strategies able to improve asthma management in adolescent (Table 4, Fig.5).

Table 2. Characteristics of adolescents' medical management according to the AMADO survey

Adolescent management	Total	World regions participating in the AMADO survey				
		AME (N=13, 5%)	APR (N=18, 7%)	EU (N=130, 54%)	LA (N=69, 29%)	NA (N=11, 5%)
Number of adolescent seen/week	222 Answers					
0-10	113 (47)	6 (46)	4 (22)	58 (44)	28 (40)	10 (91)
10 to 20	83 (34)	6 (46)	5 (28)	45 (34)	26 (38)	1 (9)
20-30	26 (11)	1 (7)	2 (11)	15 (11)	8 (11)	0 (0)
Specific adolescents health care	234 Answers					
No	186 (78)	11 (84)	8 (44)	105 (81)	49 (71)	7 (63)
Yes	48 (20)	1 (7)	4 (22)	24 (18)	17 (24)	4 (36)
Age refer to adult services	198 Answers					
18 yr	136 (57)	4 (31)	5 (27)	82 (63)	37 (53)	8 (73)
15 yr	33 (14)	5 (38)	2 (11)	10 (8)	12 (17)	0 (0)
16 yr	29 (12)	2 (15)	4 (22)	19 (14)	4 (6)	0 (0)
Adolescent who consults because of asthma	239 Answers					
Yes rarely	109 (45)	4 (31)	9 (50)	61 (47)	31 (45)	4 (36)
Yes often	104 (43)	6 (46)	8 (44)	53 (41)	31 (45)	6 (54)
Never	26 (11)	3 (23)	1 (5)	16 (12)	5 (7)	1 (9)
Age able to take treatment	307 Answers					
Depends capacity of adolescent	98 (41)	2 (15)	6 (33)	29 (22)	18 (26)	1 (9)
10-15 yr	96 (40)	5 (38)	4 (22)	57 (44)	25 (36)	4 (36)
15-19 yr	67 (28)	4 (31)	8 (44)	29 (22)	19 (27)	5 (45)
Depends of parents/responsible	46 (19)	0 (0)	1 (5)	1 (1)	2 (3)	0 (0)
Source of information that the adolescent decided for the consultation	302 Responses					
Family advice	187 (87.0)	9 (70)	13 (72)	101 (78)	54 (78)	10 (91)
Friend advice	45 (21.0)	2 (15)	3 (17)	24 (18)	13 (19)	3 (27)
Prevention campaign	12 (5.0)	1 (8)	1 (5)	6 (5)	4 (6)	0 (0)
Social media networks	43 (20.0)	2 (15)	4 (22)	23 (17)	12 (17)	2 (18)
School nurse advice	15 (7.0)	1 (8)	1 (5)	8 (6)	4 (6)	1 (9)

Values are presented as number (%).

AMADO, Asthma Management in ADOlescents; AME, Africa/Middle-East; APR, Asia-Pacific-Russia; EU, Europe; LA, Latin-America; NA, North America.

Table 3. Asthma diagnosis in adolescents: results of the international AMADO survey

Asthma diagnosis	Total	Regions of responders				
		AME (N=13) (5%)	APR (N=18) (7%)	EU (N=130) (54%)	LA (N=69) (29%)	NA (N=11) (5%)
Diagnostic suspicion or exacerbation	228 Answers					
0-3/month	107 (45)	8 (62)	2 (11)	57 (44)	27 (39)	7 (64)
3-5/month	78 (33)	2 (15)	4 (22)	50 (38)	20 (29)	2 (18)
5-10/month	43 (18)	3 (23)	4 (22)	18 (14)	16 (37)	2 (18)
Specific training caring adolescence with asthma	248 Answers					
No specific training	147 (61)	8 (62)	3 (16)	86 (66)	39 (57)	3 (27)
Supervision within the service/clinic	60 (25)	3 (23)	4 (22)	23 (18)	17 (25)	7 (64)
Specific training course	25 (10)	1 (8)	5 (27)	12 (9)	6 (9)	1 (9)
Online training course	16 (7)	1 (8)	0 (0)	8 (6)	5 (7)	0 (0)
Situation in which is easier to approach the diagnosis of asthma	337 Responses					
Prescription of a contraception	14 (6)	0 (0)	1 (6)	8 (6)	4 (5)	1 (9)
Acute respiratory infection	78 (34)	4 (30)	5 (27)	42 (32)	23 (33)	4 (36)
Writing a medical certificate	43 (19)	3 (23)	3 (16)	23 (18)	12 (17)	2 (18)
Treatment of other chronic illness	58 (25)	3 (23)	4 (22)	31 (23)	17 (25)	3 (27)
Rhinitis symptoms	144 (62)	8 (62)	10 (55)	78 (60)	41 (59)	7 (64)

Values are presented as number (%).

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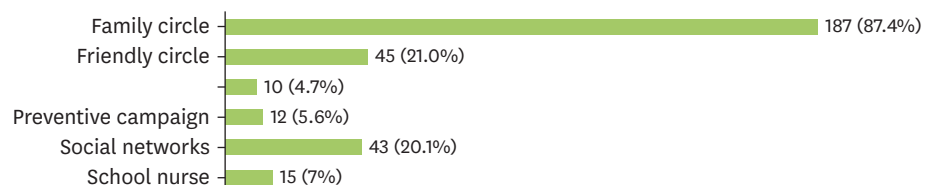


Fig. 2. Why do the adolescents come in consultation(214 answers).

Table 4. Asthma management: characteristics according to the AMADO survey

Asthma management in adolescents	Total	Regions of responders				
		AME (N=13) (5%)	APR (N=18) (7%)	EU (N=130) (54%)	LA (N =69) (29%)	NA (N=11) (5%)
Difficulties in follow-up	243 Answers					
Yes sometime	192 (80)	10 (77)	16 (89)	104 (80)	55 (80)	8 (73)
Yes, most of time	29 (12)	2 (15)	2 (11)	18 (14)	6 (9)	1 (9)
Never	22 (9)	1 (8)	1 (5)	8 (6)	7 (10)	2 (18)
Reason(s) of difficulty	301 Answers					
Socio-economic difficulties	132 (58)	5 (38)	4 (22)	29 (22)	23 (33)	4 (36)
Family problems	103 (45)	3 (23)	9 (50)	59 (45)	28 (41)	4 (36)
Addiction problems	35 (15)	1 (8)	0 (0)	10 (8)	2 (3)	0 (0)
Psychiatric disorders	31 (13)	0 (0)	2 (11)	6 (5)	4 (6)	0 (0)
Use therapeutic education (TE)	240 Answers					
Never	107 (44)	7 (54)	9 (50)	60 (46)	24 (35)	7 (54)
Yes often	73 (30)	4 (31)	4 (22)	33 (25)	28 (41)	4 (36)
Yes rarely	60 (25)	2 (15)	5 (28)	27 (21)	16 (23)	0 (0)
Reason never use TE	112 Answers					
No access	79 (70)	8 (62)	10 (55)	29 (22)	28 (41)	4 (36)
Don't know	26 (23)	0 (0)	4 (22)	12 (9)	8 (12)	2 (18)
Not usefull	7 (6)	0 (0)	2 (11)	4 (3)	1 (1)	0 (0)
Medical treatment of asthma	179 Answers					
Depends on the severity	103 (54)	6 (46)	6 (33)	47 (36)	36 (52)	8 (73)
Favour once day inhaled device (ID)	47 (25)	4 (31)	8 (44)	19 (14)	14 (20)	2 (18)
Favour twice a day ID	29 (15)	3 (23)	4 (22)	10 (8)	12 (17)	0 (0)
The main difficulty in the follow-up	265 Answers					
Adhesion to the treatment	178 (81.0)	9 (69)	12 (67)	96 (74)	52 (75)	9 (81)
Long-term monitoring	62 (28.0)	3 (23)	4 (22)	34 (26)	18 (26)	3 (27)
Communication with health professionals	25 (11.0)	1 (8)	2 (11)	13 (10)	8 (12)	1 (9)
How to optimize the management of asthma in adolescents	143 Answers					
Personalized therapeutic education	49 (32.0)	3 (23)	3 (16)	27 (21)	14 (20)	2 (18)
Optimize communication	29 (19.0)	2 (15)	2 (11)	16 (12)	8 (12)	1 (9)
Better relation	10 (6)	1 (8)	1 (8)	5 (3)	3 (4)	0 (0)
Social media, new technology	9 (6)	1 (8)	1 (8)	5 (3)	2 (3)	0 (0)
Other (diversity of answers)	46 (30.0)	2 (15)	3 (16)	25 (19)	13 (18)	3 (27)

Values are presented as number (%).

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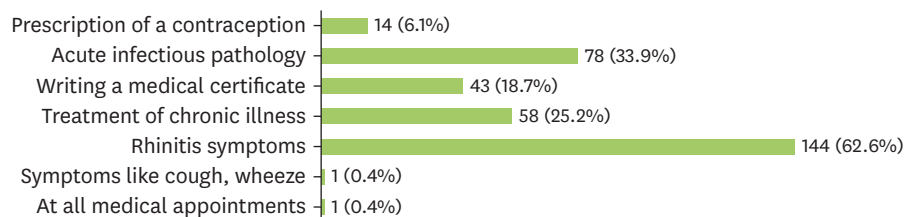


Fig. 3. Situation in which it is easier to approach the diagnosis of asthma (230 answers).

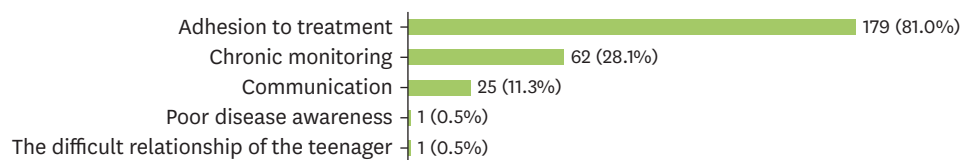


Fig. 4. Main reason of difficulties in their follow-up (221 answers).

DISCUSSION

To our knowledge, the current survey provides the first international perspective about AMADO conducted among health professionals responsible for caring these patients.

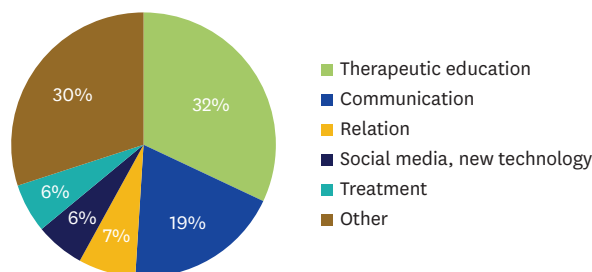


Fig. 5. How to better manage asthma in adolescence (153 answers).

Equally important, this initiative is the first step of collaboration project among professionals from different countries in order to implement quality management of adolescent patients suffering from asthma.

This survey shows that all participants face difficulties in managing asthma in adolescents, especially concerning the adherence to the treatment. Asthma is a chronic disease, which requires long-term treatment and management that is difficult to obtain especially during adolescent.

Adolescents usually come with their parent to consultation. This suggests that family circle, and especially parents, still have an important role in asthma management during adolescence. The way family influences asthma outcomes is not well understood. However, family support has been positively associated with asthma control and quality of life by reducing barriers concerning adolescents' negative attitudes toward medication and healthcare providers [9]. On the other side, family socio-economic difficulties can lead do adherence difficulties and dysfunctional family behaviours can affect asthma severity [10]. Physicians should always include the family in asthma management approach, especially when inadequate parental involvement is suspected. In our survey, physicians noticed that family problems and also socio-economics difficulties were leading to difficulties in the treatment adherence. Indeed, families of adolescents with severe asthma are reported to have higher rates of psychological impact [11]. Healthcare providers should also evaluate how physical and psychological dimensions interact in adolescents with asthma.

During adolescence, psychosocial development involves dynamic changes in cognitive functioning, family and peer relationships and school occurs. Asthma-related fears may become more emotional and cognitively sophisticated during adolescence [12]. It can be difficult to distinguish intense emotional reactions from depressive disorders in young people because of these cognitive and physical changes that take place during this time. A study demonstrated that 16.3% of adolescents with asthma met Diagnostic and Statistical Manual of Mental Disorders, fourth edition criteria for anxiety or depressive disorders compared with 8.6% of those without asthma [13].

Another Taiwanese study including 162,766 high school students between 11 to 16 years showed that the incidence rate of suicide in participants with current asthma was more than twice in comparison with those without asthma (11.0 vs. 4.3 per 100,000 person-years) [14]. School staff, clinical staff, and family members should be reminded of the need for awareness of prevention measures to improve mental health in young people, particularly those with more severe and persistent asthma symptoms.

In our survey, adherence to the treatment and the chronic management are the main critical aspects. Almost two-thirds of participants never had any specific training in caring adolescents with asthma. This showing that healthcare professional needs to be sensitized and trained to manage this specific age group. Suffering from asthma during adolescent can make them feel different to their peers and they may be denied, hidden, or ignored. They wanted to participate in physical activity at the same level as their friends. This can result in non-adherence to treatment plans and can lead adolescents to poor asthma control [15]. The process of transferring responsibility for treatment and care from parents to adolescents should include their active participation in the decisions related to their disease and in the discussions with their healthcare professional [16]. Adolescents should meet their healthcare professional without their parents. In this way they can express their experiences, concerns and expectations about living with asthma and feel themselves more responsible, in taking their own decisions regarding their disease [17].

Respondents suggest that therapeutic patient education (TPE) can be a solution to improve asthma management in adolescent but almost a half of them never use it because of problem of access. TPE enables people with chronic diseases to manage their illness and yields benefits in both health and financial terms [18]. The objective is to enable patients to acquire and maintain abilities that allow them to manage their lives with their disease. Education is an important component of effective asthma self-management, which should promote the health of youth adults with asthma and reduce the negative impact of the disease on daily life. Efficacy of asthma TPE in adolescents needs to be further investigated, as there is a limited number of TPE specifically tailored on adolescents [19-27].

As main limitation of the study, the different response rate by regional area deserves to be mentioned (**Table 1**). Although it affects the overall data analysis, we considered the quality of responses. Furthermore, despite the specific response rate, the survey represents a unique opportunity to give the voice to health professionals from 46 countries. In some countries, such as China, even being one of the most populated of the world, we did not receive responses. We hypothesized that in some specific countries the respondents could not access the survey due to national regulations which do not allow Google accounts. Difficulties with the English language may also have to be considered as a limitation. Although it is the first step of the AMADO initiative, we highlight the need of recruiting more responses from non-European/American countries in the future steps of the initiative.

Management of asthma in adolescents is still a challenge in clinical practice. The results from this survey will help us identify key components in order to improve outcomes in the future. This survey is the first step of the international AMADO initiative, which intends to optimize diagnosis and prevention of asthma in this cohort and prevent avoidable deaths.

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SUPPLEMENTARY MATERIAL

Supplementary material 1 can be found via [10.5415/apallergy.2021.11.e45](https://doi.org/10.5415/apallergy.2021.11.e45)

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