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NURSING APPROACH IN PATIENTS WITH OBSTRUCTIVE SLEEP APNOEA – ASSESSMENT OF PHYSIOLOGICAL CHANGES AND BENEFICIAL EFFECTS

THESIS SUMMARY

Of a PhD Thesis

For awarding the educational and scientific degree "Philosophy Doctor."
In the field of higher education 7. "Healthcare and Sports"
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Research Supervisors:

Assoc. Prof. Mariana Nikolova, PhD

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The thesis contains 211 pages and is structured in five main chapters. It includes 95 figures, 10 tables, and 4 appendices (the number of figures and tables in the thesis and the thesis summary differs due to the requirements for developing each one). The bibliography includes 269 references, of which 68 are in Cyrillic and 201 in Latin.

The doctoral thesis was discussed and referred for defence by an extended departmental council of the Department of Healthcare at the Medical University "Prof. Dr. P. Stoyanov" – Varna on June 7th, 2023. The public defence will take place on October 6th, 2023, at 15:00 and will be conducted remotely using the electronic platform Webex.

The defence materials are available at the Career Development Center of MU–Varna and are published on the MU-Varna website.

CONTENTS

LIST OF ABBREVIATIONS

ANP	Autonomous nursing practice
BASM	Bulgarian Academy of Sleep Medicine
BAHPN	Bulgarian Association of Health Professionals in Nursing
URT	Upper respiratory tract
RDDS	Respiratory disorders during sleep
EEG	Electroencephalogram
EMG	Electromyography
EOG	Electrooculography
ECG	Electrocardiogram
MIA	Medical Institutions Act
BMI	Body Mass Index
CHD	Coronary heart disease
MI	Medical institution
MA	Medical Academy
MHAT	Multiprofile hospital for active treatment
MOH	Ministry of Health
MOPH	Ministry of Public Health
ICN	International Council of Nurses
MU	Medical University
OSAS	Obstructive sleep apnoea syndrome
PSG	Polysomnography
RTA	Road Traffic Accident
WHO	World Health Organization

INTRODUCTION

Obstructive sleep apnoea is a significant medical, social and economic problem worldwide. The disease is the subject of increasing attention from the scientific community due to its severe consequences on individual and public health. Obstructive sleep apnoea syndrome (OSAS) is recognised as a common clinical condition, with distribution data ranging between 4–9% in men and 2–4% in middle-aged women. Thus OSAS stands out as an important concern among socially significant diseases.

According to a number of studies by professional and scientific organisations, the prevalence of sleep-disordered breathing (SDB) is much higher than actually recorded; 80–90% of the symptomatic population are undiagnosed individuals. The high prevalence does not correspond to the diagnostic and therapeutic possibilities even in the most developed countries in Europe and the world.

OSA is the cause of impaired quality and length of life among diagnosed individuals. Cardiovascular, cognitive and metabolic disorders are only a part of the overall spectrum of diseases associated with the long-term consequences of untreated sleep apnoea.

Obstructive sleep apnoea is a condition poorly understood by the medical community in Bulgaria. Both patients and the medical community underestimate the problem. The reasons for this are related to the public's need for more awareness about RDDS, the need for a unified national strategy for managing patients with evidence of RDDS, and the lack of knowledge and application of sleep screening algorithms. The problem does not occupy its rightful place in the prevention and prophylaxis of socially significant diseases. The sleep laboratories that have been opened are primarily in the country's large cities and are not funded by the NHIF. The need for solid financial resources for diagnostics is a serious issue and causes patients not seeking expert assistance. There is a deficiency of sufficiently well-trained medical staff in sleep disorders. This puts the case of the necessary amount of care and support for OSA patients in the focus of medical professionals.

Defining the place and role of the nurse as a member of the somnological team is an important process in planning and delivering quality healthcare for OSA patients. Developing a nursing approach and implementing an algorithm for nursing activities and interventions create an opportunity to improve the health and quality of life of the somnology patient. Establishing a specialised nursing practice is a challenge for healthcare professionals.

Addressing the problems of OSA patients, assessing the necessity of nursing care at each stage of the somnological process, and exploring the benefits of implementing contemporary nursing practices and models, appears to be a current and significant issue in contemporary medical theory and practice and is the focus of this research.

1. THESIS METHODOLOGY

1.1. Aim, objectives and hypotheses of the study

Aim: To investigate and evaluate the organisation of healthcare for individuals with obstructive sleep apnoea, to ascertain the nurse's role in the phases of the somnological process and from this point, to offer solutions to optimise care.

Objectives

1. To present the essential characteristics of the occurrence, development and prevalence of OSA Syndrome at home and abroad and to evaluate its importance for public health.

2. To outline the profile of the somnological patient and show the necessity of nursing care and activities.

3. To analyse the healthcare needs of patients with Obstructive Sleep Apnoea Syndrome and present the adverse consequences of not meeting and/or underestimating them.

4. To explore innovative methods and best nursing care practices leading to beneficial consequences for individuals with OSA.

5. To explore and evaluate the place of nursing care in every aspect of care management for OSA patients through the views of nurses, physicians, and patients.

6. To explore opportunities to improve the quality of functioning of OSA patients by increasing the organisation and participation of the nurse in the overall care of these patients.

7. Generate solutions for activities and promote the competencies of nurses working in medical structures providing care for patients with OSA.

Research hypotheses

1. Developing and implementing a nursing approach to the activities and nursing care for individuals with OSA Syndrome are essential for favourable changes in patient's condition and better quality of life.

2. Autonomous nursing practices for individuals with OSA Syndrome contribute to enhanced patient satisfaction and provide more effective and quality healthcare.

3. Public awareness of untreated OSAS' clinical manifestations and long-term consequences is inadequate, leading to medical, financial and social losses. Regulating the competencies of the nurse will lead to an increase in the quality of nursing care provided.

4. Nurses' professional competencies in providing high-quality, patient-centred healthcare are unsatisfactory and do not meet the needs of patients with OSA.

1.2. Studies conducted

1.2.1. Theoretical study

Objective: To establish trends in the diagnosis, treatment, follow-up and control of Obstructive sleep apnoea syndrome in the world and Bulgaria. To identify good international practices in the care of OSA patients, including nurses' involvement.

Methods: Descriptive review – the scientific databases Scopus, Google Scholar, and PubMed were searched using keywords: diagnosis, treatment, control, OSA follow-up, consequences of OSA, effects of OSA, nursing care for patients with OSA, Telemedicine and OSA, Sleep medicine.

1.2.2. A quantitative study in three categories: nurses, patients, physicians

Objective: To study and evaluate care organisation for patients with OSA and reveal the nurse's role in the somnology team.

Study size – 250 individuals divided into groups:

First group of respondents:

- **Nurses** providing care for individuals with OSA Syndrome, working in the medical establishments of hospitals and outpatient care in the cities of Varna, Sofia, Plovdiv, Pleven, Vratsa, Troyan, and Sliven (n=140).

Second group of respondents:

- **Individuals diagnosed with OSAS** by polysomnography and polygraphy in the above-mentioned medical institutions (n=80).

Third group of respondents:

- **Experts – physicians** experienced in treating sleep-disordered breathing working in the above-mentioned medical institutions (n=30).

Criteria for inclusion in the quantitative study

First group of respondents – nurses

- Basic medical education "Nurse".
- Nurses working in the wards/clinics and specialised offices in the hospital and pre-hospital medical institutions.
- Signed informed consent form.

Second group of respondents – patients

- Patients over 18 years of age.
- Individuals with clinical evidence of sleep apnoea who have conducted polysomnography and polygraphy.
- Patients with a confirmed diagnosis of obstructive sleep apnoea.
- Patients undergoing treatment – PAP therapy.
- Presence of minimum basic education.
- Able to read and write in Bulgarian.
- Individuals are willing to cooperate.
- Signed informed consent form.

Third group of respondents – physicians

- Physicians working in departments/clinics of the MMA, UMHAT, MHHAT, Departments of Neurology, departments of pulmonology and phthisiology, ENT, and cardiology, as well as specialised pulmonary hospitals and physicians from outpatient structures where polysomnography, polygraphy, treatment and follow-up of OSA patients is conducted.
- Recognised speciality as a pulmonologist, neurologist, ENT, and cardiologist.
- Internship for at least one year in the medical institution.
- Signed informed consent form.

Exclusion criteria in the quantitative study – not meeting the inclusion criteria.

Methods

Direct anonymous individual survey to collect information, opinions and evaluations of OSA patients, nurses and physicians on the quality, effectiveness and opportunities for optimising healthcare in the somnology practice.

Statistical – to systematise, summarise, analyse and interpret statistical data in order to reveal the nature of observed phenomena and correlations. For the statistical analysis and presentation of the results are applied:

- ***Comparative analysis*** – to compare the changes in the indicators of the variables.
- ***Variance analysis*** – to measure the differences in the population by a specific attribute. Measurement of the indicators arithmetic means (x), modes and medians of the statistical series, and mean square deviation.
- ***Parametric analysis*** – Student's t-test for independent samples.
- ***Non-parametric methods*** for hypothesis testing.
- ***Cronbach's alpha*** – a method for testing internal consistency (i.e. internal reliability) between items/questions in an instrument.
- ***Correlation analysis*** – to establish the degree of relatedness between two variables (Pearson's r; Spearman's ρ; Cramer's V). A level of $p<0.05$ was assumed for the statistical significance of the results.
- ***Tabular and graphical method*** of data presentation

Data statistical analysis was performed using SPSS v. 19.0.

Toolkit

For each group of respondents, questionnaires No. 1, 2, 3. were developed, consisting of closed questions with ready-made options and semi-closed questions with formulated options for some of the answers and the possibility of expressing an opinion. For some questions, more than one answer is given within the presented options. All three categories of respondents were asked questions on the same issue of interest.

Questionnaire No 1 – Nurses

The survey card contains 35 questions spread over three sections:

- *Socio-demographic characteristics*;
- *Awareness regarding OSA* – referral, diagnosis, and treatment at different stages;
- *Quality and effectiveness of care* – nursing care and prospects for development, attitudes to training and competencies. Through direct questions, the functioning of an OSA patient in family life and social environment is also determined.

Questionnaire No. 2 – Patients

The survey card contains 38 questions distributed in three sections:

- *Socio-demographic characteristics;*
- *Somnological care:*
  - ✓ assessment of the processes of diagnosis, treatment and the patient's difficulties at different stages;
  - ✓ assessment of contact with nurses – level of training, their skills to provide adequate care for individuals with OSA syndrome;
- *Satisfaction* in terms of care received in the overall somnological process.

Questionnaire No. 3 – Specialist physicians

The survey card contains 29 questions distributed in three sections:

- *Socio-demographic characteristics;*
- *Assessment of the difficulties of OSA patients;*
- *Nursing care* – assessment of the current state and opportunities for developing nursing care provided to OSA patients.

1.2.3. Qualitative research – *In-depth interview with patients*

Aim: To identify issues in the process of holistic care for OSA patients through their exposures and experiences.

The questionnaire contains 30 questions divided into four sections:

- *Socio-demographic characteristics;*
- *Period of referral and diagnosis;*
- *Treatment period: general procedures, PAP therapy* – describes healthcare organisation with a nursing focus.
- *Period of observation and control* – describes the need for outpatient observation and control as factors for therapeutic success.

The average length of an interview is 50–60 minutes. Information obtained during the interview was recorded, transcribed, processed and summarised.

1.3. Organisation of the study

1.3.1. Time and place of the survey

Eight hospitals and five outpatient facilities in the Republic of Bulgaria, where polysomnography and polygraph records are conducted and OSA patients are treated, were included in the quantitative study. All MMA hospitals in the country where OSA patients are hospitalised, two university hospitals from the cities of Varna and Pleven, the oldest hospital for the treatment of pulmonary diseases in Troyan, and two smaller hospitals – St. Ivan Rilski Hospital in Razgrad, and Dr. Ivan Seliminski Hospital, in Sliven. OSA patients are treated in these hospitals, and diagnostics are carried out in their outpatient facilities – Re Spiro Medical Centre, Razgrad, and CardioLab Simonov, Sliven.

The main part of the study was performed independently by the author. In surveying the opinion of nurses and patients, the collaboration of head and senior nurses was much welcomed and appreciated.

Time frame: June 2022 - December 2022

The studies were approved by the Ethics Research Committee of the Medical University – Varna with Protocol No. 116/28.04.2022.

1.3.2. Stages of the study

The thesis research was carried out in 5 stages described in Table 1.

Table 1. Stages of the study

Stage	Activity Description	Time	Place	Tools
I	Problem formulation. Definition of the aim and objectives of the study. Development of hypotheses. Selection of methods. Development of the toolkit.	October - March 2020/2021	Varna	Review of literature sources on the issue.
II	Pilot study Conducting an interview survey after approval by the Ethics Research Committee.	March 2022 June - October 2022	Varna Vratsa Pleven Plovdiv Razgrad Sliven Sofia	Questionnaire № 1, 2, 3
	In-depth interview	October - November 2022	Varna	Questionnaire
III	Data processing and analysis.	November - February 2022/2023	Varna	Statistical data processing
IV	Description of results	December- March 2022/2023	Varna	
V	Drawing conclusions and contributions	April 2023	Varna	

2. OWN RESULTS AND DISCUSSION

2.1. Survey – Nurses

2.1.1 Characteristics of the nurses included in the study

Table 2. Socio-demographic characteristics

Indicator		**Number**	**%**
Age	Mean age		**47.96 yrs ± 1.04**
	Up to 30 yrs	18	12,90 %
	31 - 40 yrs	24	17,10 %
	41 – 50 yrs	40	28,60 %
	51 - 60 yrs	30	21,40 %
	Over 60 yrs	28	20.00 %
	Total	**140**	**100 %**
Job title	Head Nurse	4	2,90 %
	Senior nurse	16	11,40 %
	Nurse	120	85,70 %
	Total	**140**	**100 %**
Place of employment	University Hospital	76	54,30 %
	Multiprofile hospital	56	40,00 %
	Diagnostic & Consultation Center	8	5,70 %
	Total	**140**	**100 %**
Education	Master in healthcare management	46	32,80 %
	Bachelor in healthcare management	13	9,30 %
	Bachelor in Nursing	42	30.00 %
	Occupational training	26	18,60 %
	Specialist in nursing	13	9,30 %
	Total	**140**	**100 %**
	up to 1 year	3	2.10 %

Work experience	1 - 3 yrs	13	9,30 %
	3 - 5 yrs	4	2,90 %
	5 - 10 yrs	10	7,10 %
	10 - 20 yrs	21	15,00 %
	Over 20 yrs	89	63,60 %
	Total	**140**	**100%**

The results presented demonstrate a noticeable trend of ageing nursing staff. The presence in the sample of nurses over 60 years of age indicates that there are nurses who continue to work after retirement.

2.1.2. Nurses' awareness of respiratory disorder during sleep (RDDS)

Self-assessment of nurses' awareness of issues related to OSA is presented based on responses to 12 items.

The reliability of the self-assessment scale has an internal consistency coefficient, Cronbach's alpha = 0.928, which indicates that the questions on different topics related to OSA are well-selected and correlated. Nurses' responses on the 12 topics associated with OSA were distributed in ascending order from uninformed to excellently informed (Table 3).

Table 3. Nurses' level of awareness of OSA Syndrome

Result	Levels of awareness	Percentage %	Number of individuals
0 - 12	Not informed	1,40 %	2
13 - 24	Poorly informed	9.30 %	13
25 - 36	Informed	32,10 %	45
37- 48	Very well informed	41,40 %	58
49 - 50	Excellently informed	15,70 %	22

"Informed" was the most common response indicated by respondents (mode 34, median 38.5, standard deviation 10.260). The deviation in the self-assessed awareness scale is insignificant and is shifted to the left towards the lower values (Fig. 1)

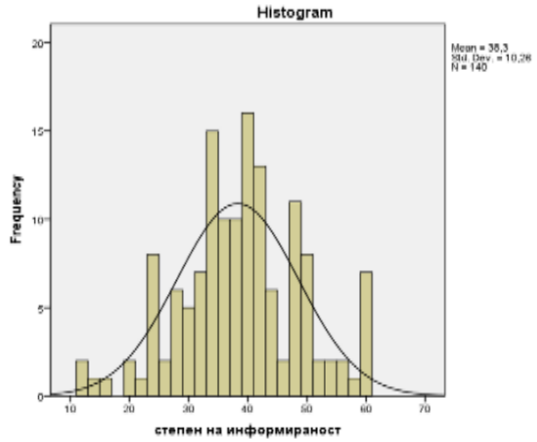


Fig. 1. Nurses' awareness of OSA Syndrome

Awareness of the RDDS is shown in (Figure 2).

Nurses showed ***the highest awareness*** (excellent and very well over 50%) regarding:

- Correlation between road accidents and drowsy driving (57.20%);
- Obstructive sleep apnoea – as a significant medical and social problem (52.80%);
- Unhealthy habits are responsible for the severe course of OSA 52.00%).

Good awareness (between 30 to 40%):

- Duration and follow-up of the effects of therapy (39.30%);
- Consequences of untreated obstructive sleep apnoea (33.60%);
- Main signs of Obstructive sleep apnoea syndrome (30.70%);
- Constant positive pressure therapy (28,60%);
- Polysomnographic testing – the gold standard in diagnosing OSA (25.70%).

Poor awareness (medium and low):

- New developments in the treatment of OSAS (55.00%);
- Payment for diagnosis and treatment of OSA (45.70%);
- Screening programs for individuals with sleep disorders or occupations requiring increased attention (47.00%);
- Activity of laboratories and establishments in medical institutions of sleep medicine (40.60%) (Fig. 2).

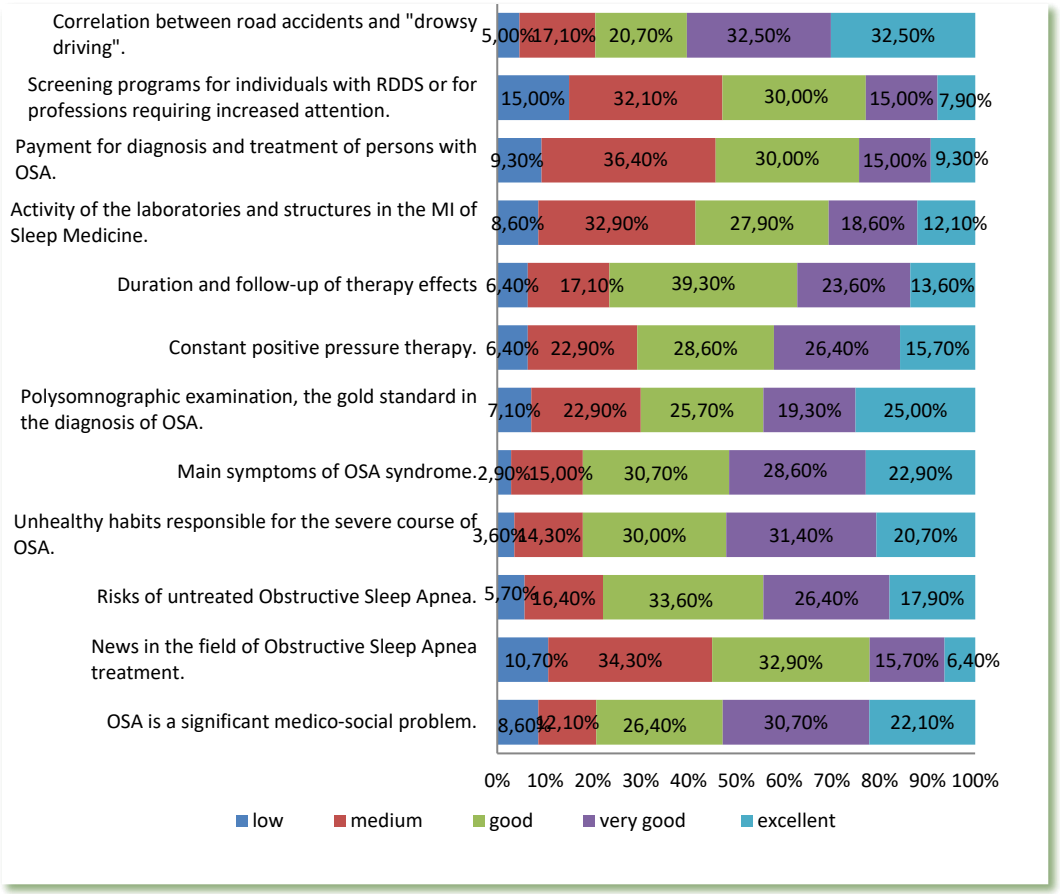


Fig. 2. Nurses' awareness of different OSA-related topics

Successful control of OSA is associated with knowledge of the syndrome's clinical manifestations and timely referrals for risk patients to sleep medicine specialists. The leading symptoms of OSA, according to nurses, are listed in (Fig. 3).

Sexuality disorders and frequent awakenings at night to urinate are noted by very few respondents. Nurses need to obtain information about these two symptoms to consider their medical and social implications.

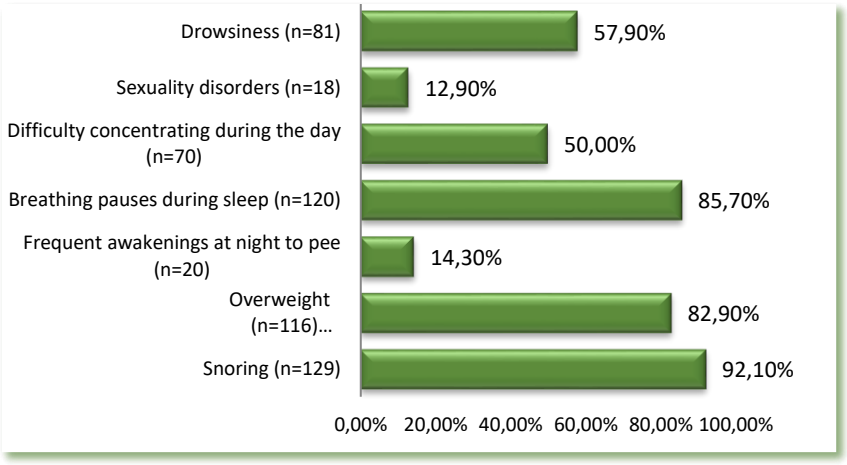


Fig. 3. Signs associated with Obstructive sleep apnoea syndrome according to nurses

Providing government funding for OSA patients is a policy of many health systems. In Bulgaria, the patients themselves pay for the diagnosis and treatment due to the lack of a clinical pathway.

The implications of introducing funding for this socially significant disease, according to nurses, are shown in Figure 4. The significant health benefits for OSA patients stand out.

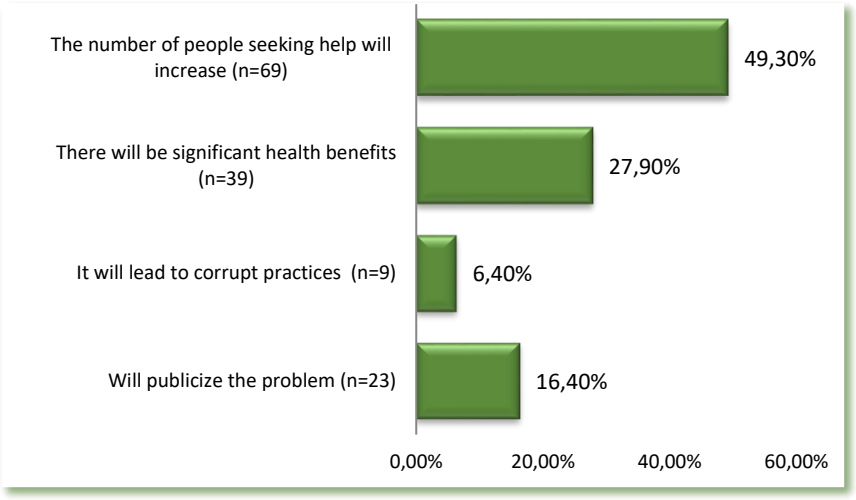


Fig. 4. Nurses' opinion on the benefits of providing state funds for the diagnosis of individuals at risk of OSA

2.1.3. Nursing care for patients with OSA

The majority of nurses firmly stated the need for nursing care for OSA patients (80.70%). A high proportion of nurses felt that nursing care for OSA patients was necessary throughout the course of treatment (68.60%). An equal number indicated responses only during the period of

diagnosis (11.40%) and only during the period of control and follow-up (11.40%). Few respondents identified the need for nursing care only during treatment (8.60%). Providing patient-centred comprehensive healthcare is one of the tasks of modern nursing. Good somnological care encompasses the entire diagnosis, treatment, control and follow-up period.

Approaches to providing information to OSA patients

Respondents' opinions on the means of providing information on RDDS gave preference to the spoken word – "lectures by qualified specialists" (37.90%) and consultations with members of the somnology team (22.10%). Nurses (22.10%) also noted that online information overtakes standard forms of communication (Figure 5).

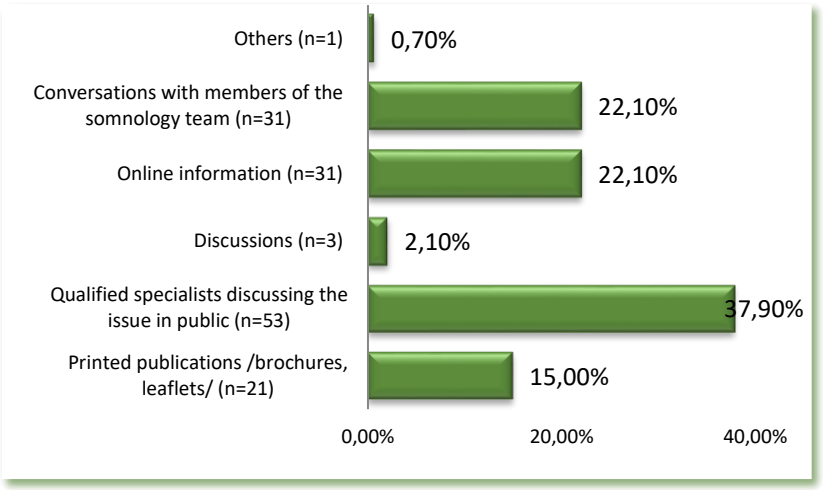


Fig. 5. Means of providing information on RDDS

To the question "Do you think that patients diagnosed with OSA are well enough prepared to maintain good health in the domestic setting?" many of the respondents gave a negative answer (64.30%), and only (10.70%) believed that patients were well prepared. The belief that patients need to be sufficiently prepared to be involved in maintaining their health is clearly stated (Fig. 6).

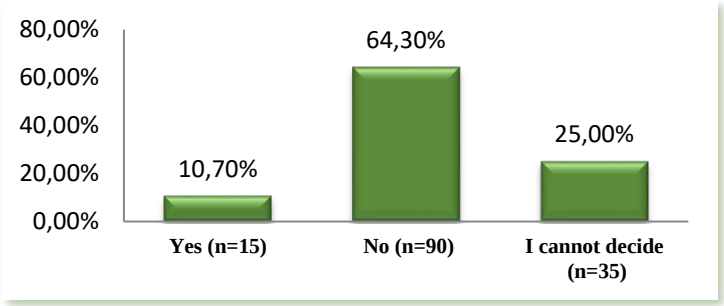


Fig. 6. Nurses' views on patients' preparedness to maintain good health in the home setting

Nurse's assessment of the current situation in the care process

Nurses ranked first the active team collaboration throughout all stages, from diagnosis to treatment, in caring for patients with OSA, 77.90% of all responses (Fig. 7).

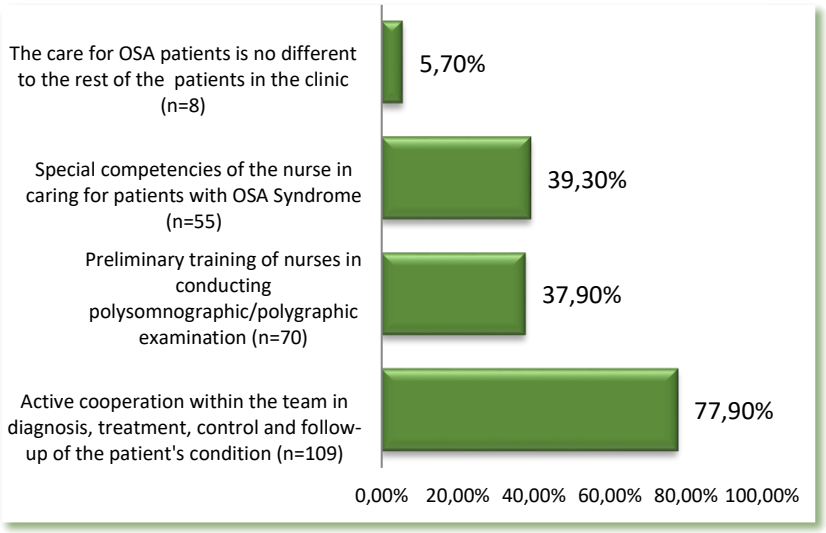


Fig. 7. Prerequisites for good care of patients with OSA

The need for particular competencies in caring for patients with OSA was stated as second in relevance (39.30%) (Fig. 7).

Barriers to quality care

Nurses emphasise the patient's attitude towards the disease – responsibility, motivation (65.00%), second is the financial cost of diagnosing and treatment (52.10%) (Fig. 8).

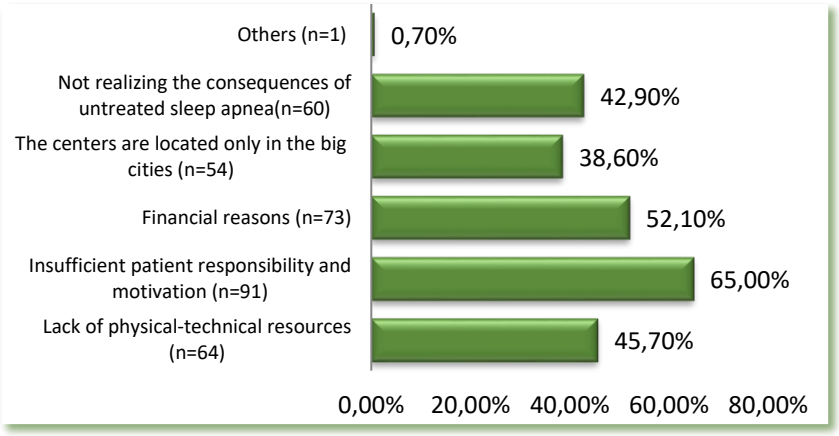


Fig. 8. Barriers to patient involvement in the therapeutic process

Nurse-patient relationship – almost equal number rated it as "good" (40.00%) and "nominal" (37.10%) (Fig. 9).

Fig. 9. Nurse – OSA patient relationship

Nurses identified as the most serious patient-related difficulties in controlling unhealthy habits – 70.70%, discipline and motivation for treatment – 61.40%, and using PAP modules – 57.20% (Fig. 10).

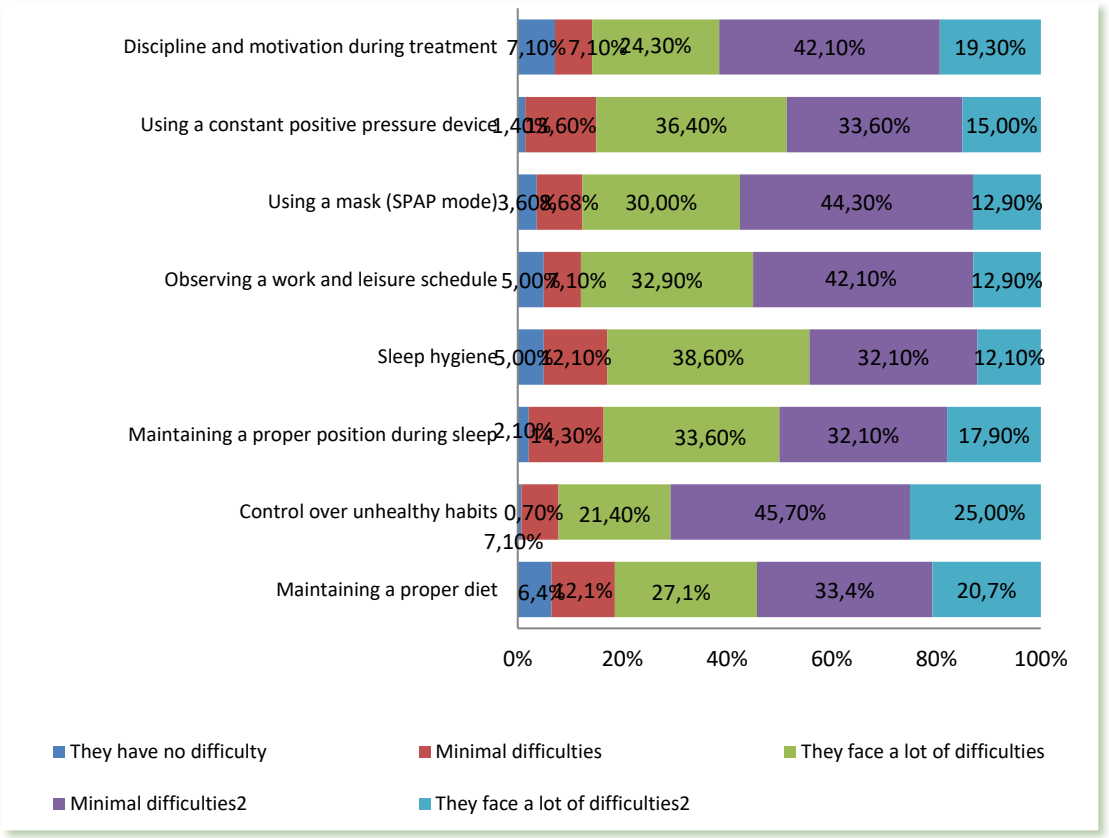


Fig. 10. Difficulties of the OSA patient according to the nurses

Monitoring and control of patients with OSA

On the question about the frequency of monitoring and control, the statement that it is mandatory for any chronic disease "whenever there is an expressed request on behalf of the patient" (47.10%) garnered the highest number of responses. This is because, in reality, there is no established system for monitoring and follow-up of patients with OSA. This issue should be clarified in disease management (Fig. 11).

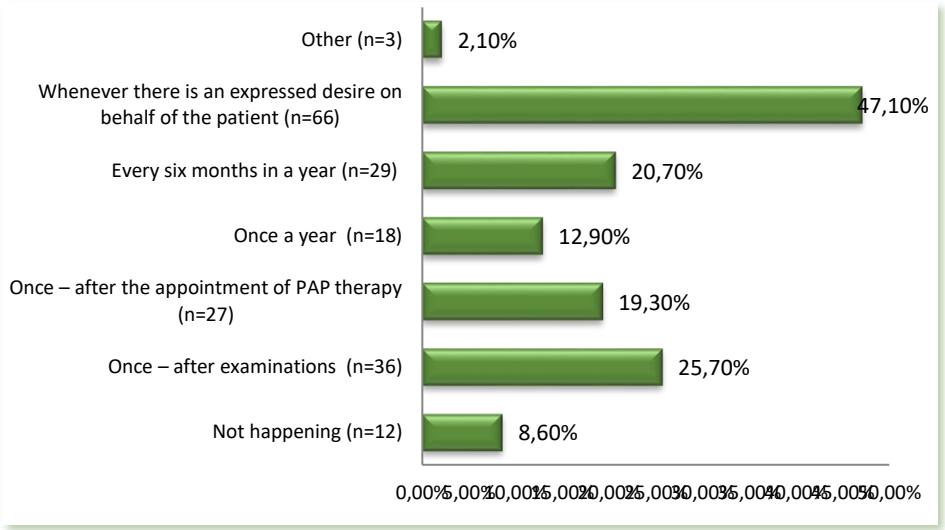


Fig. 11. Need for monitoring of patients with OSA

Answers to the question "Can specially trained nurses conduct observation of OSA patients?" can be used as a guide for establishing a system for regular observation of OSA patients. The vast majority, 76.40%, answered in the affirmative to the question, and the negative responses were relatively few (10.00%). Respondents, by a large majority, stated willingness to participate in the somnology team providing comprehensive care for OSA patients (79.30%).

A correlation was found between the views on this question and the job position of the nurses ($p < 0.05$). A statistically significant correlation was found between nurses' education and willingness to participate in the somnology team. Managers, heads and senior nurses firmly stated the need for nurses in the multidisciplinary team ($p < 0.001$).

Respondents ranked patient education first, teamwork with the physician, family and all others involved in the care process second, and interaction with the patient third as key activities to optimise care for patients with OSA. The respondents' view coincides with the current trends for the patient's active involvement and patient environment in the healing process. This seriously raises the issue of training for the care providers, in this case, nurses, whose role we are keen to investigate (Fig. 12).

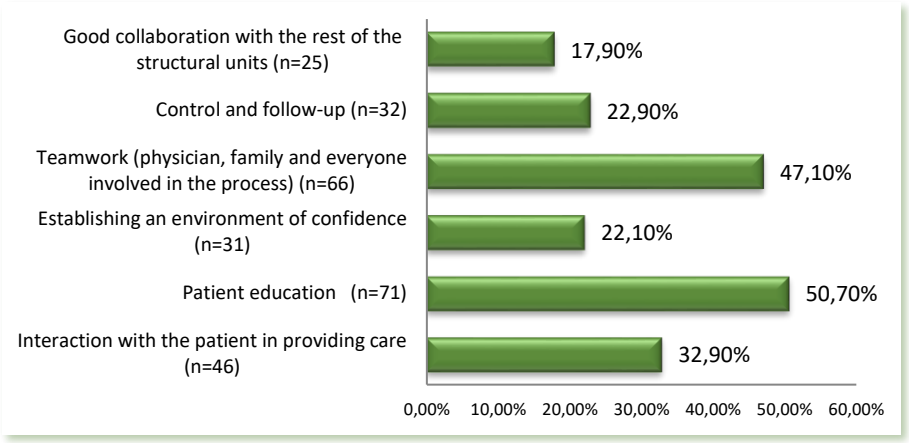


Fig. 12. Nurses' activities for optimisation of care

Point of care for OSA patients

Respondents gave preference to specialised sleep centres/laboratories (50.00%), followed by the patient's home (32.10%) (Fig. 13).

Nurses in our study still needed to identify home care as an alternative for improving the quality of life of OSA patients. Multiple studies of international scope have shown that ambulatory patient care is a successful model for addressing resource shortages in healthcare and is associated with high levels of patient satisfaction.

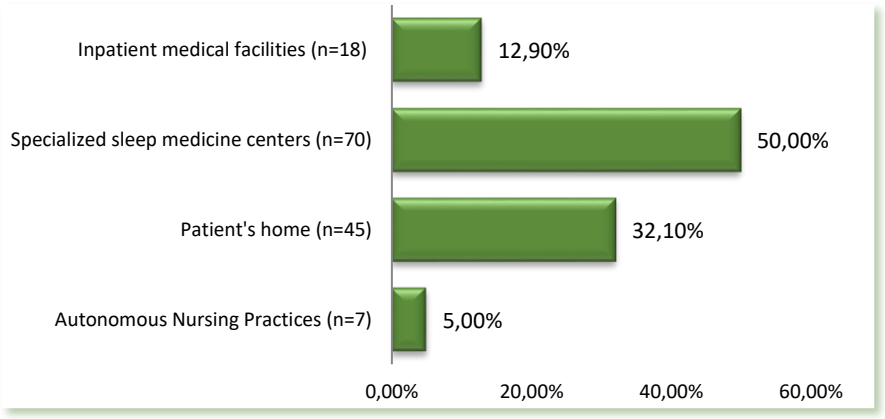


Fig. 13. Suitable locations for nursing care for patients with OSA

In this day and age, patient education is an integral part of nursing. It can be focused on promoting, preventing and treating patients with OSA. A very high proportion of respondents

identified nurse-led education as an effective measure of disease control (77.10%; n = 108) (Fig. 14).

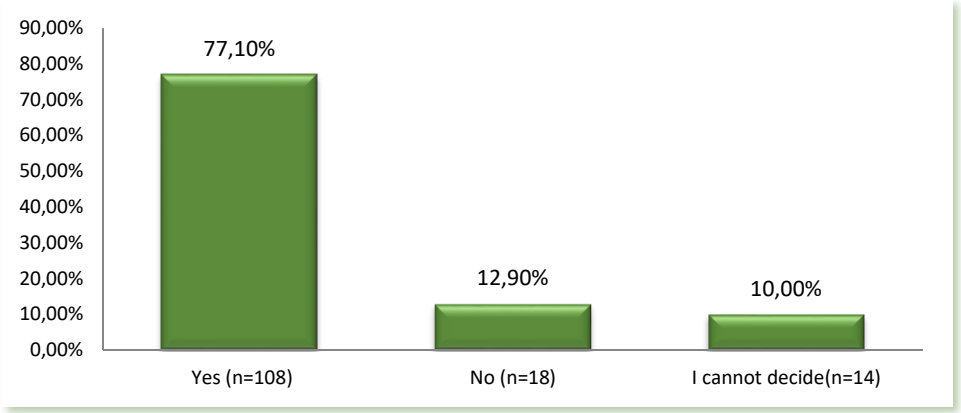


Fig. 14. Opportunity for patient education by nurses in the process of OSA control

Respondents' views on excuses for not participating in OSA patient education are shown in Figure 15.

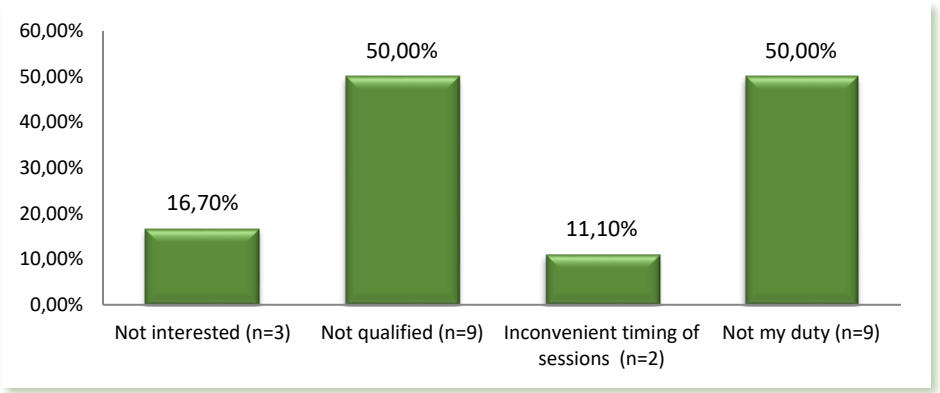


Fig. 15. Reasons for nurses to participate in patient education

We investigated the opinion of nurses (n =108) who answered affirmatively to the question about participation in patient education regarding the forms of its provision. More than half of the nurses (58.30%) expressed an opinion of specialised training conducted by a competent nurse (Fig. 16).

Fig. 16. Forms of training of OSA patients according to nurses

Nursing competencies and focused education on sleep issues throughout the sleep medicine practice period are proven and effective models for higher satisfaction and quality of care for OSA patients.

2.1.4. Nurses' training needs and motivation

The need for increased knowledge of RDDS for nurses was rated very high – at 77.90%. Thus they advocate themselves as full-fledged members of the somnology team (54.30%) and an active partner to the physician and patient (24.30%) (Fig.17).

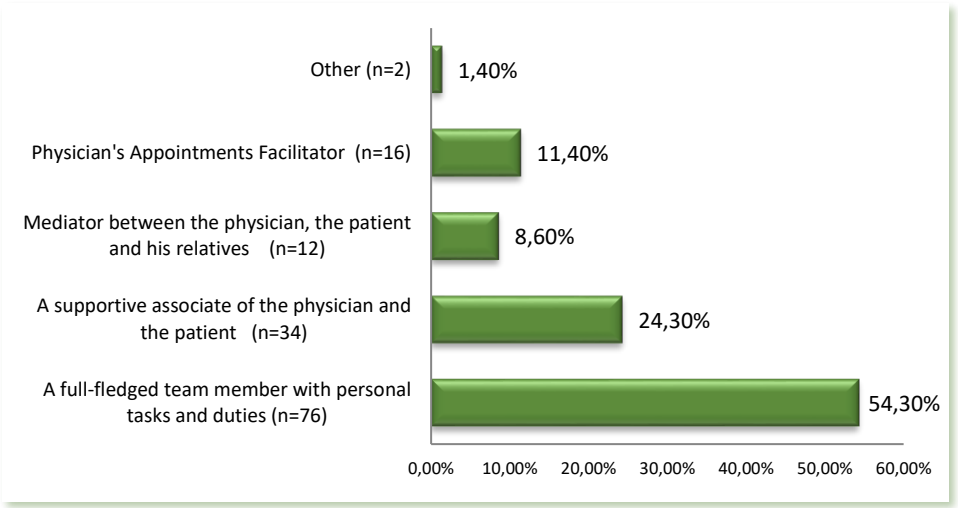


Fig. 17. Opinions on the role of the nurse in the somnology team

The needs for upgrading nurses' qualifications in somnology face some difficulties. A high proportion of respondents indicated that they do not participate in training because there is a

lack of publicity about the training (69.30%), the courses are only in large cities (21.40%), and the inability to allocate funds from their personnel budget for training (27.90%).

The highest proportion of respondents (79.90%) preferred to receive training through training programs organised by sleep medicine societies (23.90%). Workshops (22.90%), distance learning (12.80%) and specialisation (12.80%) would be receiving significantly less attention (Fig. 18).

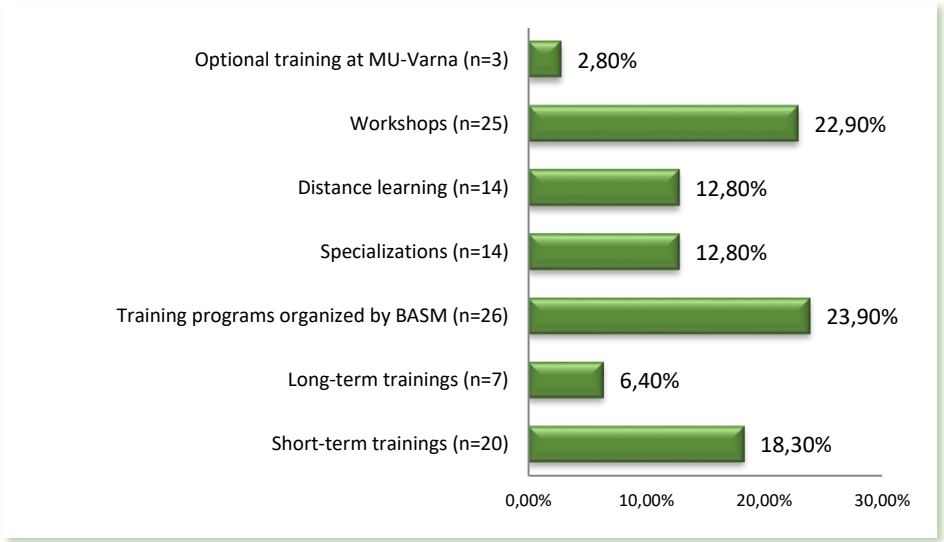


Fig. 18. Forms of continuous training of nurses in somnological practice

International organisations for sleep disorders point out that good somnological care results from interdisciplinary interaction.

Nurses view their participation in the multidisciplinary somnology team as a new and exciting endeavour (47.10%), define it as a challenge (30.00%), and as a means of additional payment (20.70%) (Fig. 19).

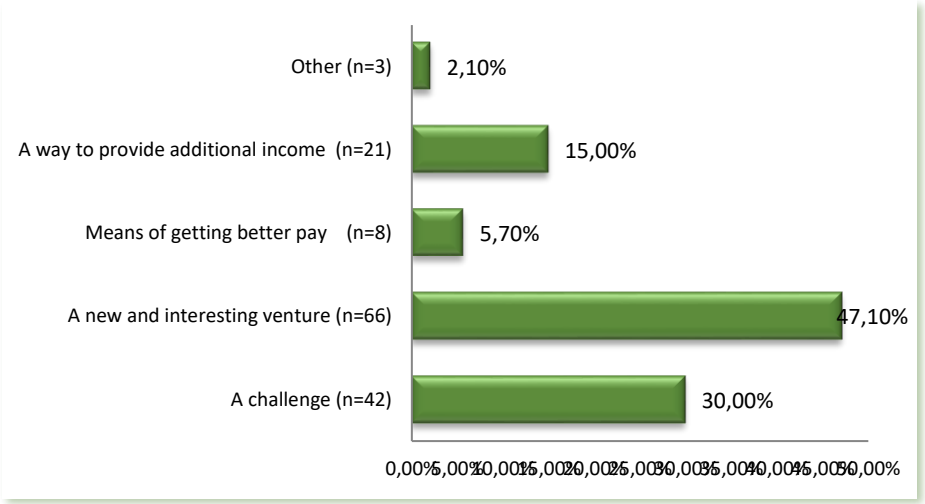


Fig. 19. Nurses' views on their participation in a multidisciplinary team

It is a fact that the issue of pay improvement is more frequently chosen by nurses with more than 20 years of experience ($p<0.05$). With increasing age and work experience, low remuneration is perceived more negatively (Fig. 20).

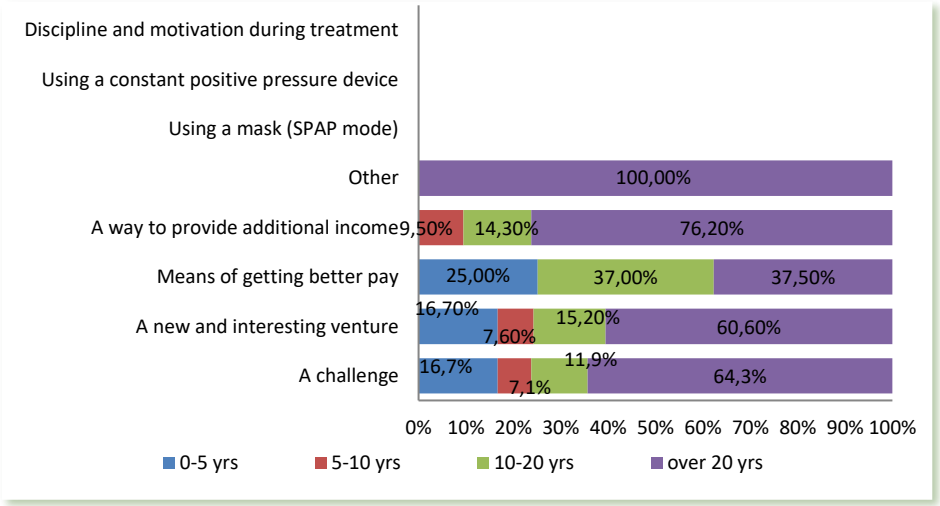


Fig. 20. Age of nurses and perception of their participation in the somnology team

2.2. Survey – Patients

2.2.1. Socio-demographic characteristics – patients

The opinions of 80 patients diagnosed with OSA in medical facilities in eight cities of the country were studied. The main part of the sample consisted of patients from Varna (40.00%). The socio-demographic characteristics of the studied patients are shown in Table 4.

Table 4. Socio-demographic characteristics – patients

Indicator		**Number**	**%**
Age	Mean age		**55.83 yrs ± 1.13**
	Up to 30 yrs	1	1.30 %
	31 - 40 yrs	3	3.80 %
	41 – 50 yrs	20	25.00 %
	51 - 60 yrs	29	36.30 %
	Over 60 yrs	27	33.80 %
Gender	female	18	22.50 %
	male	62	77.50 %
Education	Higher education	33	41.30 %
	Secondary education	46	57.50 %
	Primary education	1	1.30 %
Employment	Unemployed	4	5.00 %
	Retired	16	20.00 %
	Working	60	75.00 %
Residence	City	63	78.8 %
	Village	17	21.3 %
Distribution by cities	Varna	32	40.00 %
	Pleven	14	17.50 %
	Sofia	11	13.80 %
	Plovdiv	7	8.80 %
	Vratsa	3	3.80 %
	Sliven	9	11.30 %
	Troyan	1	1.30 %
	Razgrad	3	3.80 %
	Total	**80**	**100%**

Distribution by residence – most respondents were from urban areas (78.80%).

Gender distribution between males (77.50%) and females (22.50%) is consistent with global data of higher prevalence rates of OSA among males.

Age distribution – corresponds with results from international studies of a higher prevalence of Obstructive Sleep Apnoea Syndrome in working-age individuals (Table 4).

Education – individuals with higher and secondary education predominate, likely associated with higher health responsibility and active seeking of medical help to resolve sleep problems.

2.2.2 Public and patient awareness of OSA syndrome

Patient awareness of breathing disorders during sleep is a prerequisite for successful disease prevention and control. To the question "Do you think that society defines Obstructive sleep apnoea syndrome as an important and significant health problem?", the largest proportion of patients answered negatively (70.00%) (Fig. 21).

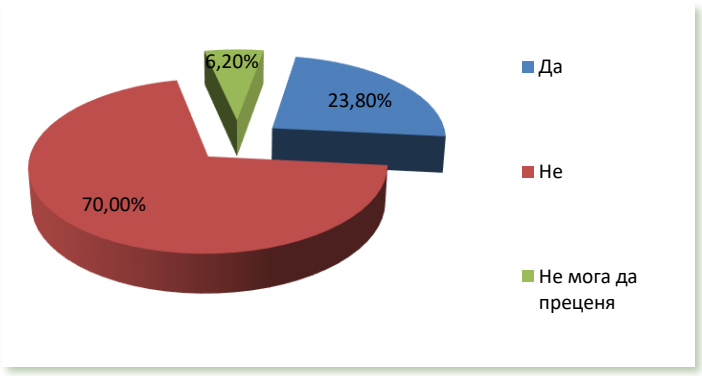


Fig. 21. Meaning of Obstructive sleep apnoea syndrome – public awareness

Obstructive sleep apnoea syndrome is associated with a significant burden on individual and public health. Figure 22 shows the distribution of responses on the level of patient awareness of various sleep-related topics.

A slight, positive asymmetry of 0.754 was found, indicating a higher number of respondents with an awareness level below the mean value (median 32, mode 34). The level of awareness was measured by Cronbach's alpha 0.895 (Fig. 22).

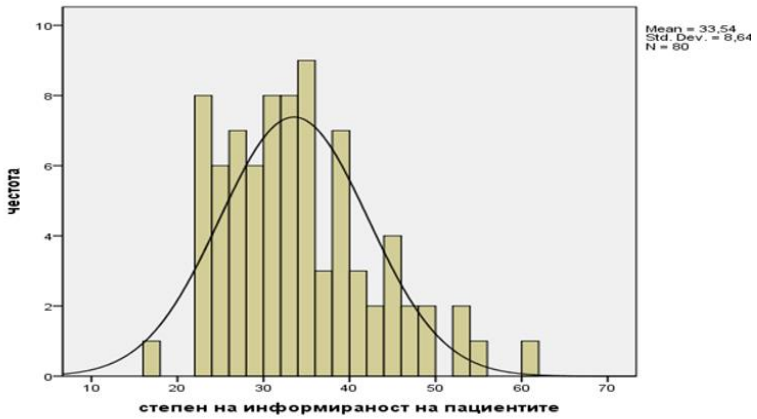


Fig. 22. Level of awareness of patients with OSA

Most respondents fell into the informed patient group (25 – 36) (Table 5).

Table 5. Level of awareness

Level of awareness	**Uninformed**	**Poorly Informed**	**Informed**	**Well informed**	**Excellently informed**
	0 –12	13 – 24	25 – 36	37 – 48	49 – 60

Patients reported the best awareness (50% or more "excellent" and "very good") on topics related to:

- *Correlation between road accidents and drowsy driving* – they were excellently informed (32.50%) and very well informed (32.50%).
- *Basic signs of OSAS* – excellently informed (16.30%), very well (35.50%).

Respondents demonstrated good knowledge on:

- *OSAS as a significant medical and social problem* – good (47.50%), very good (16.50%).
- *Unhealthy habits responsible for the severe course of OSA* – good (33.8%), very good (23.80%).
- *Risks and consequences of untreated OSA* – good (36,30%), very good (27,50%).

Poorly and insufficiently (prevalence of scores poorly and medium (average) over 50%) informed respondents on topics related to:

- *Payment for diagnosis and treatment of OSA* – poor (10.00%), average (52.50%).
- *Duration and follow-up of effects of prescribed therapy* – poor (7.50%), average (43.80%).
- *Performance of sleep laboratories and structures* – poor (31.30%), average (40.00%).
- *New developments in treating OSA* – poor (30.00%), average (41.30%).
- *Polysomnography* – the gold standard in OSA diagnosis – weak (17.50%), average (33.80%).
- *Constant positive pressure therapy* – weak (10.00%), average (38.80%).

It is alarming that *respondents are poorly informed about screening programs for OSA*, with 41.30% of respondents rated as "poorly informed" and 31.30% rated as "moderately informed" (Fig. 23).

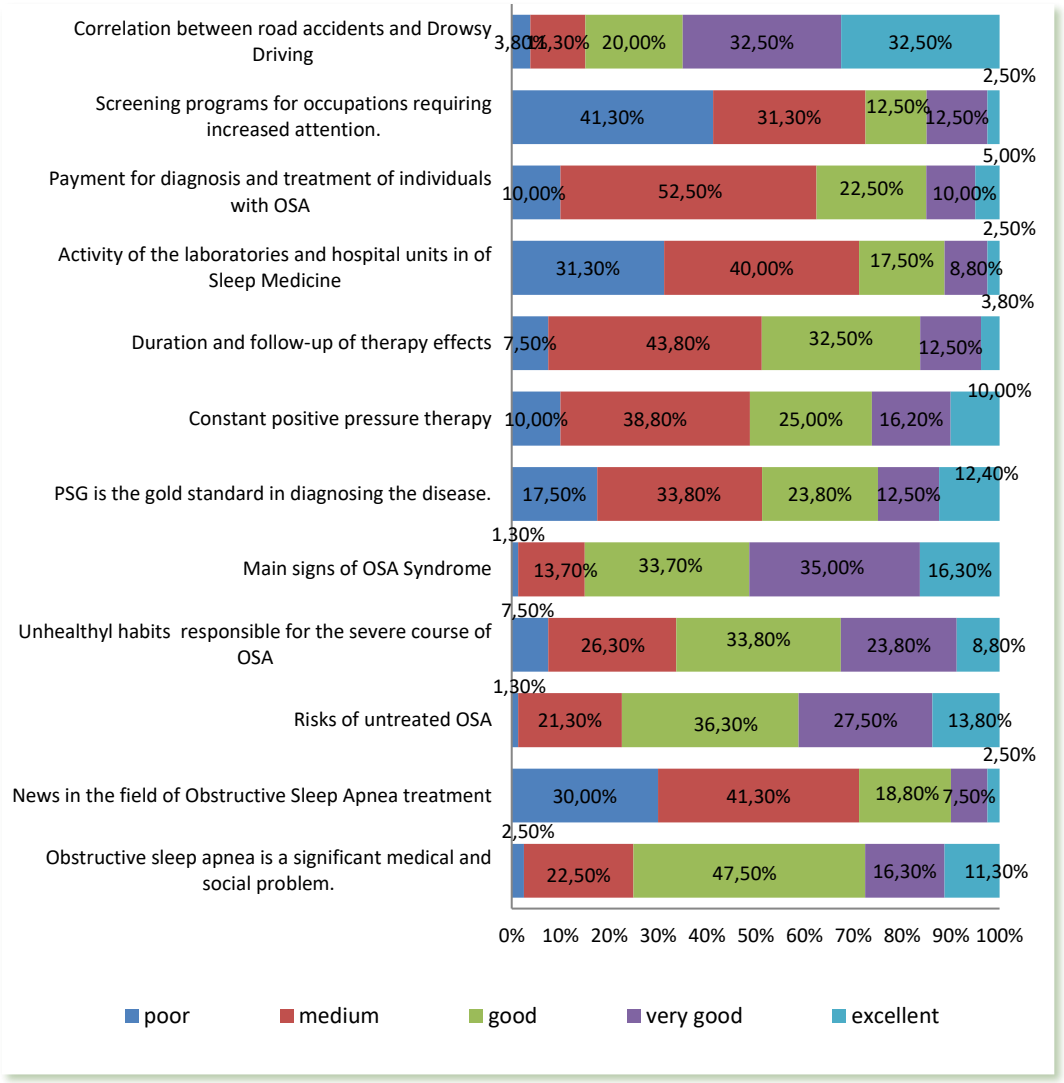


Fig. 23. Awareness of different topics related to OSA

Sources of information

Physicians were the most demanded source of information among OSA patients; the second position was given to the Internet, and the third was an acquaintance with such a problem (Fig. 24).

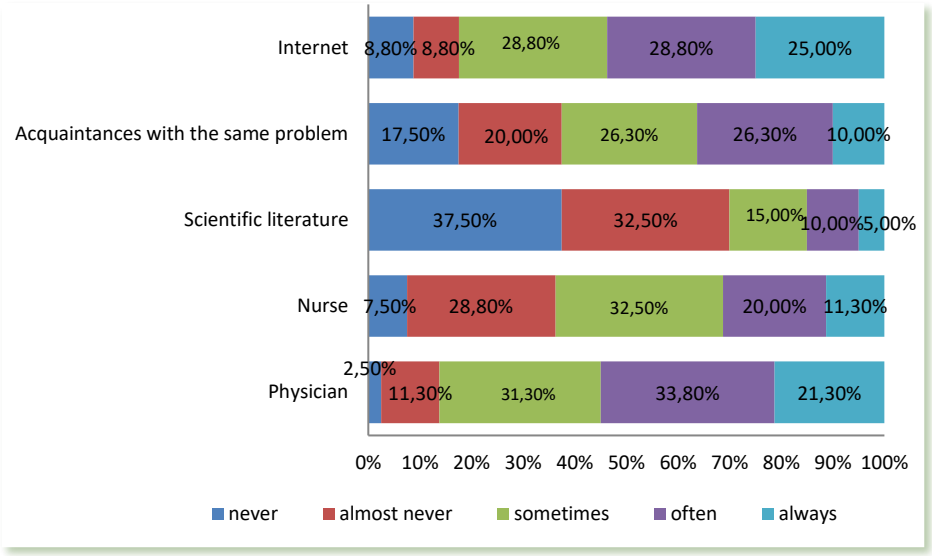


Fig. 24. Sources of information on sleeping disorders

The proportion of respondents who contacted the nurse was very low – sometimes (31.30%), almost never (11.30%), and never (7.50%). Most likely, this is due to the fact that the nurse is an "invisible" participant in the somnological aspects process, and patients have no reason to contact her.

Awareness of primary symptoms of OSA

Patients were best informed about snoring (97.50%) and being overweight (76.30%) as the most important symptoms of OSA. Daytime napping was reported by 67.50% of the respondents. A smaller proportion of patients reported breathing pauses during sleep (27.50%) and associated difficulty concentrating during the day (38.80%).

Disturbed sexuality is a characteristic symptom of OSA. Still, given the topic's sensitivity, we suggest that patients were not candid enough to share about this problem, yielding a low relative response rate (20.00%) (Fig. 25).

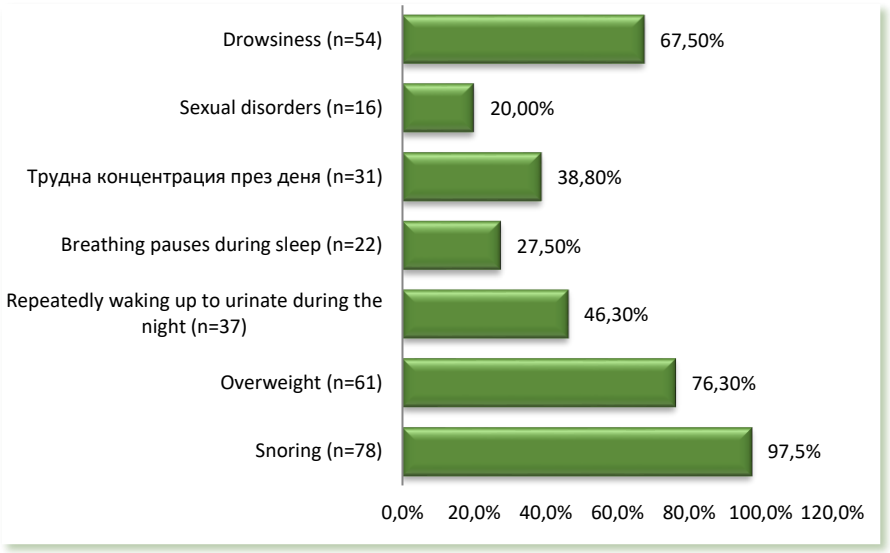


Fig. 25. Awareness of the main symptoms of OSA

2.2.3. Diagnosis of OSA patients – detection mode, diagnostic procedures, problems

The survey on the activities of sleep medicine establishments found that they needed to actively search and follow up on OSA patients. The initiative for seeking medical help rests with the patients themselves. For OSA symptoms, 45.00% of respondents sought the help of a specialist for sleep problems, and twice as many respondents shared the problem with their GP (23.80%). A few individuals indicated a routine check-up (7.50%) (Figure 26).

It could be debated whether patients with overweight or obesity and cardiovascular disease are actively questioned about the presence of OSA. This could certainly give more substance to the prophylactic examination.

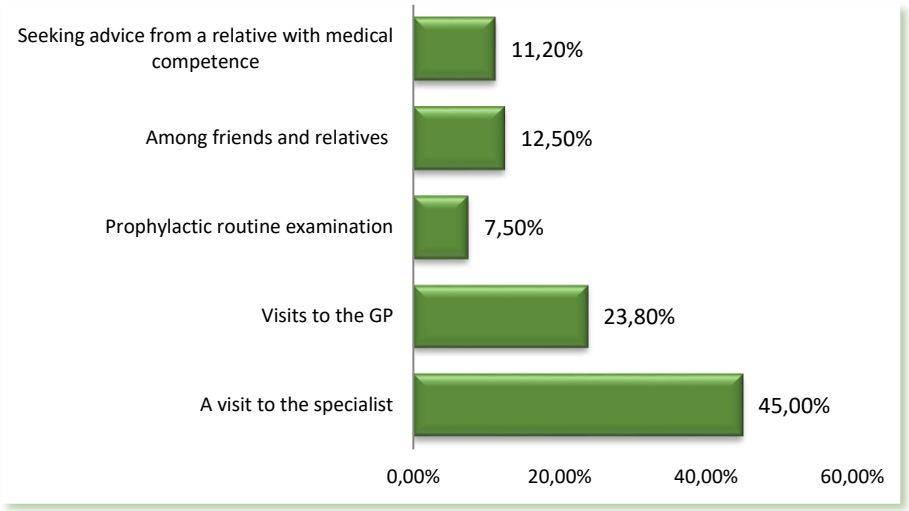


Fig. 26. Seeking medical help for sleep problems

Problems

Almost all respondents (90.00%) said snoring was a serious problem. For the majority (72.50%), it affects family relationships, with the patient's partner and relatives most often affected. Apart from medical, the problem is also psychological, as it is the basis of deteriorated partner relationships.

Numerous researchers have put forward data on the correlation between noisy snoring, depression and social isolation of OSA patients. A straight proportional correlation between divorce rates and OSAS has been indicated.

Financial difficulties in the diagnosis and early treatment of OSA

The issue of OSA diagnosis faces significant financial difficulties because it is entirely out of the patient's resources, and both PSG and PG diagnostic procedures have a high cost. Providing OSA diagnosis with public funds would bring several benefits to tackling this socially significant problem (Figure 27).

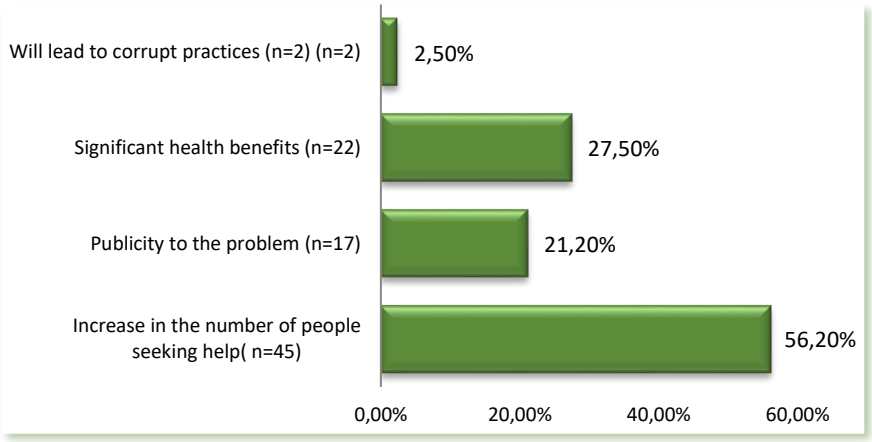


Fig. 27. Implications of the provision of state budget funds for OSA treatment

2.2.4 Treatment of OSA patients

Time-barring, duration of treatment

All patients forming the sample and diagnosed with OSA had PAP therapy. 2.50% of respondents discontinued treatment; one was operated on. The highest proportion of patients had been undergoing treatment for one year (28.60%), and the lowest proportion of patients had been undergoing treatment for ten years or more (5.00%). The results correspond with the

worldwide trend of an increasing number of patients diagnosed and treated after the Covid pandemic (Fig. 28).

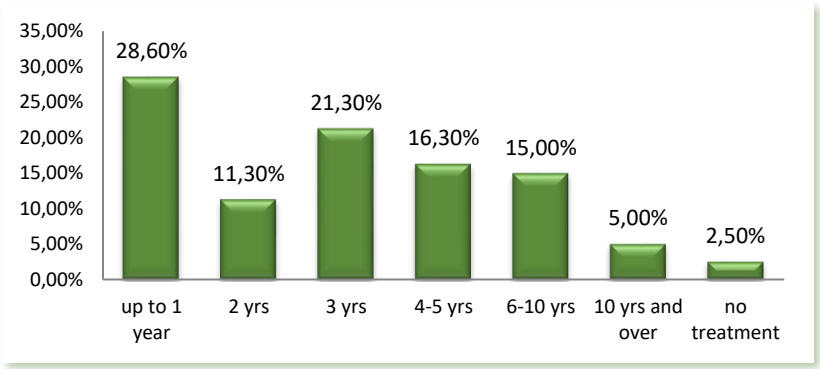


Fig. 28. Distribution of patients by duration of treatment

The first positive results of treatment were reported the next day (46.,20%), and after a week (38.80%), the one-eighth of respondents found positive changes after a month (11.20%).

Follow-up of OSA patients

Tracking changes in the status of OSA patients was associated with regular visits to sleep laboratories or specialist offices. When asked, "How often are monitoring and follow-up conducted?" almost one quarter said that they were not conducted (23.80%); that is, they were not followed up; only once after diagnosis, they indicated (16.30%), after starting PAP therapy (20.00%). Overall negative responses were given by 60.00% (n=48) (Figure 29).

The positive responses of the respondents are the basis of effective disease control and motivate the patient for long-term treatment.

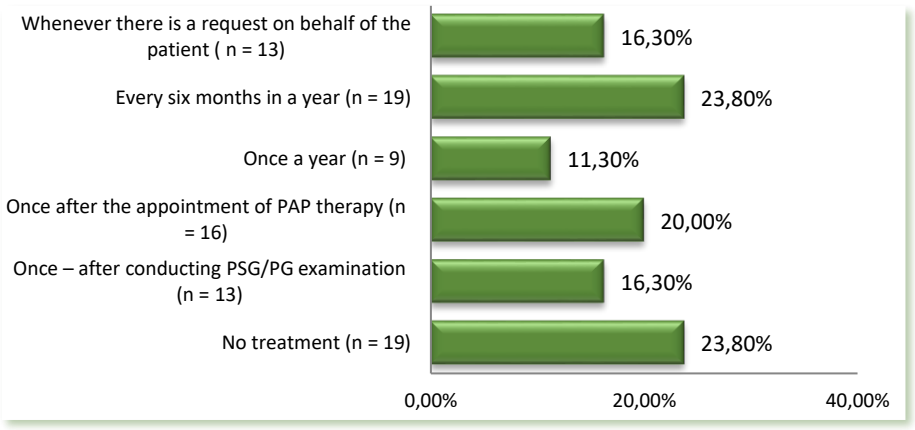


Fig. 29. Control and follow-up of the OSA patient – availability and duration

Improving the quality of life of those diagnosed with OSA is a result of the activities of all members of the somnology team. Analysis of respondents' views on control and follow-up concerning treatment duration shows that those best followed up are those detected recently (1–3 years). The reasons for this are both objective and subjective. On the organisational side, we report the lack of a registry for OSA patients and an institution with follow-up authority as an objective reason. As subjective, we note that most patients, after diagnosis, have ceased contact with the physician and need more information about the activities of laboratories/sleep medicine establishments.

Difficulties of patients with OSA

Respondents ranked using a mask in PAP therapy as one of the top concerns, followed by maintaining an adequate work and rest schedule, sleep hygiene, and control of unhealthy habits. Patients' difficulties indicate the focus of nursing care (Fig. 30).

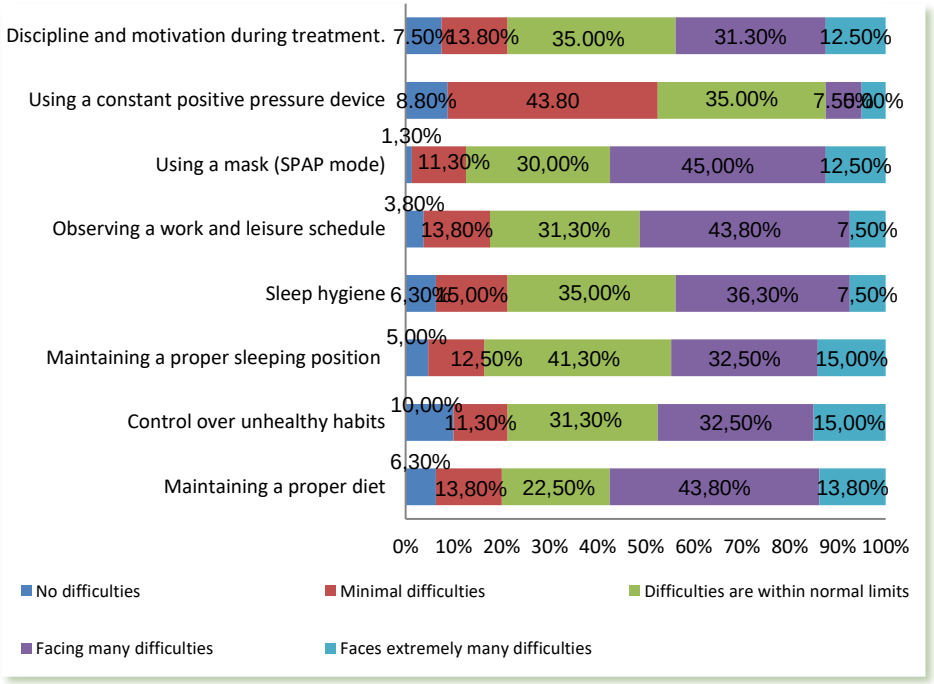


Fig. 30. Most common difficulties of patients with OSA

2.2.5 Nursing care in the treatment process of patients with OSA

Most patients, 77.50%, answered affirmatively about the need for nursing care (Fig. 31).

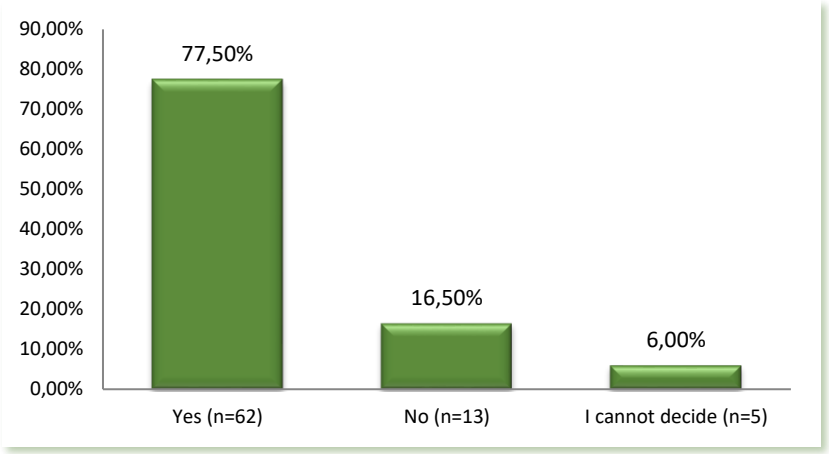


Fig. 31. Nursing care necessity

The highest proportion of positive responses was among respondents in the 61–70 age group (91.00%), followed by those in the 41–50 age group (80.00%). There was a statistically significant difference in the opinion of respondents according to their age ($p < 0.05$) (Figure 32).

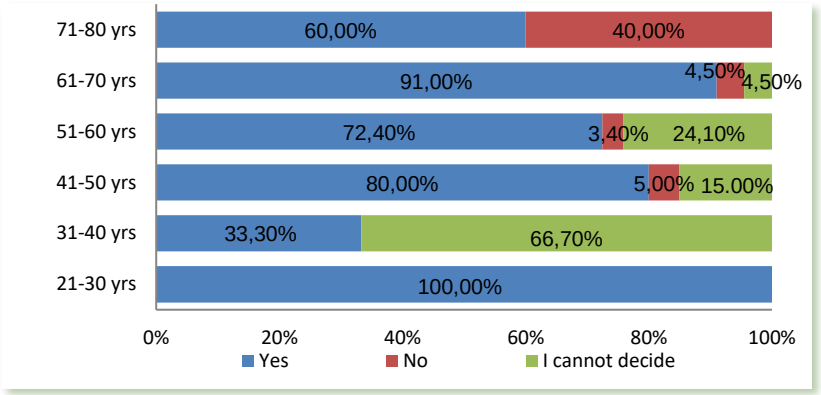


Fig. 32. Nursing care necessity and age of patients with OSA

The high proportion of positive responses from respondents aged 61–70 is consistent with the global trend that the need for healthcare increases with age.

The nurse's role as a full member of the somnology team with its functions and responsibilities was affirmed by 65.00% of patients; according to 21.20%, the nurse is an active partner of the physician and the patient. A small proportion still considers the nurse to be only an intermediary (7.50%) and an administrator of physician appointments (6.30%) (Fig. 33).

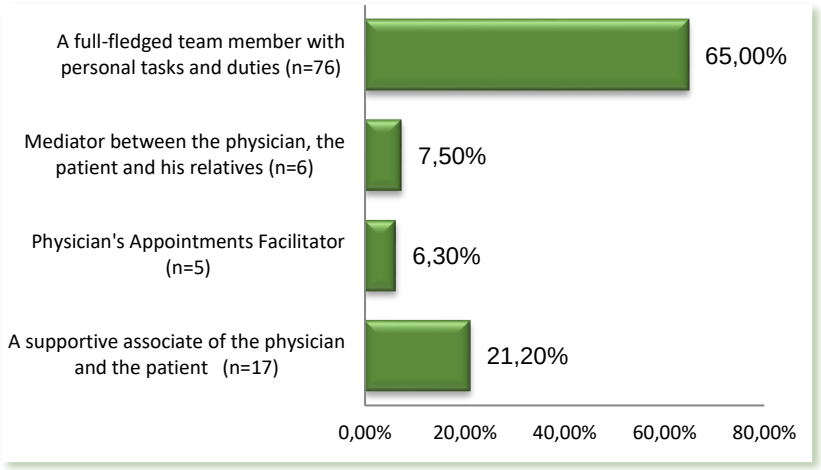


Fig. 33. The role of nursing care in the somnology team

Patients rated the nurse's role in conducting specific examinations – polysomnography and polygraphy: as "extremely helpful" (62.50%), "necessary" (58.80%), "creates a sense of security" (48.80%) and "reduces anxiety" (35.00%). Notably, patients rated psychological comfort in PSG as a factor for better care (Fig. 34).

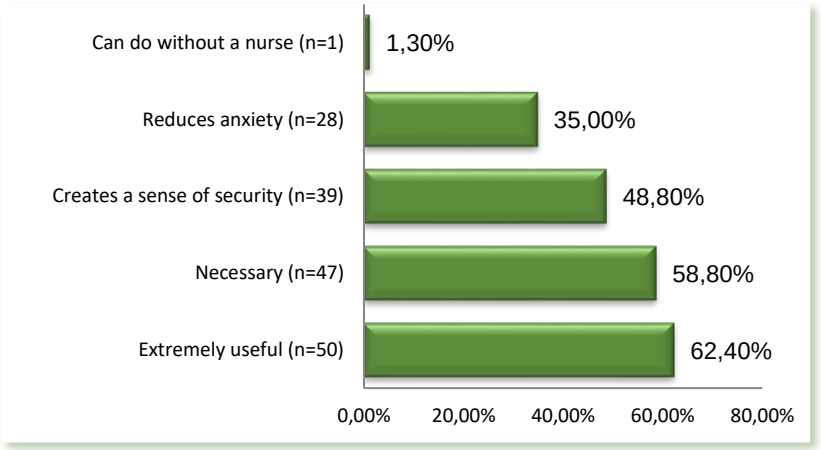


Fig. 34. Nurse involvement in specific examinations

The competent and trained nurse is uniquely positioned to assist the patient in carrying out interventions that improve individual functioning. Respondents overwhelmingly stated that a specially trained nurse could conduct training (87.50%) (Fig. 35).

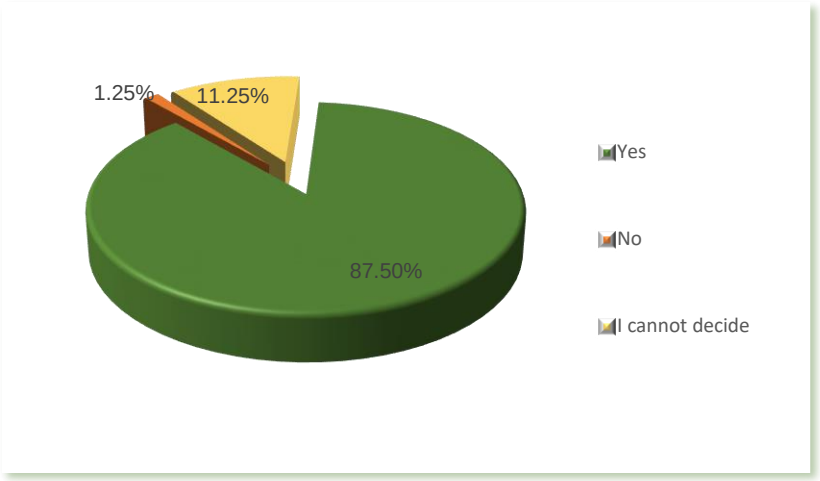


Fig. 35. OSA patients' education by specially trained nurses

Patient satisfaction is directly related to the quality of care. Respondents ranked active interaction with the patient (33.8%) as the key to optimising nursing care for OSA patients, followed by education (28.8%), teamwork with the physician, family, and all others involved in the patient care process (20.00%;) (Fig. 36).

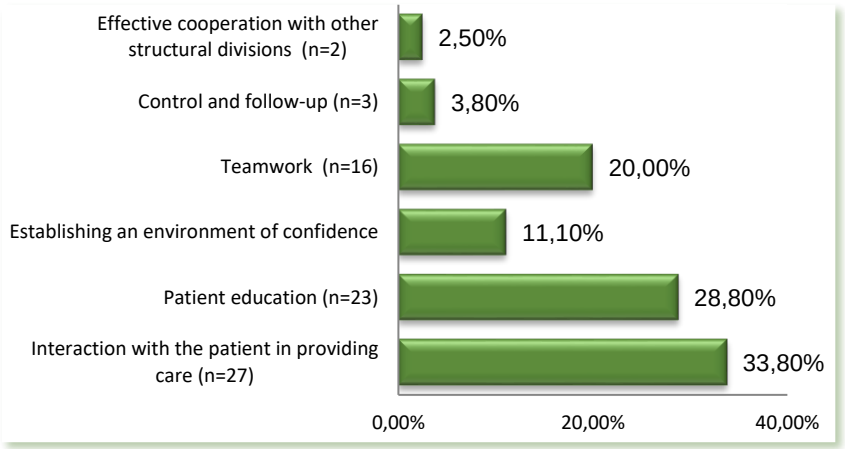


Fig. 36. Key activities to optimise care for OSA patients

Education of OSA patients is an element of modern disease management. Patients appreciate the need for training, confirming that nurses can conduct it. Currently, the training issue is new to most OSA patients in our country. It is routinely performed at the time the PAP device is provided, most often by a physician. When we asked the question, we had in mind a more systematic training aimed at all aspects of the disease: risk factors, behaviour patterns, motivation for treatment, follow-up, and coping with difficulties encountered. Respondents

feared that organised training courses would be associated with financial costs (31.30%) and that courses would be held only in large cities (38.80%) (Fig. 37).

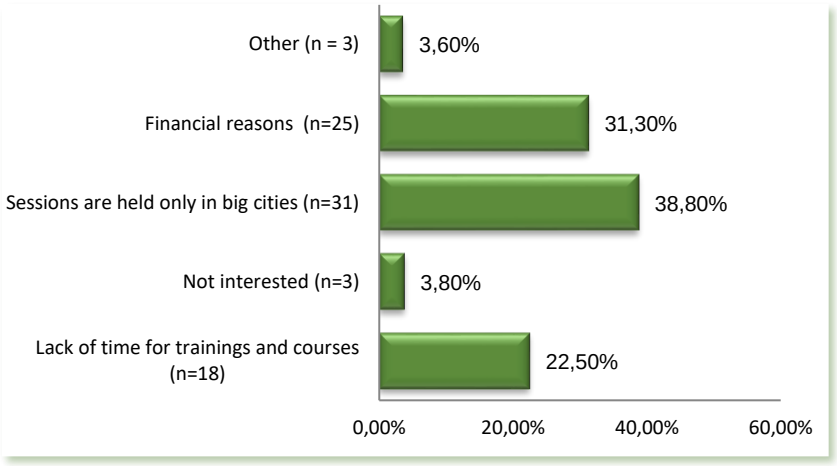


Fig. 37. Patients' attitudes towards participation in training

Some European and international sleep laboratories have successfully exploited the potential of telemedicine and are providing online training and courses to OSA patients.

Effective communication requires nurses to have additional competencies and knowledge to meet the patient's ever-changing demands.

Respondents indicated the qualities that a nurse must possess to implement good communication in the care process. Most respondents (75.00%) put the nurse's good professional training first. Secondly, the information should be presented in an understandable language (65.00%), and thirdly, the nurse's ability to spend enough time communicating with the patient (48.75%) (Fig. 38).

Fig. 38. Patients' opinion on the qualities they felt nurses should have

The nurse is closest to the patient. Building an atmosphere of trust, sharing, and support is essential for effective communication and helps to improve patient health. On the question "Is communication/relationship with the nurse important to you?" a substantial proportion of respondents answered in the affirmative (87.50%) (Figure 39).

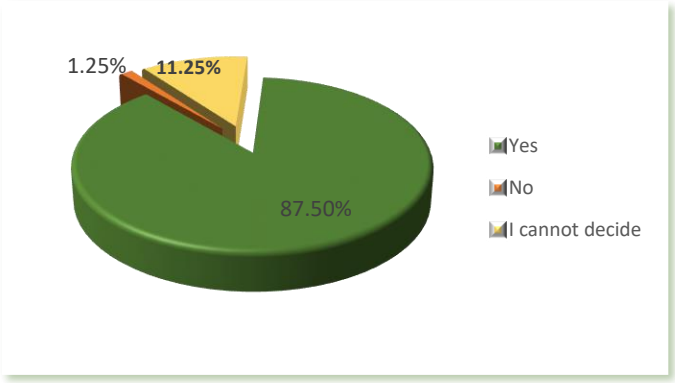


Fig. 39. The nurse-patient relationship

Respondents believed that when a 'non-significant' change occurred in an OSA patient's condition, they wished to discuss it with a health professional. It is noteworthy that an almost equal proportion of respondents were "physicians" (48.75%) and "nurses" (47.50%) (Fig. 40).

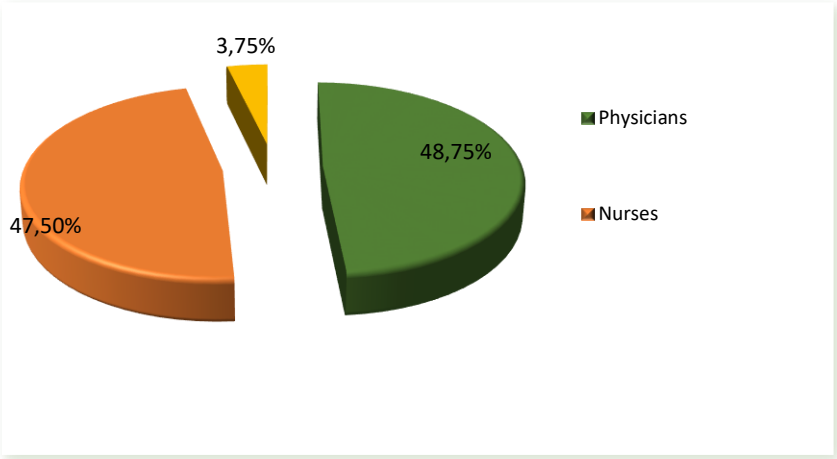


Fig. 40. Sharing attitudes when a non-significant change in status occurs

We assume that the lack of a clearly regulated role of the nurse in the overall treatment and diagnostic process of the somnology team has influenced patients' opinions on this issue, and the nurse is less frequently mentioned.

The results of the study outline the profile of OSA patients:

- Working-age male diagnosed with PSG.
- Seeking help from a sleep medicine specialist.
- Well aware of the primary symptoms of OSA, but there are symptoms which are neglected.
- Self-funds his/her diagnostic and treatment procedures.
- Not adequately followed up during the treatment period due to lack of an institution committed to follow-up.
- Encounters difficulties in mask use, compliance with diet, work, rest, and sleep hygiene.
- Assesses the need for education on OSA as very significant.
- Appreciates highly the opportunity for the nurse to participate in the somnology team. Willing to share changes in his/her condition with the nurse, i.e. the nurse should participate in the follow-up, which is currently lacking.

2.3. Survey – Physicians

2.3.1. Characteristics of the physicians surveyed

Table 6: Socio-demographic characteristics – Physicians

Indicator		**number**	**%**
Age	Mean age		**49 yrs ± 2.4**
	Up to 30 yrs	4	13.20 %
	31 - 40 yrs	5	16.70 %
	41 - 50 yrs	5	16.70 %
	51 - 60 yrs	8	26.70 %
	over 60 yrs	8	26.70 %
Workplace	University Hospital	17	56.70 %
	MHAT	6	20.00 %
	Diagnostic & Consulting Center	7	23,30 %
MI Structure	Ward	20	66,70 %
	Diagnostic & Consulting Center	10	33.30 %
Work experience	1-3 yrs	3	10.00 %

	5 - 10 yrs	7	23.30 %;
	10 - 20 yrs	12	40.00 %;
	over	8	26.70 %
	Total	**30**	**100 %**

Physicians with professional experience of more than 10 years (40.00%) working in hospital structures provided with special equipment, night observation for sleep recording and the possibility of consultations predominate in the survey (Table 6).

2.3.2. Physicians' opinion on the nurse's role in caring for patients with OSA

Physicians unanimously stated the need for nursing care for OSA patients (96.70%). Respondents identified the nurse's role in the multidisciplinary team (66.00%) as a full-fledged team member with its functions and responsibilities (Fig. 41).

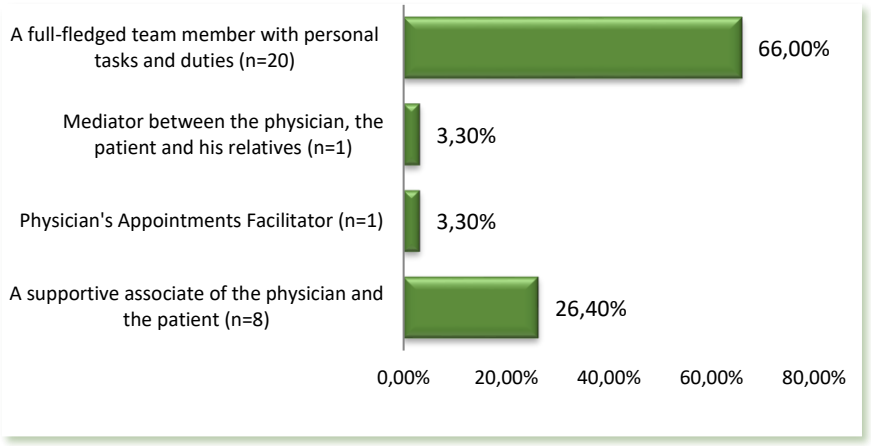


Fig. 41. Physicians' opinion about the nurse's role in the team

According to the majority of respondents (86.00%), the involvement of the nurse in the care of OSA patients requires prior training of nurses in conducting a polysomnographic examination, active collaboration between the team members at each stage of the somnological process (80.00%), particular competencies in caring for OSA patients (60.00%) (Fig. 42).

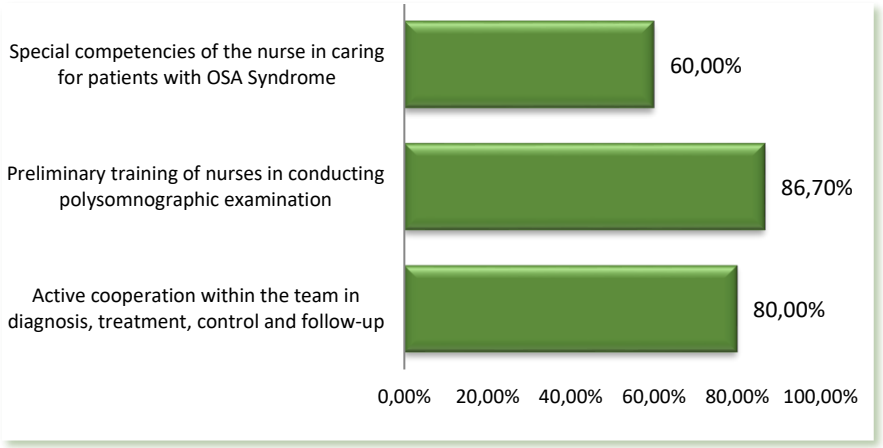


Fig. 42. Requirements for the care of patients with OSA

Most respondents (76.70%) identified the nurse's role in providing care for patients with OSA as necessary, with 20.00% finding it particularly important. We found a statistically significant correlation between the age of the physicians and their opinion of the role of the nurse in the somnology team ($p < 0.001$) (Fig. 43).

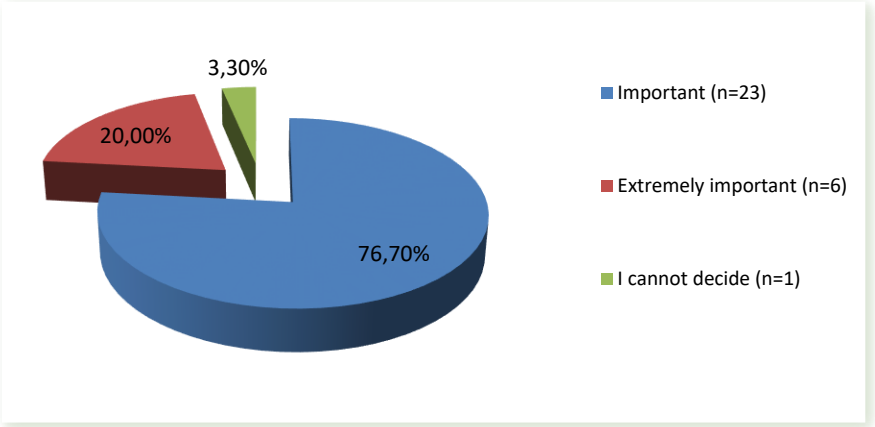


Fig. 43. The nurse's involvement in the process of caring for patients with OSA Syndrome

2.3.3. Significant nursing activities in the care of patients with OSA

Respondent physicians (73.30%) identified the most significant nursing activities for OSA patients as the *implementation of physician appointments*, consistent with old, traditional understandings of the role and functions of the nurse working only on physician appointments. *Promotional activities related to rebuilding habits and routines* were ranked second at 63.30%.

Providing psychological support for OSA patients also received a significant share (50.00%) (Fig. 44).

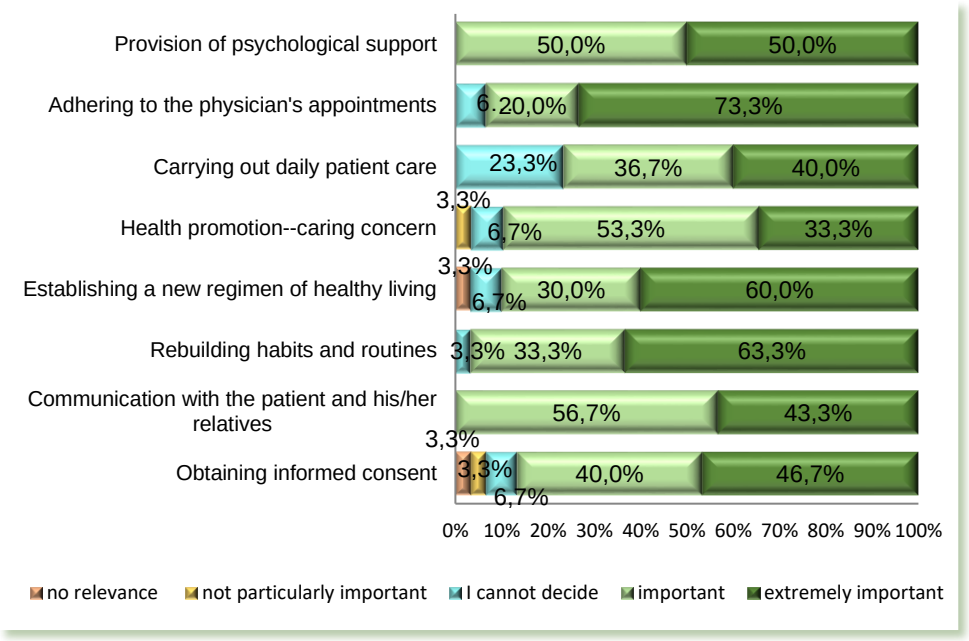


Fig. 44. Significant activities performed by the nurse in providing care for OSAS patients

The majority of surveyed physicians (70.00%) indicated that specially trained nurses can monitor OSA patients. In our country, there needs to be more regular control and monitoring of OSA patients. Nurses can help solve this problem. The responses of almost all physicians, 97.00%, affirmed the need for nurses to upgrade their basic training. According to 40.00% of respondents, short-term courses are the most effective model for additional training on sleep problems (Fig. 45).

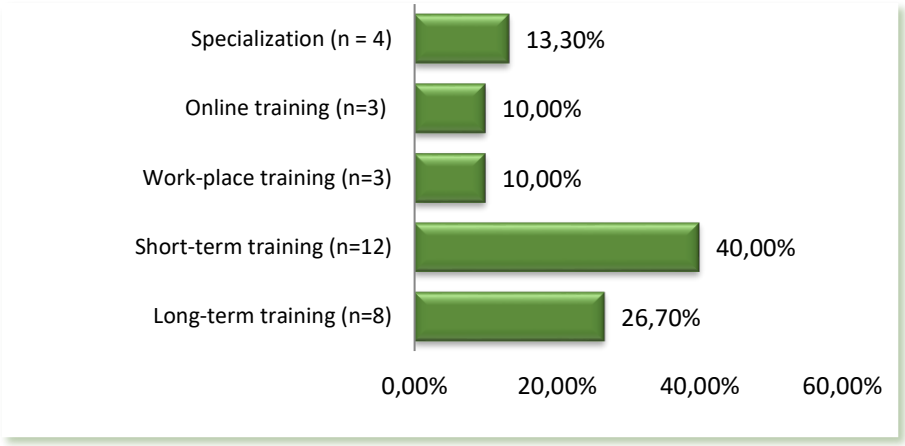


Fig. 45. Preferred form of additional training

According to the majority of respondents (70.00%), insufficient skills result from the lack of training; for 46.70%, the problem is nurses' lack of time and busy work schedules (Fig. 46).

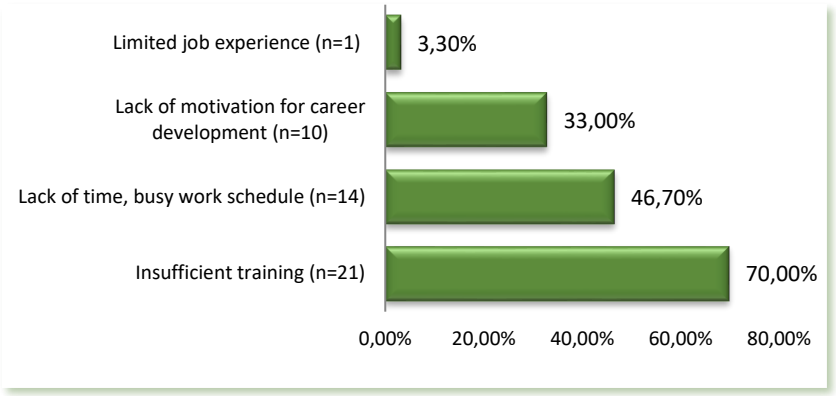


Fig. 46. Reasons for insufficient skills of nurses

2.4. Qualitative study of the healthcare provided to patients with OSA Syndrome

An in-depth interview was conducted with patients diagnosed with OSA undergoing treatment with a PAP device and followed over time. In order to preserve the anonymity of the interviewees, the respondents are presented by numbers from P1 to P10.

Patients are of an active age, and it is assumed that maintaining good health and optimal quality of life is their priority at every stage of the treatment. According to the time-barring of the disease, interviewees have a different duration, which makes it possible to obtain broader information about their exposure and experience related to the various stages of diagnosis, treatment and follow-up.

2.4.1. Sleep problems

The interviewees' sleep problems began around 40 years of age (P2, P3, P4, P5, P6, P7, P8, P9). The initial complaints of the participants were very similar, as they all reported being overweight, loud snoring, getting up frequently to urinate, sleepiness and fatigue during the day, increased blood pressure (P1, P2, P3, P4, P5, P6, P7, P8, P9, P10). Individuals with O indicated that the listed symptoms were in a different combination with additional complaints such as morning headache, dry mouth, difficulty concentrating (P2, P3, P7, P8, P9, P10), depression (P4, P6, P7), diabetes (P9), oncological disease (P8).

"...I started snoring a lot; I got up 4-5 times a night to urinate, my mouth was dry, and I drank many fluids. I woke up in the morning with a headache; concentrating was difficult, and I was constantly sleepy, especially in the afternoon" (P5).

"...My wife says that I fall asleep while "still in the air" (P8).

"...I was very worried that my colleagues would not find out that I was dozing off; I was constantly trying to do something. I became tense, anxious. I did not want to get together with friends, not to fall asleep in front of them or, if we had to spend the night somewhere in a hut or bungalow, not to disturb them with my snoring (P7).

"...When I went on a business trip, I always got a private room because I know I snore a lot" (P6).

"...Even my little granddaughter, who is four years old, does not want to sleep with me because I snore very loudly" (P10).

"…I always knew I had such a disease. I think my mother and grandfather suffered from OSA but did not get tested. They also perished from this (P2).

All the participants say that their complaints intensified in the last one to two years before they sought help; it is the reason they turned to a physician or shared the problem with a medical professional.

The respondents shared about the ineffectiveness of the prescribed antihypertensive therapy.

"...My blood pressure is still high; I take my pills, it will drop for about an hour or two and then up again (P6).

"...The cardiologist prescribed me more drugs, but without much effect" (P4, P7).

Most interviewees point to increasing sleepiness and falling asleep at work or home.

"...When I drive, especially on longer distances, I have to stop every hour or two hours to get out of the car and then continue" (P5).

"...My work is related to driving, and I started to worry a lot about causing an accident on the road and causing the death of an innocent person because I keep falling asleep" (P3)

"...I am an international driver; I started falling asleep while driving. There was a refrigerator in the truck, and to avoid falling asleep, I ate whatever I could find in it. It is good that there

are demarcation lines on the roads, and when I start to leave the road, I feel a shaking; how many times has it saved me" (P8).

One examined individual shared, *"In the evening, I slept on the ground, leaning on the bed frame, because I was afraid of suffocating" (P9).*

"...I became an introvert, I did not feel like going out, I constantly felt exhausted, I did not feel like doing anything" (P4).

2.4.2. Diagnosis of OSA – polysomnography, polygraphy

Impaired quality of life and the medical and social consequences of the syndrome are the main reasons participants seek help. Patients describe the **pre-diagnosis period** as multiple visits to various specialists, most often cardiologists, neurologists, urologists, and endocrinologists (P1, P2, P3, P4, P6, P7, P8).

"...I have been overweight and have heart problems since high school. One day in the twelfth grade, I had a seizure. I went to a neurologist, and they prescribed epilepsy medication. I became very relaxed. I slept about 22 out of 24 hours. I did not dare start a job after I graduated. About two years ago, when I was admitted to a cardiology ward because I was out of rhythm, I fell asleep constantly. The doctor, "a young one," asked me if I might have OSA. I said I had never heard of this disease. She referred me for an examination. A severe degree of OSA was established" (P1).

Two patients visited a urologist because frequent urination at night was associated with a prostate problem.

"...I went to a urologist, the guy listened to me, I explained everything to him, they did tests, he said he did not see a problem, but he still prescribed me herbal medicines, just in case. Nothing changed; I did not get better, but it got worse. In the evening, I got up 7–9 times to urinate. I started reading about my complaints online, so I made an appointment for an examination (P2).

"...How many urologists have I visited, and I visited an associate professor, they say it is not the prostate. Look for another cause". I shared this with an acquaintance; his wife was a nurse and told me to get tested for OSA (P4).

Both patients were diagnosed with severe OSA (P2, P4).

"...I work a lot; I attributed the fatigue and dozing off during the day to this. One evening at a restaurant with friends, one of them fell asleep as we were talking and started snoring. After

we woke him up, our other friend, who is a physician, began questioning him about his sleep apnoea symptoms. I found that I have some of these signs as well. This provoked me to consult a sleep specialist; I was diagnosed with severe OSA (P6).

One participant indicated that he was delighted with his cardiologist, who had monitored him for years.

"... As I told her that I have sleep problems, the lady referred me to a specialist" (P3.).

A visit to a specialist and an examination in a sleep laboratory is indicated in all patients with suspected OSAS. To this day, polysomnography is regarded as the "gold standard" in diagnosing the disease. The individuals indicated that they did not receive prior information about the nature of the polygraph or polysomnography and were not explained in detail what their behaviour should be. In seven of the patients, appointments for sleep recording were done by a doctor (P1, P2, P5, P7, P8, P9, P10); for three of them, it was done by the nurse over the phone (P3, P4, P6).

"...They gave me a device, showed me how to use it, how to put the cables, what time to go to bed and when to turn off the device. After that, they warned me to return everything" (P7 about the polygraph).

"... It is good that the doctor explained everything to my son in advance because I probably would not have been able to do it myself (P10 for the polygraph).

For seven patients, the study was polysomnography conducted in hospital structures. One of the participants described the room in which the PSG was conducted.

“…. I liked it very much, clean and tidy. There were two rooms. There were two of us, each in a separate room. A nurse accommodated me, I do not remember her name, but she was very kind and attentive. She performed her duties quickly and accurately. The nurse to me explained that the electrodes would record my sleep while I slept. She will be in an adjacent room all night watching us. In the morning, she woke me up, turned off the machine and told me to wait to see my doctor" (P6).

According to the patient's description, it is about a nurse who underwent special training in a leading European clinic on sleep problems.

Another participant shared:

"...I went on the appointed day and time for admission, and they put me in some office. I do not know exactly what this room is for. A doctor put the electrodes on me and explained that if something bothered me at night, I should call the nurse on duty in the ward. She would inform him. It seemed the man had other work to do; he was not only dealing with me" (P8).

The performed polysomnography (n = 8) and polygraphy (n = 2) conclusively prove a severe degree of OSA in all examined individuals: severe in P1, P2, P4, P5, P6, P7, P8, P9, moderate-severe with respondents P3, P10. Making an accurate diagnosis is essential to start timely treatment and prevent the severe consequences of OSA Syndrome.

Regarding their direct impressions of the medical team during the examination, the majority of respondents shared that they had contact mainly with the physician, whom they called by name, but had very few memories of the nurse (P1, P3, P4, P5, P7, P9, P10). Only two participants shared positive impressions of the nurse, describing her as competent and knowledgeable.

"... The nurse was very kind, confident in what she was doing, and answered the questions I asked her" (P6, P8).

2.4.3. Constant positive pressure therapy in patients with OSA Syndrome

The reporting of the results of the polygraph/polysomnography examination was done by a physician. Only three patients indicated a nurse was also present (P6, P8, P9). During the meeting, most interviewees (respectively, P1, P2, P3, P4, P5, P7, P8, and P10) did not discuss their proposed treatment method.

“…. I was scared when I heard I would have to sleep with a device for the rest of my life. I was not sure I would get used to the mask. I had many questions then, but because of the shock, I could not ask them" (P8).

Two of the respondents had no concerns about the proposed PAP therapy.

"...I used to dive, so I am not afraid of a mask and apparatus" (P7).

"...If I want to live, I normally listen to what the doctor tells me" (P5).

"...A part of the interviewees shared fears and concerns about how their life would go "everywhere with the machine." "It seemed scary to me to carry this device everywhere. When people see me with this briefcase, what would they think if they recognise what I use it for" (P7)?

"...I was petrified how my wife would react, what kind of a man I am, young and in the evening with a mask and a device (P8).

Most patients say that they were also apprehensive about the price of the device and the equipment (P3, P4, P5, P7, P10). On this occasion, one of the respondents shared:

"...I bought the device from an ad on the Internet, I have not had it adjusted, I do not have the money for that either. He, the person who sold it to me, told me it was tuned" (P3).

The participants also shared problems adapting to the mask and needing more alternatives.

"...It is challenging for me to get used to the mask. I have been receiving treatment for three years now. I asked if it could be changed, and they answered that the device was for this mask. I cannot buy a new device" (P4).

"...I tried for two weeks, but I could not get used to the mask; it was tight when I turned around it shifted. I decided I could not sleep with a mask; it was uncomfortable for me. I woke up, I thought that the money for the device was not negligible and if I will not use it, it is pure waste."

To the question, "Are you aware of the consequences of untreated sleep apnoea, and has anyone suggested to you to try a different mask, e.g. for the nose, hypoallergenic, silicone?" the patient replies:

"...I was told quickly what stopping the treatment could lead to; no one offered me other treatment options or a mask (P10).

2.4.4. Monitoring and control of the effect of the conducted PAP therapy

Changes in health status after PAP therapy are noted by all respondents. The participants indicated that the very next day, they felt the beneficial effects of the treatment (P2, P3, P4, P5, P6, P7, P8); for two of them, this change occurred after one week of using the device (P9, P1).

"...For the first time, I woke up refreshed as if I was a new person" (P 2),

"...I went to bed, got up only twice, the dryness that was bothering me a lot disappeared" (P4).

"... Since I have been using the device, my wife is not afraid to go to bed. Gone is the snoring that nothing could save her from - another room, earplugs. It was scary" (P9).

The duration of constant positive airway pressure (CPAP) treatment requires persistence, support and strong motivation. Regular visits are a factor in the successful control of OSAS. Most patients reported not being given instructions on how long to return for a follow-up

appointment. One of the examinees (P8) says that he must meet with his sleep medicine specialist once a year, get a new PSG, review the latest records from the device, adjust the pressure if necessary, and visit a cardiologist.

"...I visit my doctor every year; he also refers me for tests to a cardiologist who reviews the recording from the device. He sees when I have not used the device, and he scolds me a little".

In his narrative, the interviewee did not mention a nurse during the regular visits (P8).

Three people say that since their diagnosis until now, they have not had any check-ups.

"... I have been receiving treatment for five years. I was diagnosed in Sofia, which is very far, Varna is closer, but I do not know where and whom to go to, for someone to take care of me, to tell me if everything is okay" (P9).

"... I do not have time for monitoring and control" (P4).

"...Could you tell me how long I should be monitored, because I know whom to turn to in case of a problem with the device, but no one has told me anything about monitoring my condition" (P6).

After receiving an answer from the interviewer, the patient thanks and declares readiness to visit his physician.

Two patients stated that they stopped their treatment, respondents (P10, P2).

"... I have always been overweight. I used the device for three years; during that time, I lost 18 kilograms, reduced my blood medication to one pill, was cheerful, able to work, and decided that I could do without the device" (P2).

Even though they conducted treatment in different settlements of the country, the general opinion of the respondents (P1, P3, P4, P6, P7, P9) is related to dissatisfaction with the care provided during the treatment and follow-up period. The main reason for the problem is the need for more information about regular visits and the lack of interest of the team, specifically the physician, in the treatment carried out. For many respondents, communication between the medical team – physician, nurse and patient is insufficient and ineffective.

"...Absolutely no training, no advice on how to lose weight, nothing, just being told you need to lose weight, and it is so easy (resp. 7). I am from the countryside and do not know where to

check my device or who to turn to for a new examination. Since they set up the device for me, I have been using it like this for 10 years. Shouldn't there be some change?" (P5)

One of the patients shares his communication with the team.

"...Only the doctor can talk about the disease expertly. The nurses are quite untalkative, refuse to commit themselves faithfully, and have much work, but what can we do? Who can we get information from?" This stresses me out a lot, and above all, there is no information; there is no one to tell you when you start treatment, how things will develop, what tests you should do, and whether there are medications for sleep apnoea. I find my answers online or discuss them with acquaintances with the same problem" (P8).

Of interest to the study is the opinion of a participant in the interview, who shares his impressions of the organisation of the process of diagnosis, treatment and follow-up of OSA patients in Spain:

"...I am 48 years old. I have always been overweight. I have been taking blood pressure medicines for 20 years. First, it was one pill, then they got to 4–5, and I was only 40 years old. At that age, I went with my husband to Spain. I started to work there, cleaning the portals of the port. I gained much weight. I started to feel terribly tired, especially in the afternoon. During breaks, I hid from my colleagues so they would not see me dozing off. I did not want the evening to come. I woke up 5–6 times with a dry throat and often went to the toilet to urinate. My husband said I snore a lot and sometimes stop breathing during sleep."

Diagnosis

"...I had heard from other Bulgarians who work in our city in Spain that they sleep with machines and feel very good afterwards. I decided to go to my GP and share my complaints. There, as soon as you say that you have a problem with sleep, they immediately send you to a specialist. I made an appointment. I waited about two weeks for them to accept me. A doctor and a nurse worked in the office I visited. The doctor explained that I should be tested for sleep apnoea. He briefly informed me about what the disease is and what is the risk of not treating it. After that, the nurse introduced me to the examination methods – polygraphy, polysomnography. She gave me a sleep recorder to use at home (polygraph). The nurse showed me how to use it and instructed me when to go to bed and when to turn off the device. She was

attentive throughout the conversation, asking me questions if I understood everything and reassuring me that if I could not manage at home, I would stay overnight in the hospital."

Treatment

"…I did the examination and took the recording device. I received the result of the recording after about a month. The nurse called me and gave me a date and time to visit. My doctor informed me that I suffer from a severe form of OSA. A nurse was also present. We discussed the treatment that the doctor suggested – PAP therapy. The device, as well as the mask, were provided to me free of charge. Together with the nurse, we chose the mask. I had the opportunity to test several masks. The nurse explained to me how to put the mask on, how to clean it, and how to take it off. She brought to my attention the risk factors for OSA. She told me that I needed to lose weight. She weighed me and recorded my weight on my medical history card. She explained to me about the diet and rest regime. The nurse informed me that a technician would check the device every three months and replace my mask. She told me we would see each other again in about three months."

"...There, in Spain, if you want to visit a nurse, you also make an appointment in advance."

Tracking and Control

"...At the end of the third month, the nurse called me on the phone and reminded me that I should go for a follow-up examination. I also received a notification at the address registration. They will not leave you alone there until you go."

"…I showed up for the examination. In three months, I had lost two kilograms, had no headaches, and felt energetic and rested. The first night I used the device, I woke up rested.

"...I continued to use the device, and in two years, I lost 15 kilograms; they reduced my blood pressure medication, and I only drank Enalapril. I decided I was fine and did not need the device anymore. I stopped the treatment."

"...During this period, my husband and I moved to England. My sleep apnoea complaints came back again after about 7–8 months. I have again become very sleepy during the day, and my blood pressure, despite taking 4–5 pills, is high again. I know; I did it myself. My brother, who also has sleep apnoea and has never stopped his treatment, feels excellent and is very happy with the results."

"...I am now in England, again waiting for a device, but here the system is more cumbersome. I have been waiting for a whole month now. I am determined never to stop my treatment again."

In Bulgaria, my mother also has sleep apnoea. I have an acquaintance with this same problem as well. They have not been examined. They claim that they have no funds, neither for examination nor for the purchase of a device nor a mask. I wonder why people in Bulgaria are not examined en masse for sleep apnoea. Why don't general practitioners refer you to a specialist when you say you have such complaints? Why not provide funds for these people for diagnosis, treatment and follow-up? Abroad, this problem is taken very seriously, and as soon as you share, they examine you."

***"…My impressions of the nurses in Spain** who work with us OSA patients are that they are highly competent, responsive and assertive. They thoroughly organise the training and follow-up of individuals with sleep apnoea. Regular patient visits are part of the nurses' job. Nurses follow a care plan and perform specific tasks in its implementation. They will not leave you alone until they accomplish what they have set out to do."*

The interview highlights the main problems for OSA patients.

• Ignorance and neglect of OSAS by medical professionals. Lack of sufficiently well-trained staff on sleep problems.

• The absence of a nurse (constant monitoring) during the night-time OSA testing.

• Failure to provide funding for diagnosis and treatment is a major reason for people not seeking help for sleep problems.

• There is a lack of appropriate patient education at each stage of the somnological process.

• The lack of alternatives for patients who do not tolerate PAP therapy is significant for the progression and course of OSA. The refusal of treatment is associated with serious consequences on the physical and mental health of the respondents.

• The need for psychological support is expressed.

The patients' narratives did not mention the nurse's involvement and role in the overall process of somnological care, from diagnosis to follow-up. Given the current trends for good practices and quality of care, what was shared by the interviewees unconditionally substantiates the need for a competent and trained nurse in the somnology practice.

More information about the nurse's specific role in the overall somnological care process must be provided. Only two of the patients speak of a competent nurse: according to the rest, the nurses carry out the physician's instructions and do not engage in training and other activities specifically aimed at patients with OSA.

2.5. Autonomous nursing practices – results and discussion

Changes in society and the dynamic development of the nursing profession have incited a new perspective on patient care. Providing the best quality care is a challenge for all medical teams. Autonomous nursing practices (ANP) refer to the nurse's independent actions in the overall healthcare organisation. In favour of the ANP are the positive changes in the education of nurses resulting from its elevation to university, which raised the question of recognising their increased competencies as a prerequisite for independent work.

In the last 10–15 years, the issue of the autonomous role of the nurse has been prevalent in healthcare/nursing research. In this manner, there is a tendency for autonomous nursing practices (ANP) to mould the thematic cores of research focused on the independent role of the nurse. Autonomous nursing practices (ANPs) as structures have a future with sufficiently good legislation and a precise definition of the scope of activities, duties and responsibilities. In our country, such practices do not exist, there are only isolated examples, but the question of ANP is increasingly gaining prominence in healthcare research in Bulgaria.

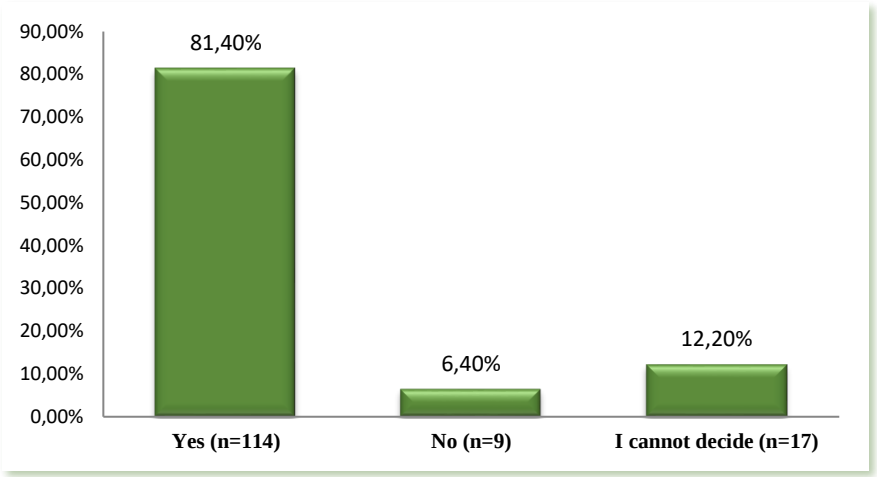
Although in providing care for OSA patients in our country, there is little to no participation of the nurse, let alone an autonomous role, we asked the respondents about the essence of ANP and, eventually, their support (reference – Questionnaires 1, 2, 3).

2.5.1. Endorsement of the ANP concept in the treatment of OSA

We proceed from the assumption that the positive attitude of nurses towards autonomous nursing practices can provide the groundwork for constructing the specific role of the nurse in the processes of diagnosis, treatment and control of OSA.

We asked a probing question about specialised nursing practice related to supporting and caring for patients with OSA. It turned out that (81.40% %; n=114) of the surveyed nurses endorsed this idea, which can be a good ground for developing such a practice (Fig. 47).

The analysis found a significant correlation between nurses' education and their readiness to organise ANP. ($\chi 2$ = 22.799, r = -0.269, V = 0.285) $p < 0.001$. Nurses with an educational qualification of a Master's degree in Healthcare Management, without exception, endorse a nursing practice to provide care for OSA patients (Fig. 47).



support

Fig. 47. Nurses' opinion on organising ANP for patients with OSA

The issue of autonomous nursing practices is relatively new to the medical community. According to 60.00% of the physicians surveyed, creating autonomous nursing practices will lead to better patient care. The considerable number of those who indicated the answer "I cannot decide" (36.70%+) can be explained by the fact that autonomous nursing practices are relatively new and physicians are not well informed about their essence and status.

2.5.2. Focus on Autonomous Nursing Practices for OSA Syndrome

According to the nurses, the most appropriate focus of ANP is the opportunity to concentrate the practice on patient education (72.10%; n=101) (the question provides more than one answer as an option). Secondly, the nurses indicate their participation in conducting PSG (43.60%) (n=61), thirdly – sleep screening programs among occupational risk groups (41.40%; n=58) (Fig. 48).

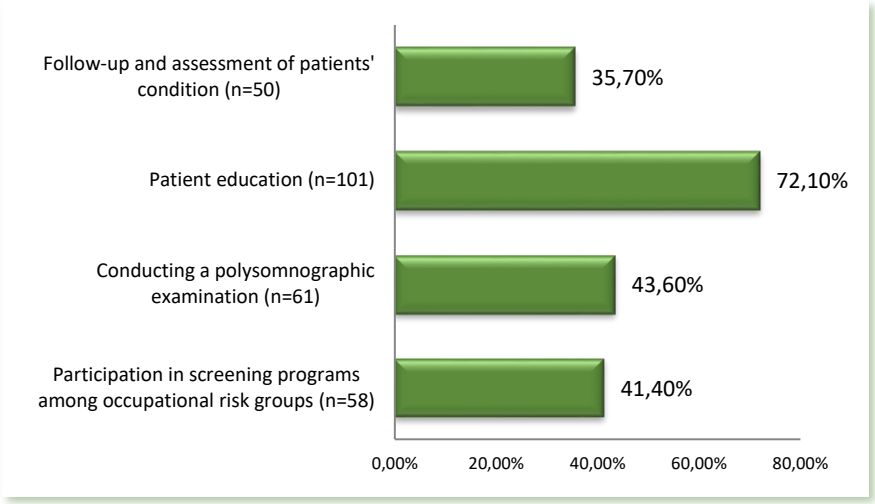


Fig. 48. Possible ANP guidelines according to nurses

The surveyed physicians also place patient education as the most effective focus of ANP, followed by screening programs among occupational risk groups, and are somewhat more reserved regarding the participation of nurses in PSG (Fig. 49).

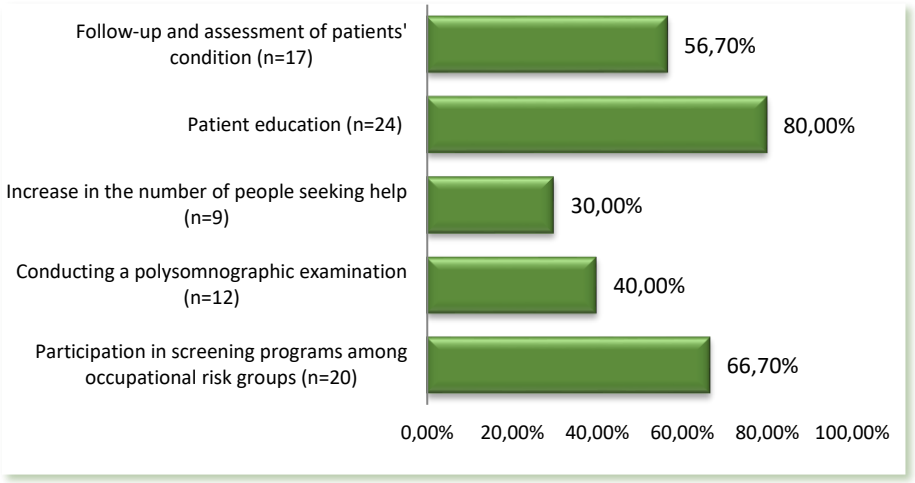


Fig. 49. Possible ANP guidelines according to physicians

2.5.3. Patients and autonomous nursing practices

Acting upon, achieving goals and taking responsibility is a model of personalised nursing care based on the patient's individual needs.

Patients' views on hypothetical autonomous nursing practices are presented.

The results show extremely high support (90.00%) for organising autonomous nursing practices.

Logically, the question for those who answered positively follows: "Would you visit such a practice?" Willingness to visit is declared by (95.80%) of the surveyed individuals (Fig. 50).

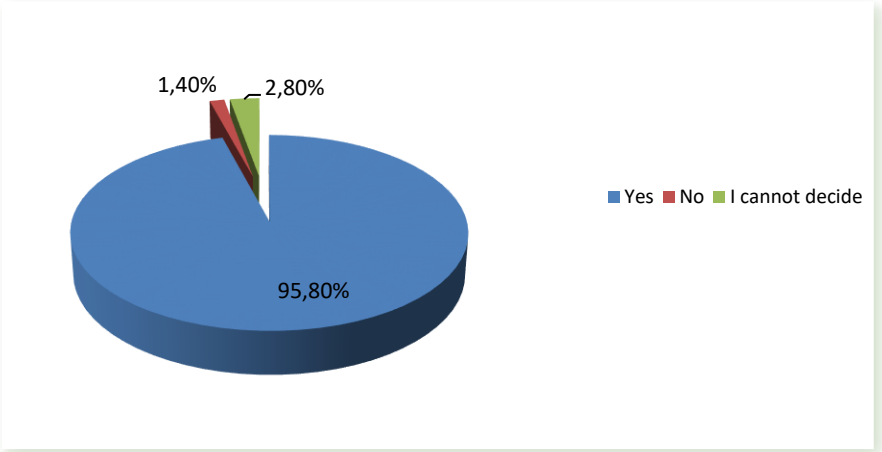


Fig. 50. Patients' attitudes towards autonomous nursing practices

Figure 51 illustrates patients' views on the main activities that nurses can perform independently. In the first place was the training of the patients (77.50%). In the second – monitoring and evaluation of changes in their condition (56.30%), and in the third – nurse's participation in the organisation and conducting screening for OSA among at-risk populations (51.30%) (Fig. 51).

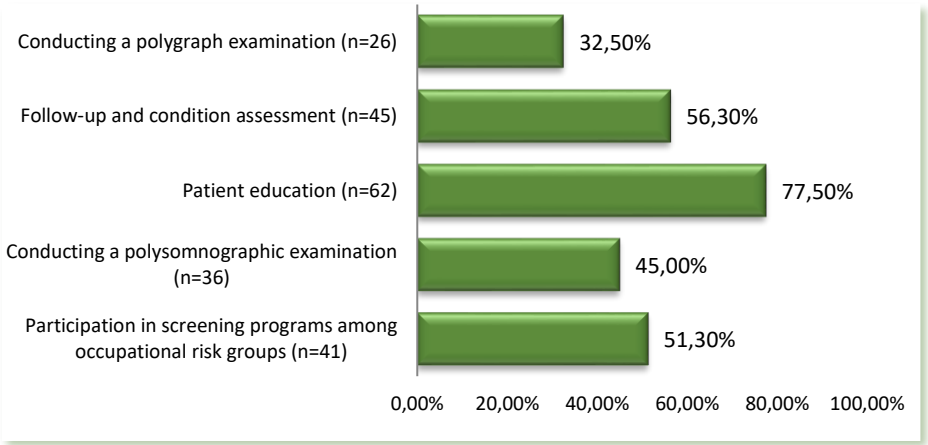


Fig. 51. Patients' opinions about activities that can be performed independently by the nurse (in % of responses)

The comparative analysis of the survey among the three groups of respondents shows a high degree of unanimity in support of the idea of creating an ANP. The significant support from the patients corresponds to the results of the qualitative study, in which the patients shared their experiences, pointing out the lack of attention and support from the medical team. All three groups of respondents have a high degree of unanimity with respect to the scheduling of key activities on which the ANP should be focused. A definitive first place is given to patient education.

In our opinion, the future involvement of nurses in ANP should be accompanied by appropriate postgraduate training and obtaining the competence to participate in quality activities for OSA patients. Only with careful training of nursing personnel can we contemplate their relatively independent role in optimising the care of patients with OSA.

3. OPTIMISING HEALTHCARE FOR PATIENTS WITH OBSTRUCTIVE SLEEP APNOEA (SUMMARY, CONCEPTUAL PROJECT)

3.1. Summary

The care of patients with sleep apnoea is usually managed by a physician in collaboration with a sleep technician regarding the use of the device. There is a lack of a straightforward program for the search/identification, diagnosis, treatment and follow-up of patients with OSA. Nurses have little or no involvement in the care of patients with OSA. We could call them the "invisible members" of the multidisciplinary health team. In the quantitative survey, the group "Nurses" revealed their perceived need to increase their knowledge about OSAS (77.90%) and the desire to be full-fledged members of the multidisciplinary somnology team (54.30%).

These data are positive signs for further development of nursing care. The prerequisites for such development are within the scope of activities of public institutions:

• Changes in public attitudes and health policies towards the problem of OSA – to be considered a significant public health problem.

• Identifying a public resource to facilitate patients in financing, albeit partially at first, the diagnosis and treatment of OSA.

• Formulation of principles and stages of healthcare organisation for OSA patients, in which the nurse's role with duties adequate to her/his competencies will be articulated and defined.

It takes a certain amount of time to complete these activities. For us, as researchers of the nurse's role in the care of OSA patients, the critical question is whether to build models for the development of healthcare that have little real basis in health policy, resp. in the organisation of medical institutions or to passively wait for the "maturing" of society for endeavours in this field?

We afford ourselves the opportunity to draw attention to the possibility of choosing a "middle" ground. Based on consensus between interested parties, conducting a temporary pilot project "Organisation of diagnosis, treatment and follow-up of patients with OSA", to be designated in a relevant medical institution (unit/establishment) by an act of the MOH.

Within the design framework of the pilot project should be ***the participation of medical nurses in the specific stages of OSA management***, which requires:

- Knowledge of identifying the population at risk;
- Competencies for conducting polysomnography, polygraphy;
- Patient Educator Competencies;
- Competencies of a patient follow-up administrator – with timelines and monitoring parameters;
- Competencies for effective communication and support for the patient and family/environment.

3.2. Idea projects for the development of nursing care for patients with OSA

The project can be successfully used to involve nurses in the somnological care, which will compensate for the lack of such involvement of nurses that we have identified. Implementing the project will bring us closer to the good nursing practices successfully applied worldwide.

The modern nurse's performance must be contingent upon her decision-making skills and the application of innovative models and practices to ensure an effective result. The nurse's skills to assess, systematise and take decisions must develop continuously.

3.3. A proactive approach to nursing care in educating OSA patients

Applying a proactive approach towards nursing activities aims to ensure that nurses not only perform the assigned tasks but initiate opportunities to achieve a better quality of life for the patient with OSA.

The thematic rationale of our proposed approach includes establishing links between each element to achieve a high quality of service.

- *Ensuring an individual approach*
- *Building trust*
- *Integration of various specialists in training*
- *Effective dialogue with the patient*
- *Achieving adherence to therapy*
- *Emotional support*

3.4. Patient's condition assessment card during specialised sleep examinations

Implementing the card will contribute to a greater team commitment and reduce patients' fears and worries. The card contains the following data:

- *Identification characteristics;*
- *Registration of main indicators;*
- *Nurse's assessment of the patient's behaviour during the examination.*

4. CONCLUSIONS, CONTRIBUTIONS

4.1. Conclusions

Conclusions from the theoretical study:

1. Extensive prevalence of Obstructive sleep apnoea syndrome (OSAS) has been established worldwide among working-age individuals, 4–9% among men and 2–4% among women. Predictors of OSA – overweight and unhealthy lifestyle patterns- are also increasing.

2. The current European database for sleep apnoea contributes to a more precise clarification of the extent of the disease. In Bulgaria, there is no register of OSA patients.

3. OSA is recognised as a significant social and medical problem in most developed countries. The social, financial, social and psychological consequences of OSA for society and the individual have been identified.

4. A managing framework for the medical care of OSA patients has been built, including diagnosis, treatment, and follow-up by a multidisciplinary team.

5. The nurse's role with specific functions in the overall process of somnological care is defined. In Bulgaria, there are no requirements for nurses providing care for OSA patients to possess a certain level of specialised qualification.

6. Good nursing care practices in sleep medicine in advanced countries are identified and presented.

Findings from the quantitative study

7. The detection of OSA in Bulgaria is done only at the patient's initiative. There is no early detection system, and no opportunistic screening is performed. Most often, patients turn to a specialist in sleep medicine (45.00%).

8. All three groups of respondents indicate identical difficulties of OSA patients during treatment – using PAP mode, control of unhealthy factors and diet. To overcome them, patient education is indicated as very useful.

9. Society does not define OSA as a significant social and medical problem, according to 70.00% of patients and 54.30% of nurses.

10. Sleep laboratories, physicians (73.30%), and nurses (50.00%) are indicated as the most suitable establishments for treatment. Patients' home is primarily neglected by physicians and less so by nurses, which is contrary to the world practice where ambulatory care is regarded as a successful model.

11. At present, the nurse does not have a specific role in the activity of the somnological team. The need to be included in the team is confirmed by physicians (96.70%) and nurses (79.30%) and by patients (65.00%).

12. Nurses' outstanding support for ANP (81.40%) is a reasonable basis for establishing and developing such practices. ANP has been given serious support from patients as well, who designate ANPs as an essential place in the follow-up and assessment of the condition of patients with OSA.

13. It is a one-sided opinion that patient education can only be carried out by a specially trained nurse.

Findings from the qualitative study

14. The protocol for OSA patients in terms of diagnosing, treating and tracking the illness should be more clearly outlined. Nurses do not have a clearly defined role in this process.

15. Financial burden on patients during the diagnostic-treatment process is a significant barrier to undiagnosed OSA and patient dissatisfaction.

4.2. Contributions

Cognitive and theoretical contributions

1. A study on the needs of OSA patients, assessed by physicians and nurses working in the field of sleep medicine and by the patients themselves, was conducted for the first time in our country.

2. A theoretical study of the international experience regarding the nurse's participation in caring for OSA patients was made, and a number of good practices were identified.

3. For the first time, the role of the nurse in the multidisciplinary somnological team – current status and perspectives, is explored. Nursing competencies in caring for OSA patients are outlined.

4. For the first time, the opinions of physicians, nurses and patients about society's attitude towards the OSA Syndrome were investigated and assessed.

5. Barriers for OSA patients are brought to light, and strategies to overcome them are highlighted.

Practical and applied contributions

1. The nurse's role in promoting and preventing OSA is outlined.

2. Developed and put forward for implementation are:

Conceptual pilot project *"Organisation of diagnosis, treatment and follow-up of patients with OSA"*, in the design of which the participation of a medical nurse in the specific stages of OSA management is outlined.

A proactive approach to nurses' involvement in the education of OSA patients.

Patient's condition assessment card for evaluating and tracking medical changes in the OSA patient's condition.

Nurses from outpatient and hospital practice can participate in a thematic postgraduate training course divided into two modules.

THESIS RELATED PUBLICATIONS AND PARTICIPATIONS

1. Yancheva, St., M. Nikolova, V. Tsvetkova, The influence of obstructive sleep apnoea on the quality of life, Collection of reports and abstracts from the Third International Conference Nursing Care – Contribution to the quality of life, Varna Medical Forum, 2022; 177–183

2. Yancheva, St., M. Nikolova, V. Tsvetkova, Professional opportunities and competencies of the nurse to identify sleep disorders in patients with obstructive sleep apnoea, Varna medical forum, 2022, 281–288

3. Yancheva, St., M. Nikolova, V. Tsvetkova, Obstructive sleep apnoea, medico-social dimensions, nursing approaches in prevention and diagnosis, Varna Medical Forum, 2021; 10:438–442