Nationwide Study on Practices Related to Screening Among Greek Paediatricians

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ABSTRACT

Objective: The aim of this study was to investigate pediatricians’ practices toward screening in Greece.

Materials and Methods: The survey was conducted within a six month period in a stratified random sample of 371 pediatricians. A questionnaire with three sections was created and pilot tested. Socio-demographic characteristics associated with inappropriate screening were identified using multivariable logistic regression models and latent class analysis.

Results: A total of 294 participants completed the telephone survey (response rate 78.6%). The median number of wrong answers to questions related to pediatricians’ practice towards screening recommendations was 7±1.57 with minimum 2 and maximum 11 wrong answers. Pediatricians, with less than 15 years of experience, age >50 years old or view more than eighty patients per week, have had significantly higher odds of responding wrong to more than seven questions, hence be less compliant to USPSTF screening guidelines. Latent class analysis has shown that female gender, age <50 years old, and work in the private sector, were associated with a poor practice towards international screening guidelines.

Conclusion: Our survey found gaps in screening practices among a nationwide sample of Greek pediatricians. Moreover considerable variability in reported practices of screening was noted. There is a need for the development of a national childhood screening program in Greece.

Keywords: Greece, screening, pediatricians

Introduction

The practice of evidence-based medicine means integrating individual clinical expertise with the best available external clinical evidence from systematic research [1]. Further, evidence-based public health is the process of integrating science-based interventions with community preferences to improve public health [2]. Preventing and managing childhood diseases in primary care is a key factor in improving public health. Early identification and intervention for treatable or preventable diseases in asymptomatic children are considered one of the major public health achievements [3].

To the best of our knowledge, there is limited evidence of international consensus on screening of pediatric diseases (e.g. hearing loss) [4].

The U.S. Preventive Services Task Force (USPSTF) systematically reviews and publishes evidence-based recommendations for screening several diseases in children and adolescents. Although these recommendations are developed for application in the U.S., they may be helpful to other healthcare systems and practitioners worldwide [5].

Although major strides have been made toward improving public health in recent years, evidence shows a low level of implementation of screening guidelines among primary care pediatricians [6-9]. This highlights the importance of evaluating the extent of guideline compliance among pediatricians and identifying predictors associated with inappropriate practices. Our survey was designed to assess self-reported practices regarding screening in a national representative sample of pediatricians.
Materials and Methods

Study Design and Settings
The survey was conducted within six months with a stratified, random sample of pediatricians drawn from a national database of pediatricians in all geographic areas of Greece. This sampling method did not employ a homogeneous allocation per region but a proportional one based on the population of pediatricians of each region. This was not a geographical cluster sampling, and there was no need for the correction/weighting of the results. It was estimated that the inclusion of approximately 10% of Greek pediatricians would be satisfactory. This estimation of the sample was based on an expected prevalence of a 50% prevalence of correct screening practices among pediatricians with a 5% precision.

In total, 371 physicians were randomly selected to participate in the study. A questionnaire with 26 questions was developed. The questionnaire was structured in two main sections: (a) The characteristics of pediatricians included personal (age, sex, country, and university of primary medical qualification, hospitals at which they were trained during specialization, postgraduate studies) and professional (number of examined patients per week, years of practice, work in private or public sector) and (b) practice patterns toward screening recommendations. In particular, the participants were asked about their screening practices related to a variety of clinical entities (herpes simplex virus (HSV) and human immunodeficiency virus (HIV) infections, depression, iron deficiency anemia, obesity, lipid disorders, high blood pressure, hip dysplasia, idiopathic scoliosis, speech and language disorders, and visual disorders). Responses were compared with the recommendations of USPSTF at the time of the survey. The questionnaire was pilot tested among ten pediatricians to ensure the accuracy and consistency of the questions. After pilot testing, the final version of the questionnaire was sent by mail to all the selected pediatricians together with information on the study objectives. The data were collected through telephone interviews to achieve a higher response rate and decrease, as much as possible, the social effect of responding to sensitive questions. All interviews were conducted by one particular expert (medical doctor) to minimize the inter-observer bias. Ethics committee approval was received for this study from the ethics committee of the General Assembly of the Medical Faculty, School of Health Sciences, University Thessaly, Greece (Protocol number: 5-02-07-2008).

Participant consent was verbal and was documented by interviewers agreeing to complete and respond to the telephone interviews.

Statistical Analysis

Univariate and Logistic Regression Analysis
The data were entered into a database created by Epi Info software (Centers for Disease Control and Prevention, Atlanta, Georgia, United States). Statistical software R version 3.2.0 (packages EpiTools and glmR Foundation for Statistical Computing) was used to analyze data from the questionnaire. Descriptive analysis was conducted by using the frequencies of the variables. Relative risk analysis was initially performed, while variables found statistically significant were included in a backward logistic regression model. The total number of wrong answers given by a pediatrician for questions related to screening (questions 9-24 excluding questions 11, 16, and 17) was used as an outcome variable in a logistic regression analysis. For that purpose, it was categorized into two levels based on the median values: <7 and ≥7 wrong responses. Included independent variables were the personal and professional characteristics of the pediatricians. Statistically significant differences were considered when p-value was <0.05. The odds ratio (OR) and 95% confidence intervals (95% CI) were also calculated.

Latent Class Analysis
Latent class analysis was performed with R statistical software version 9.2 to identify unobserved response patterns or attitudes that are similar between individuals. The responses of the pediatricians to a total of five questions (as shown in Table 2) that were in line (correct answers) or not (wrong answers) with the USPSTF guidelines were used as manifest variables in latent class analysis and a backward latent class logistic regression analysis with covariates. Latent class regression analysis was performed to evaluate which of the characteristics best predict the probability of an individual belonging to a certain latent class.

The final latent class model was chosen based on the Akaike information criterion (AIC) value, Bayesian information criterion (BIC) value (.), and fine interpretation of the latent class memberships. Only the statistically significant covariates found in backward elimination remained in the model. Values were considered statistically significant if p was <0.05.

Results
Out of the 371 pediatricians randomly selected initially, 294 agreed to participate in the study, representing a response rate of 79.2%. The characteristics of the study population are provided in Table 1.

Descriptive Analysis of the Questions (Related to Pediatricians’ Screening Practices)
Of the participating pediatricians, 94.6% correctly answered that routine serological screening for HSV in asymptomatic children is not recommended by international guidelines. The majority of the participants (96.4%) were also knowledgeable about the USPSTF screening guidelines for HIV in an 8-year-old child (Table 2).

More than half of the pediatricians had the correct screening practice for iron deficiency anemia in a 6-year-old female. On the other hand, most pediatricians (60.1%) complied with the USPSTF guidelines in regard to the need for iron supplementation in a low-birth-weight male 7 months old. Moreover, most pediatricians ad-

**Table 1. Descriptive statistics of pediatricians’ characteristics**

| Characteristics                        | Pediatricians (n=294) |
|----------------------------------------|-----------------------|
| Gender (%)                             | 59.52                 |
| Male (%)                               | 40.48                 |
| Age (mean±SD)                          | 54.27±8.87            |
| Graduates of Greek medical schools (%) | 86.22                 |
| Graduates of foreign medical schools (%)| 13.78                 |
| Years of practice (mean±SD)            | 22.07±9.54            |
| Postgraduate studies (%)               | 32.99                 |
| Private practice (%)                   | 80.07                 |
| Number of patients per week (mean±SD)  | 90.24±65.81           |

SD: standard deviation

Main Points
- Although major strides have been made toward improving public health in recent years, evidence shows a low level of implementation of screening guidelines among primary care pediatricians.
- This highlights the importance of evaluating the extent of guideline compliance among pediatricians and identifying predictors associated with inappropriate practices.
- Our survey found gaps in screening practices among a nationwide sample of Greek pediatricians. Moreover, considerable variability in reported practices of screening was noted among participants.
- The development of a national childhood screening program may represent an important step forward in the efforts to standardize pediatricians’ approach to screening.
provide the American Academy of Pediatrics (AAP) guidelines for screening, being in line with the guidelines of the American Academy of Family Physicians (AAFP) and the American College of Physicians (ACP).

As illustrated in Table 2, pediatricians' screening-related practices were inconsistent with the USPSTF guidelines (53.8% of pediatricians were in favor of screening for obesity in children aged 6–12 months, and 54.08% of pediatricians were in favor of screening for dyslipidemia in asymptomatic children 7-year-old).

In clinical domains such as dyslipidemia (Q16 and Q18), hypertension (Q22), where the USPSTF-related recommendations are in conflict with the guidelines issued by other scientific societies, the majority of the pediatricians run counter to the USPSTF statements and opted for screening, being in line with the guidelines provided by the American Academy of Pediatrics (AAP; 96.9%, 94.9%, and 91.8%, respectively).

Similarly, concerning screening for iron deficiency anemia in a female 11 months old (Q11), where the USPSTF considered that the evidence is insufficient to make a recommendation, 53.8% of pediatricians were in favor of screening, diverging once again from the USPSTF considerations.

As illustrated in Table 2, pediatricians' screening recommendations are in contrast with the USPSTF guidelines in many clinical entities. This was the case for depression, iron deficiency, dyslipidemia, hypertension, and musculoskeletal disorders (hip dysplasia and idiopathic scoliosis).

On the contrary, Greek pediatricians showed adherence to the USPSTF screening guidelines for the following clinical entities: obesity, speech and language disorders, visual disorders, and ADHD.

The median number of wrong answers to questions related to pediatricians' knowledge toward screening recommendations was...
was labeled “poor practice”. In model A, two classes were chosen based on the AIC and BIC criteria as well as the fine interpretation of the classes. Class 1 (72, 18%) comprised the majority of the respondents and was labeled “poor practice”.

### Latent Class Analysis

#### Latent Class Analysis of the Questions Related to Pediatricians’ Practices Toward Screening

In model A, two classes were chosen based on the AIC and BIC criteria as well as the fine interpretation of the classes. Class 1 (72, 18%) comprised the majority of the respondents and was labeled “poor practice.”

#### Table 3. Logistic regression analysis of total wrong answers to the questions (9-24) related to Greek pediatricians’ practices toward screening (>7 vs ≤7 total wrong answers)

| Demographic characteristics | Total wrong answers >7 |
|----------------------------|------------------------|
| Age (years)                |                         |
| 29-50                      | 3.4 (1.92-6.2)          |
| >50                        | 1.00 (ref)              |
| Years of practice          |                         |
| 1-15                       | 2.96 (1.74-5.11)        |
| >15                        | 1.00 (ref)              |
| Patients per week          |                         |
| 1-80                       | 1.00 (ref)              |
| >80                        | 1.84 (1.08-3.19)        |

CI: confidence interval; OR: odds ratio

#### Table 4. Latent class analysis of appropriate versus poor screening practices among Greek pediatricians

| Variable          | OR (95% CI) | p    |
|-------------------|-------------|------|
| Gender            |             |      |
| Female            | 0.24 (0.07-0.8) | 0.02 |
| Male              | 1.00 (ref)   |      |
| Age (years)       |             |      |
| <50 years         | 0.07 (0.01-0.4) | 0.005|
| >50 years         | 1.00 (ref)   |      |
| Private sector    |             |      |
| Yes               | 0.07 (0.01-0.4) | 0.003|
| No                | 1.00 (ref)   |      |

CI: confidence interval; OR: odds ratio

#### Table 5. Response probabilities of latent classes (fairly appropriate and poor screening practices) among Greek pediatricians

| Correct answer | Class |
|----------------|-------|
| Q15            | 0.21  |
| Q16            | 0.11  |
| Q18            | 0.11  |
| Q19            | 0.17  |
| Q20            | 0.17  |
| Wrong answer   | Class |
| Q15            | 0.79  |
| Q16            | 0.54  |
| Q18            | 0.26  |
| Q19            | 0.83  |
| Q20            | 0.83  |

CI: confidence interval; OR: odds ratio

7±1.57, with a minimum of 2 and a maximum of 11 wrong answers. Logistic regression analysis has shown that pediatricians who have less than 15 years of experience (OR=2.96; 95% C.I.=1.74-5.11) are younger than 50 years of age (OR=3.4; 95% C.I.=1.92-6.2) or see more than 80 patients per week (OR=1.84; 95% C.I.=1.08-3.19) and have significantly higher odds of reporting inappropriate screening practices (Table 3).

**Discussion**

The current study shows that there are considerable gaps and heterogeneity in the screening practices of a nationwide sample of Greek pediatricians.

Interestingly, for clinical entities (e.g. hypertension) in which the USPSTF-related recommendations were in conflict with the guidelines issued by other scientific societies [5, 10-16], pediatricians showed considerably low levels of compliance with the USPSTF screening recommendations. In particular, an overwhelming majority of participating pediatricians were not in line with the USPSTF guidelines regarding dyslipidemia. On the contrary, the AAP recommended universal screening before adolescence [17]. Moreover, despite the lack of guidance by USPSTF regarding screening for hypertension in children, most pediatricians (91.8%) appeared to be in line with an expert panel recommendation that children aged 3 years and older should have their blood pressure measured annually [16].

These findings appear to be consistent with the results of previous studies suggesting that the physicians’ exposure to contradictory recommendations on the same topic could lead to confusion and inappropriate variation in clinical practice [15, 16].

Our study underlines also the satisfactory implementation of screening for pediatric obesity. Previous studies conducted in other countries have shown that the compliance of pediatric care providers with recommended practices, such as body mass index calculation, was poor [17-19]. Nevertheless, various difficulties exist in preventing childhood obesity [19, 20].

Despite the lack of evidence supporting screening for hip dysplasia, most pediatricians favor screening a 2-month-old male child with a family history of hip dysplasia.

Furthermore, most pediatricians were found to hold a favorable attitude toward routine screening for scoliosis in a 13-year-old male child. Scoliosis is commonly encountered in the primary care setting, and even though most adolescents with scoliosis will not develop clinical symptoms, scoliosis leads to visible deformity, emotional distress, and respiratory impairment due to rib deformity [21]. Screening for scoliosis represented a routine part of school physical examinations in adolescents for decades, which may suggest that pediatricians find it difficult to overcome previous practice inertia [21].

Our study also revealed that the majority of pediatricians tend to screen for lipid disorders in a 7-year-old male child, contrary to the USPFPFM recommendation. Perhaps, as a growing body of evidence indicates that dyslipidemia is not only a particularly important risk factor for coronary heart disease but also linked epidemiologically, clinically, and metabolically with other risk factors such as hypertension [22].

Another interesting finding was that the majority of the participants do not recommend screening for depression in a 14-year-old asymptomatic female with a family history of depression. The absence of staff-assisted depression care and the lack of familiarity with formal screening may represent the main barriers to pediatricians performing screening for depression. Another explanatory hypothesis may be that pediatricians, most of whom are private practitioners working as general pediatricians, do not feel responsible for screening for mental health disorders in asymptomatic children.

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In a study of members of the AAP, Stein et al. reported that more than 80% of respondents agreed that pediatricians should be responsible for the identification of mental health problems. However, less than one-third of the participants felt that it is their responsibility to treat and manage children with mental health problems. Interestingly, the study also revealed that those working exclusively in general pediatrics were less likely to agree that pediatricians should feel responsible for managing children with such problems [23].

Nevertheless, our study revealed some positive findings regarding the screening attitudes of Greek pediatricians. Interestingly, guideline adherence was inversely related to age. In previous studies, practitioners of younger age and relatively few years of practice appeared to be more compliant with best practice guidelines [24, 25]. Our findings may reflect the lack of experience of younger doctors. It is noteworthy that the female gender was associated with a higher degree of screening for most of the clinical entities included in our questionnaire, which is in line with several studies where female physicians are more likely to provide preventive counseling and screening than male physicians [26, 27]. Moreover, several studies suggested that there are gender differences in physician–patient communication style during medical visits. Indeed, there is evidence suggesting that female doctors outperform male doctors in terms of physician–patient communication skills [28]. However, we found that female pediatricians appeared to be less likely to provide recommendations based on the USPSTF guidelines, which may indicate that the favorable attitude toward screening, also found in our study, could enhance the tendency to over screen and over diagnose patients.

Finally, an interesting finding in our study was that pediatricians with poor screening practices were more likely to be private practitioners. Nowadays, because the number of patients who prefer private health services over public hospitals is reduced, the necessity for a close level of care is crucial, for private practitioners to survive competition in a hostile economic environment. In this setting, private pediatricians may feel more obliged to reciprocate parents’ expectations for a higher quality of health services. On the other hand, strong personal relationships established between private pediatricians and parents, as well as the parents’ preferences, may influence the decision-making process and contribute to over screening.

In conclusion, our survey found gaps in screening practices among a nationwide sample of Greek pediatricians. Moreover, considerable variability in reported practices of screening was noted among participants. Our findings identify opportunities to improve compliance with screening guidelines among pediatricians in Greece. The development of a national childhood screening program may represent an important step forward in the efforts to standardize pediatricians’ approach to screening.

Ethics Committee Approval: Ethics committee approval was received for this study from the General Assembly of the Medical Faculty, University of Thessaly School of Health Sciences (Protocol number: 5-02-07-2008).

Informed Consent: Verbal informed consent was obtained from individuals who participated in this study.

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