

# Considerations regarding the Use of the Management Specific Process in the Diagnosis and Treatment of Sleep Apnea

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## Summary

*Addressing a medical case by using decision-making process techniques specific to organization management can be an important way of structuring and managing it effectively. At the same time, development and SWOT matrix analysis of the case could be a good starting point in setting priorities for action and to adopt the most appropriate decisions.*

*During a medical case management, it is important and demonstrable the fact that an advantage may be established by the general principle of management applied also at a micro level.*

*In the management of apnea cases, it may be applied a SWOT analysis as a management principle.*

*Sleep apnea is characterized by repetitive interruption episodes and/or reduction of air flow during sleep, lasting more than 10 seconds. These events are quantified, in terms of seriousness, by apnea hypopnea index/ hour of sleep.*

*We can say, strictly didactic, that there are three forms of sleep apnea: central, obstructive and mixed. The disease occurs in the general population to 4% of men aged over 50 years, 2% of women and 0.7% of children, with the worrying trend of increase lately.*

**Keywords:** *management; decision; sleep apnea; diagnosis; SWOT analysis*

**JEL Classification:** *I18; P46*

## Introduction

Romania, constantly engaged in achieving the Millennium Development Goals, adopted The 2030 Sustainable Development Agenda, which details 17 Sustainable Development Objectives (SDO), meeting informally as the Global Objectives. Within these broad objectives set for the next 15 years, health issues that occupy the third place importance and is called Health and welfare-ensuring healthy living and promoting the welfare of all at any age.

In the series of studies Global Burden of Disease, based on the levels observed for 33 indicators (each was noted with a value between 0 - 100, the maximum value being associated with achieving parameter contained in the Sustainable Development Goals - SDG), it was established that "Romania is the worst among EU states, on the 74th of 188 countries included in the analysis, with an average of 63 points. Among European countries, only the former USSR is worse than us, but not all. It is, however, an improvement compared to 2000, when our country

was ranked 84, with an average of 54. In 1990, Romania was ranked 87, with an average of 50 points. (Sirota, D., Mischkind, L.A. 2010)

By its content, the New Agenda substantially exceeds the Millennium Development Goals, placing the central theme related to poverty eradication, education and health.

Achieving sustainable development goals by 2030, namely the 17 goals, 169 goals measured by 230 indicators, involves long-term strategy, the implementation of which must meet the following requirements: “one of the dangers of long-term planning is fixing unrealistic goals. Although in some circumstances you can try to overcome the gap between goals and heroic existing resources, not always the case”. (Hamel and Prahalad, 1989). Although organizational capacities can be improved, modified structures and cultural patterns processed, there are limits to what changes they can accomplish. Also, technological achievements can be copied by competitors. The essence is the network of working relationships inside or outside an organization and its stock of intellectual capital. Gradual improvements can sometimes be the best option.

Health has, like every other component of human activity, specific elements within both supply and demand. In essence, the specificity is the fact that both demand and supply carriers are financially involved in following the same purpose. Recovery, mainly through its own physical and intellectual capacity of man involves, besides the forces of medical facility dedicated to patient and family support, the companies, the local authorities and not least, of the state. Optimizing the correlation between supply and demand requirements of healthcare is conditioned and satisfies the interests of the tender, core of which stands income of medical personnel. Low level of salaries, conjugated to poor mechanization, causes an exodus of medical staff, which has resulted in the departure from 2008 to date, of more than 20,000 physicians, given that Romania lacks more than 13,000 physicians in hospitals. “In France and Belgium, Romanian doctors are most numerous, after the French and Belgians. In recent years, the number of Romanian doctors in Germany has increased by 10 times. Two years ago I was talking to a health policy specialist from Germany who told me that Germany will need more doctors and counts that more doctors coming from Romania; and wondered what will remain to us. How much educating a doctor costs? In Moldova there have been studies and showed that 25,000 euros. Say to us is 30000. If we multiply this figure by the 20,000 doctors who left, reach 600 million.” (14). Meanwhile, in 2007-2013, Romania lost 150 million euros allocated from European funds for the construction of three regional hospitals (Cluj, Iasi and Craiova).

Based on these assumptions, we believe that the adaptation and use of organizational management techniques can help increase the efficiency and effectiveness of care. For medical professionals, as well as for managers at all levels of an organization, decision-making is the most important part of the business, “.. all other activities are carried out to ensure correct decisions or if the decision has already been adopted, to implement and monitor its effectiveness.” (\*\*\*) “Viața Medicală” no. 39, 2016)

The steps for adopting rational decisions in an organization are: identify the problem, defining the set of possible solutions, choosing the solution with the greatest potential for efficiency, implementation and evaluation of the results (\*\*\*) “Viața Medicală” no. 39, 2016). Medical structuring approach cases according to these steps are easy, there are remarkable similarities as principle, and provide a suitable framework for the use of management techniques in order to increase the success rate.

We propose to exemplify such an approach in the case of respiratory disorders during sleep, showing a growing incidence in adult male.

Respiratory disorders during sleep present various clinical forms and a laborious diagnostic and treatment algorithm, involving different medical specialties: pulmonology, otolaryngology, orthodontics, internal diseases, nutrition diseases, surgery, family medicine and so on.

Determinants of sleep apnea are anatomic changes of the pharynx and the nasal cavity:

- Atonia palate;
- Plunge palatine wave;
- Hypertrophic luetes;
- Hypertrophy of the tonsils;
- Hypertrophy of the tongue base;
- Hypertrophic adenoids;
- Nasal septum deviation (Aronsohn, R.S., Whitmore, H., Van Cauter, E., Tasali, E., 2010).

Strictly didactic, there are three forms of sleep apnea:

- Central;
- Obstructive;
- Mixed (Aronsohn, R.S., Whitmore, H., Van Cauter, E., Tasali, E., 2010).

Breathing, in central sleep apnea (breathing Cheyne-Stokes type), is interrupted due to respiratory effort. In obstructive sleep apnea, breathing is interrupted by the presence of anatomical changes that induce partial or total collapse of the pharynx and in the mixed sleep apnea, changes are both obstructive and functional. Obesity is the main risk factor in the obstructive sleep apnea. It was identified in 70% of patients with apnea (Bodea, D., 2011).

It seems to be a direct relationship between the severity of sleep apnea measured by apnea-hypopnea index and body mass index. The disease can occur at any age, but more commonly to people over 40 years, predominantly to males, with a ratio of 2/1. A risk two to four times more likely to develop sleep apnea occurs to patients with a family history, the genetic predisposition manifesting in the massive head and facial structure and in their predisposition to obesity (Bonnet, M.H., 1985).

Normally, the elderly present episodes of stopping breathing during sleep, leading to difficulty to diagnose sleep apnea, these producing not significant changes in arterial oxygen concentration (Bodea, D., 2011).

Among the etiopathogenic causes of central apnea, we highlight: inhibition of the respiratory center caused by brain disorders and injury of the solitary tract nucleus, post-encephalitic, bulbar polio, multiple sclerosis, irradiation, and so on, inhibiting the central efferent reflexes triggered the upper airways (Aronsohn, R.S., Whitmore, H., Van Cauter, E., Tasali, E., 2010).

## **Identifying the Problem - Diagnosis of Sleep Disorders**

From the point of view of organizational management, use of specific techniques of investigation in order to gather information that would lead to establishing the correct diagnosis should avoid focusing on effects to the detriment of cases, to clear both the risk perception of selective and that of diagnosis from the solutions at hand (\*\*\*) “Viața Medicală” no. 39, 2016).

This is done carefully, centering the history on determinant factors, on pulmonary pathology, neurology, cardiovascular, in association with clinical examination of the upper airways, but also on special para-clinic tests. The probability of a positive diagnosis of apnea can be determined through the use of Epworth sleep questionnaire which assesses the subjective degree of daytime sleepiness (Cornescu, V., Curteanu, D., Marinescu, P., Toma, S., 2003).

Patient’s medical history highlights disorders during sleep, the presence of snoring, the presence of daytime somnolence, living conditions. It has to be made a careful monitoring of body mass index and neck circumference, values to consider being the largest 41 cm for women and 43 cm for men. The most common symptom is drowsiness and it is initially shown in routine, but as the disease progresses, it becomes very harmful and it is involved in all activities of daily living (Cornescu, V., Curteanu, D., Marinescu, P., Toma, S., 2003).

Interrupting sleep occurs due to awakenings emerges as a consequence of hypoxia or sustained muscular effort, all these things being done by the patient unconsciously. These episodes of sleep fragmentation lead to brain fatigue accompanied by irritability, depressed mood, morning headaches, aggression, cognitive disorders.

Sleepiness of children is much less common. Symptoms can vary from a simple irritability, emotional unsteady, low frustration tolerance and even marked impulsivity to aggression, hyperactivity and memory disorders (Downey, R. 3rd, Perkin, R.M., MacQuarrie, J., 1993).

Although it can be particularly severe in certain situations, drowsiness resolves hits using positive pressure therapy (CPAP). Symptomatic picture also includes: sudden awakening from sleep with shortness of breath, dry mouth, feeling of fatigue, adapting difficulties and performing routine activities, attention deficit, low professional performance and decrease memory (Bodea, D., 2011).

In the case of a breathing disorder during sleep reported by the patient and supported by the practitioner, the family doctor, there must be a sleep monitoring confirmation through polygraph or polysleepgraphy (Hoffstein, V., 1996).

Polygraphia represents a continuous recording during the night of some parameters:

- Air flow;
- Snoring
- Chest-abdominal respiratory effort;
- Arterial oxygen saturation;
- Heart rate;
- Posture.

The investigation has a role in screening and in the decision to start therapy, as well as titration and therapeutic monitoring.

Diagnosis of sleep apnea is excluded if the oximetry values are within normal limits. The main method of diagnosis is polysleep-graphy. Parameters recorded with this device, in addition to the polygraph, are:

- Electroencephalogram;
- Electroeye exam;
- Mentonier muscle electromyogram shows the sleep architecture, sleep stages;
- Gambamuscle electromyography.

The polygraph is mounted in the evening, the patient sleeps with it at home and he/she returns it next day, while polysleep-graph is used in the laboratory where the nurse supervises recording parameters throughout the entire night followed by an interpretation of a physician (Hoffstein, V., 1996).

## **Defining the Set of Possible Solutions - According to Protocol Therapy**

The second step in the process of decision-making is to define the set of possible solutions. If creativity in organizational management is the defining characteristic of this phase, brainstorming is one of the methods commonly used (\*\*\*) “Viața Medicală” no. 39, 2016), medical case management is essential whether the solutions treatment in the therapeutic protocol default.

The treatment of sleep apnea is carried out in stages and it aims to provide regular breathing during sleep and getting a quality and undisturbed sleep by patency respiratory chain. Adopting a therapeutic conduct is made taking into consideration the severity of the affection, personal medical history and diagnosis with certainty the course of obstruction (Downey, R. 3rd, Perkin, R.M., MacQuarrie, J., 1993).

Therapeutic protocol involves:

- The change of lifestyle;
- Administration of continuous positive pressure oxygen;
- The surgical treatment.

Surgery is done in order to improve symptoms and to enable patients to abandon CPAP.

Surgical techniques most commonly used are:

- Solving the causes of nasal obstruction:
  - ✓ Septoplasty;
  - ✓ Reducing the volume of the lower nasal turbinates;
  - ✓ Polypectomy, and so on
- Permeation treatment and stiffening of the throat:
  - ✓ Pharyngoplasty;
  - ✓ Stiffening of wave palate;
  - ✓ Reducing the volume of tonsils;
  - ✓ Reducing the volume of lingual tonsil;
  - ✓ Adenoamigdalectomia;
- Reducing the volume of the base of the tongue;
- Craniofacial reconstruction;
- Advancement prosthesis of the jaw (Lugaresi, E., Mondini, S., Zucconi, M., Montagna, P., Cirignotta, F., 1983).

It is recommended to avoid excessive reduction palate wave to prevent food or liquids to reflate on the nose, with other complications. CPAP is indicated to be used in treatment of moderate and severe sleep apnea with a 100% proven for the duration of use (Lampert, H., 1994).

During this stage consideration should be given also to the environmental conditions, internal or external, that may cause conditions restricting the number of possible solutions - for example unavailability of equipment, limited financial resources or the existence of complications of general health of the patient.

## **Choosing the Solution with the Greatest Potential for Efficiency**

Once identified the various possible solutions according to the treatment protocol, a comparative assessment is needed to establish the regimen with the greatest efficiency. Optimal solution can often be a difficult process, especially when the problem identified is a significant degree of complexity and potential solutions found any risky high into effect.

Proper treatment for respiratory disorders during sleep is prescribed by a physician who recommends a device type, both by medical and technical criteria, but also because of the easiness of use and maintenance. Using CPAP generates a considerable decrease daytime sleepiness and other symptoms, with socio-professional reintegration of the patients (Downey, R. 3rd, Perkin, R.M., MacQuarrie, J., 1993). CPAP increases the quality of life indices and reduce the risk and the severity of the comorbidities associated with sleep disorders (Cornescu, V., Curteanu, D., Marinescu, P., Toma, S., 2003).

Some disadvantages occur: the device should be used daily, unlimited in time and because it is a respiratory prosthesis, it can give nasal lesions, allergies, which inevitably leads to a decrease in therapeutic compliance from the patient. Not to be neglected also the psychological aspects involved in wearing a CPAP device and also this can lead to anxiety or irritability (Lugaresi, E., Mondini, S., Zucconi, M., Montagna, P., Cirignotta, F., 1983).

At this stage, the development and analysis of SWOT matrix of the case could be a good starting point in setting priorities for action and to adopt the most appropriate decisions.

(Vasilescu, M., 2016) An example of such a matrix, generally performed at the level of respiratory disorders during sleep, is presented in the following table.

**Table 1.** Swot Matrix

<b>Strengths</b> <ul style="list-style-type: none"> <li>• The existing appropriate treatment methods</li> <li>• Introduction the somnology specialty in the university curricula as a measure of the importance of this disease</li> </ul>	<b>Weaknesses</b> <ul style="list-style-type: none"> <li>• Insufficient information among population</li> <li>• Uninvolvement of media</li> <li>• Inexistence of an integrated governmental programme</li> </ul>
<b>Opportunities</b> <ul style="list-style-type: none"> <li>• Multitude of medical specialties involved: pulmonology, otolaryngology, orthodontics, internal diseases, nutrition diseases, surgery, family medicine (thereby increasing the success rate of diagnosis and treatment)</li> </ul>	<b>Threats</b> <ul style="list-style-type: none"> <li>• High rate of this disease for adult male over 50 years old</li> <li>• Increased risk of cardiovascular disease</li> <li>• Sudden death</li> </ul>

Source: Author's adaptation from Popescu, C et. al, 2012.

Implementation of new treatments requires effort, very high expenses from staff training, continuing with technical and material and ending with acceptance by patients of the proposed changes.

Practice shows that these changes are not easy to achieve not just because of the lack of financial resources but also because of the duplication of the current proposed changes.

## Implementation and Evaluation of the Chosen Solution

From the time the regimen is set, theory and practice of management decision making recommends specific measures to ensure its effective implementation. The strategy that will determine the economic and financial performance is conditioned mainly by building an economic and financial mechanism based on co-management, recognizing and rewarding performance. The insistence for co-management German--core model is based, in addition to performance-law, that is a solution for the simultaneous and efficient three problems:" First, the problem for income and wealth sharing, secondly, the issue of power sharing economic and, thirdly, the issue of so-called social costs." (Lampert, H., 1994). In it, the central place must be given to the partnership that has "both a vertical dimension, which lies in the relationship between employees and management, and a horizontal dimension, which is both in the relationship between individuals and between divisions work. It's about people working together to achieve common goals. The partnership has both psychological components, and economic - for example, employee confidence in their important contribution to the success of the organization and that this contribution will financial gain." (Sirota, D., Mischkind, L.A., 2010).

Besides setting and planning so clear actions to be undertaken by each of the parties (doctors, patient, patient's family) and their respective responsibilities, effective communication is an important success factor.

Communication and monitoring of progress may also contribute to the identification of appearance / the possibility of manifestation of complications that can sometimes have serious complications presented below.

Sleep apnea increases the risk of cardio-vascular disease and in the case of co-morbidities such as heart failure, heart rhythm disorders, angina pectoris, severe pulmonary condition, consequences can be the most severe. The likelihood of developing coronary heart disease is two times higher to patients with sleep disorders, which can be explained by activation of the

sympathetic nervous system by increasing pro-coagulant activity and by the presence of frequent desaturation. In the case of a hypertension patient, sleep apnea is an independent risk factor, being due to treatment-resistant hypertension (Lampert, H., 1994).

Patients with sleep apnea have a higher frequency of significant bradycardia and arrhythmias. Among these, we remind: the sinoatrial block, sinus pauses, atrioventricular block of high-grade, all being correlate with the frequency of apnea episodes/ hypopnea and with the number and severity of desaturations during the night. Studies have shown that the most effective treatment in such situations is CPAP ventilation which it improves these risks (Patil, S.P., Schneider, H., Schwartz, A.R., Smith, P.L., 2007).

Sudden death is the major risk of these diseases. Patients who have more than 20 apnea episodes per hour have a much higher increased mortality compared with peers, but without a sleep apnea. Also, patients with sleep apnea have an increased frequency of road accidents due to alterations in alertness and simultaneously due to excessive sleepiness which can conduct to even falling asleep at the wheel (Lugaresi, E., Mondini, S., Zucconi, M., Montagna, P., Cirignotta, F., 1983).

Regarding lifestyle, recommendation is for overweight patients to lose weight and to maintain a high position in bed during sleep. Other recommendations that can supplement therapeutic treatment are: avoiding alcohol, tobacco, coffee during the evening and sedatives. Once established the correct diagnosis and achieve the objective evaluation of the treatment possibilities, patients may benefit from a multimodal treatment. Although there are various therapeutic options, the result is sometimes unsatisfactory because of the comorbidities of the patient and due to non-compliance of the established therapy (Popescu, C., Albu, M., Oțelea, M., 2012).

Periodic assessment of progress made in implementing the chosen solution is also an important step in organizational management, a step that is often overlooked. From a medical standpoint, those steps could confirm the correctness of the solution adopted and its establishment as a breakdown of the treatment protocol for the given context (learning from experience) or, if it does not reach the expected results could lead times the resumption of the identification stage, or to adopt other of the possible solutions identified.

The healthcare field is constantly under pressure of conventional medicine and alternative medicine, which can positively influence health if there is correct information for patients. In this context, a major role can play the patient organizations that must inform their members about the dangers they face when opting for replace therapy with conventional treatment proven performance with unconventional medicine.

Improving performance implies many forces, among which is imperative to reactivate family spirit: "family is a primary goal in life (and the only existential achievement) for many Romanians. Therefore, the family spirit covers all needs and feelings associated with the pursuit of this fundamental purpose. Self-sacrifice is expressed by placing family first, before the person ... family is very often perceived as a given thing that you need to look after and you cannot interfere with its structure. "One can choose his friends, but never his family." (19). In this context, it is not coincidentally that the daily encounter of the specialist (of the one applying the treatment for a certain period) with each patient's family takes place at noon, after the visit, completes programme for the day.

In fact, human history demonstrates organic connection between scientific theory and reality unmediated. "that is why we should not be surprised and the textbook and original works authors should not be convicted if, after developing a theory sufficiently consistent, they do not describe facts empty that they have discovered or that they wish to convey to the reader, but they dress in the terminology of this or these theories. This process is blurring the distinction between actual observations and theories that arose from them." (Vasilescu, M., 2016)

## References

1. \*\*\* "Viața Medicală" no. 39, September 23 2016.
2. Aronsohn, R.S., Whitmore, H., Van Cauter, E. and Tasali, E. (2010). Impact of untreated obstructive sleep apnea on glucose control in type 2 diabetes. *Am J Respir Crit Care Med*.
3. Bodea, D. (2011). *România, un viitor previzibil*, Result Publishing House, Bucharest, p.58.
4. Bonnet, M.H., 1985. Effect of sleep disruption on sleep, performance, and mood. *Sleep*.
5. Cornescu, V., Curteanu, D., Marinescu, P. and Toma, S. (2003). *Management de la teorie la practică*. Bucharest University Publishing House.
6. Downey, R. 3rd, Perkin, R.M., MacQuarrie, J. (1993). Upper airway resistance syndrome: sick, symptomatic but underrecognized. *Sleep*.
7. Hoffstein, V. (1996). Snoring. *Chest*. Jan. 109(1): 201-22.
8. Lampert, H. (1994). *Ordinea economică și socială în RFG*, A.I. Cuza Publishing House, Iași, p. 49.
9. Lugaresi, E., Mondini, S., Zucconi, M., Montagna, P. and Cirignotta, F. (1983). Staging of heavy snorers' disease. A proposal. *Bull Eur Physiopathol Respir*.
10. Patil, S.P., Schneider, H., Schwartz, A.R. and Smith, P.L. (2007). Adult obstructive sleep apnea: pathophysiology and diagnosis. *Chest*.
11. Popescu, C., Albu, M., Oțelea, M. (2012). *Metode, tehnici și instrumente aplicate în management*, Petroleum-Gas University of Ploiesti Publishing House, pp.46-83.
12. Schrodinger, E. (1980). *Ce este viața? Aspectul fizic al celulei vii*, Political Publishing House, Bucharest, p. 200.
13. Sirota, D. and Mischkind, L.A. (2010). *Motivarea angajaților*, All Publishing House, Bucharest, p.270.
14. Zlatian, R. (2011). *Strategii: Analiza SWOT*. Aius
15. Vasilescu, M. (2016). Magia se întâmplă între medic și pacient, *Dilema Veche*, Year XIII, no. 652 / August 18-24th 2016.