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
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].

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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).

| Characteristic | Total | AME (N=13, 5%) | APR (N=18, 7%) | EU (N=130, 54%) | LA (N=69, 29%) | NA (N=11, 5%) |
|----------------|-------|----------------|----------------|----------------|----------------|---------------|
| Countries      |       | Algeria        | Thailand       | Romania        | Brazil         | USA           |
|                |       | Israel         | Vietnam        | France         | Mexico         |
|                |       | Lebanon        | Australia      | Serbia         | Argentina      |
|                |       | South-Africa   | Japan          | Italy          | Dominican Republic |
|                |       | Egypt          | Pakistan       | Portugal       | Ecuador        |
|                |       | Morocco        | South Korea    | Belgium        | Venezuela      |
|                |       | Tunisia        | Singapore      | Bulgaria       | El Salvador    |
|                |       |                |                | Croatia        | Honduras       |
|                |       |                |                | Poland         | Paraguay       |
|                |       |                |                | Germany        |               |
|                |       |                |                | Greece         |               |
|                |       |                |                | Luxembourg     |               |
|                |       |                |                | Netherlands    |               |
|                |       |                |                | Moldavia       |               |
|                |       |                |                | Spain          |               |
|                |       |                |                | Sweden         |               |
|                |       |                |                | UK             |               |
|                |       |                |                | Ukraine        |               |
|                |       |                |                | Georgia        |               |

| 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 (67) | 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.
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 adhesion 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 3. Characteristics of adolescents’ medical management according to the AMADO survey

| Adolescent management | Total | 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 | 113 (47) | 6 (46) | 4 (22) | 58 (44) | 28 (40) | 10 (91) |
| 0–10                  |       | 83 (34) | 6 (46) | 5 (28) | 45 (34) | 26 (38) | 1 (9) |
| 10 to 20              |       | 26 (11) | 1 (7) | 2 (11) | 15 (11) | 8 (11) | 0 (0) |
| Specific adolescents health care | 234 Answers | 186 (78) | 11 (84) | 8 (44) | 105 (81) | 49 (71) | 7 (63) |
| Diagnostic suspicion or exacerbation | 228 Answers | 0–3/month | 107 (45) | 8 (62) | 2 (11) | 57 (44) | 27 (39) | 7 (63) |
| 3–5/month             |       | 78 (33) | 6 (46) | 8 (44) | 53 (41) | 31 (45) | 6 (54) |
| 5–10/month            |       | 43 (18) | 3 (23) | 1 (5) | 16 (12) | 5 (7) | 1 (9) |
| Age able to take treatment | 307 Answers | 98 (41) | 2 (15) | 6 (33) | 29 (22) | 18 (26) | 1 (9) |
| Depends capacity of adolescent |       | 96 (40) | 5 (38) | 4 (22) | 57 (44) | 25 (36) | 4 (36) |
| 10–15 yr              |       | 67 (28) | 4 (31) | 8 (44) | 29 (22) | 19 (27) | 5 (45) |
| 15–19 yr              |       | 26 (11) | 2 (15) | 4 (22) | 19 (14) | 4 (6) | 0 (0) |
| Source of information that the adolescent decided for the consultation | 302 Responses | 187 (87.0) | 9 (70) | 13 (72) | 101 (78) | 54 (78) | 10 (91) |
| Family advice         |       | 45 (21.0) | 2 (15) | 1 (5) | 24 (18) | 13 (19) | 3 (27) |
| Friend advice         |       | 12 (5.0) | 1 (8) | 1 (5) | 6 (4) | 4 (6) | 0 (0) |
| Prevention campaign   |       | 43 (20.0) | 2 (15) | 4 (22) | 23 (17) | 12 (17) | 2 (18) |
| Social media networks |       | 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 4. Asthma management: characteristics according to the AMADO survey

| Difficulties in follow-up                  | Total          | AME (N=13) | APR (N=18) | EU (N=130) | LA (N =69) | NA (N=11) |
|-------------------------------------------|----------------|------------|------------|------------|------------|-----------|
| 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 useful                                | 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 (27)    | 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  | 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)    | 23 (19)    | 13 (18)    | 3 (27)    |

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.

**DISCUSSION**

To our knowledge, the current survey provides the first international perspective about AMADO conducted among health professionals responsible for caring these patients.
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 adhesion to the treatment. Asthma is a chronic disease, which requires long-term treatment and management that is difficult to obtain especially during adolescence.

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 to adhesion 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 adolescence 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

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REFERENCES

1. Global Initiative for Asthma. The global asthma report 2018 [Internet]. Fontana (WI): Global Initiative for Asthma; 2019 [cited 2019 Mar 6]. Available from: http://www.globalasthmareport.org/

2. World Health Organization [Internet]. Geneva (Switzerland): World Health Organization; 2019 [cited 2019 May 6]. Available from: https://www.who.int/respiratory/asthma/definition/en/

3. Mallol J, Crane J, von Mutius E, Odhiambo J, Keil U, Stewart AISAAC Phase Three Study Group. The International Study of Asthma and Allergies in Childhood (ISAAC) phase three: a global synthesis. Allergol Immunopathol (Madrid) 2013;41:79-85.

4. World Health Organization [Internet]. Geneva (Switzerland): World Health Organization; 2019 [cited 2019 Oct 6]. Available from: http://apps.who.int/adolescent/second-decade/section2/page1/recognizing-adolescence.html

5. Martin M, Beebe J, Lopez L, Faux S. A qualitative exploration of asthma self-management beliefs and practices in Puerto Rican families. J Health Care Poor Underserved 2010;21:464-74.

6. Fuchs O, Bahmer T, Rabe KF, von Mutius E. Asthma transition from childhood into adulthood. Lancet Respir Med 2017;5:224-34.

7. Fagan JK, Scheff PA, Hryhorczuk D, Ramakrishnan V, Ross M, Persky V. Prevalence of asthma and other allergic diseases in an adolescent population: association with gender and race. Ann Allergy Asthma Immunol 2001;86:177-84.

8. Withers AL, Green R. Transition for adolescents and young adults with asthma. Front Pediatr 2019;7:301.

9. Bitsko MJ, Everhart RS, Rubin BK. The adolescent with asthma. Paediatr Respir Rev 2014;15:146-53.

10. Mammen JR, Rhee H, Norton SA, Butz AM. Perceptions and experiences underlying self-management and reporting of symptoms in teens with asthma. J Asthma 2017;54:143-52.

11. Jonsson M, Schuster M, Protudjer JLP, Bergström A, Egmar AC, Kull I. Experiences of daily life among adolescents with asthma - a struggle with ambivalence. J Pediatr Nurs 2017;35:23-9.

12. Rhee H, Belyea MJ, Brasch J. Family support and asthma outcomes in adolescents: barriers to adherence as a mediator. J Adolesc Health 2010;47:472-8.

13. Wood BL, Lim J, Miller BD, Cheah PA, Simmons S, Stern T, Waxmonsky J, Ballow M. Family emotional climate, depression, emotional triggering of asthma, and disease severity in pediatric asthma: examination of pathways of effect. J Pediatr Psychol 2007;32:542-51.

14. Kaugars AS, Klinnert MD, Bender BG. Family influences on pediatric asthma. J Pediatr Psychol 2004;29:475-91.

15. Miauton L, Narring F, Michaud PA. Chronic illness, life style and emotional health in adolescence: results of a cross-sectional survey on the health of 15-20-year-olds in Switzerland. Eur J Pediatr 2003;162:682-9.

16. Suris JC, Parera N. Sex, drugs and chronic illness: health behaviours among chronically ill youth. Eur J Public Health 2005;15:484-8.
17. Mullins LL, Chaney JM, Pace TM, Hartman VL. Illness uncertainty, attributional style, and psychological adjustment in older adolescents and young adults with asthma. J Pediatr Psychol 1997;22:871-80.

18. Katon W, Lozano P, Russo J, McCauley E, Richardson L, Bush T. The prevalence of DSM-IV anxiety and depressive disorders in youth with asthma compared with controls. J Adolesc Health 2007;41:455-63.

19. Kuo CJ, Chen VC, Lee WC, Chen WJ, Ferri CP, Stewart R, Lai TJ, Chen CC, Wang TN, Ko YC. Asthma and suicide mortality in young people: a 12-year follow-up study. Am J Psychiatry 2010;167:1092-9.

20. Withers AL. Management issues for adolescents with cystic fibrosis. Pulm Med 2012;2012:134132.

21. European Monitoring Centre for Drugs and Drug Addiction (EMCDDA). Offer Self-Image Questionnaire - OSIQ [Internet]. Lisbon (Portugal): EMCDDA; 2019 [cited 2019 Nov 26]. Available from: http://www.emcdda.europa.eu/html.cfm/index88785EN.html

22. Ostrov MR, Ostrov E. The self-image of asthmatic adolescents. J Asthma 1986;23:187-93.

23. Naimi I, Apter AJ, Ginsburg K, Naimi DR. Evaluating the adolescent with asthma: are we doing enough? J Allergy Clin Immunol Pract 2014;2:230-2.

24. Teens, Social Media & Technology Overview 2015 [Internet]. Washington, DC: Pew Research Center; 2015 [cited 2019 Nov 25]. Available from: https://www.pewresearch.org/internet/2015/04/09/teens-social-media-technology-2015/

25. Versel N. Facebook reminders help teens control asthma [Internet]. MedCity News. 2015 [cited 2019 Nov 5]. Available from: https://medcitynews.com/2015/07/facebook-reminders-help-teens-control-asthma/

26. Therapeutic patient education: continuing education programmes for health care providers in the field of prevention of chronic diseases: report of a WHO working group. Geneva (Switzerland): World Health Organization; 1998.

27. Srof B, Taboas P, Velsor-Friedrich B. Adolescent asthma education programs for teens: review and summary. J Pediatr Health Care 2012;26:418-26.