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Opinión

Reasons and approaches to under-diagnosed obstructive sleep apnea in the adult population of Panama

(Razones y abordajes relacionados con el sub-diagnóstico de apnea obstructiva del sueño en la población adulta de Panamá)

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Abstract

Obstructive sleep apnea is intimately related to chronic conditions that have significant burden for patients and healthcare systems. It has negative implications for cardiovascular, metabolic and neuro-psychiatric systems. It is underdiagnosed worldwide; definitive diagnosis, as well as treatment for moderate to severe forms of the disease, are considerably expensive. There is scarce evidence of the burden the condition represents for Panama and other American countries. Sedentary lifestyle, obesity and obstructive sleep apnea are expected to increase in prevalence, making it of the utmost importance to address its underdiagnosis and to establish healthcare networks that can efficiently deal with it. The application of affordable strategies, such as questionnaires and simple biometrics, could help in efficient resource allocation to develop public health networks that would eventually be capable of accurately estimating disease burden, and to offer adequate therapeutic options. Panama has a complex health system that shares similarities with other American countries; developing a sleep apnea program in this public health system requires wise scientific driven resource allocation that minimizes underserved areas and maximizes efficiency.

Keywords: Sleep apnea syndromes, prevalence, healthcare disparities, resource allocation, Panama.

Resumen

La apnea obstructiva del sueño está intimamente relacionada a condiciones crónicas y es una carga significativa para pacientes y sistemas de salud. Tiene implicacions negativas para los sistemas cardiovascular, metabólico y neuro-psiquiátricos. Está subdiagnosticada globalmente, el diagnóstico definitivo y el tratamiento para las formas moderadas y severas de la enfermedad son considerablemente costosos. Hay escasa evidencia de la carga que esta condición representa en Panamá, así como en otros países de América. Se espera que el estilo de vida sedentario, la obesidad y la apnea obstructiva del sueño aumenten en prevalencia, haciendo de suma importancia abordar el sub-diagnóstico y establecer redes de atención en salud que puedan lidiar con esto eficientemente. La aplicación de estrategias como cuestionarios y biometría simple, son métodos que pueden ayudar a una eficiente asignación de recursos, con el fin de desarrollar una red de salud que pueda eventualmente tener la capacidad de estimar con exactitud la carga de

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OSA; Obstructive Sleep Apnea.

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la enfermedad, y ofrecer opciones apropiadas de tratamiento. Panamá tiene un sistema de salud complejo que comparte características con otros países de América, desarrollar una red de salud para apnea del sueño en el sistema público de salud requiere una sabia asignación de recursos, que siga la evidencia científica, minimice la áreas pobremente servidas y maximice la eficiencia.

Palabra clave: síndromes de la apnea del sueño, prevalencia, disparidades en atención en salud, asignación de recursos.

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Obstructive Sleep Apnea (OSA) is intimately related to chronic conditions that create a significant burden on patients and healthcare systems. It is defined by episodes of blockage of the upper airway with disruption of the sleep cycle/architecture, abnormal levels of oxygen and CO_2 in blood, having major implications for several chronic disorders. Even though the diagnosis can be suspected with history and physical exam, expensive confirmatory testing is necessary.[1] There are major implications for low-income and middle-income countries in America, given the significant burden of associated conditions of OSA itself and the expensive diagnostic and treatment options currently available.

OSA prevalence in the Americas is difficult to estimate due to lack of epidemiologic data; even in high-resource countries, OSA is still underdiagnosed.[2] A literature-based analysis performed by Benjafield *et al*. in 2019 estimated OSA to be present in 936 million people worldwide.[3] Lifestyle is becoming more sedentary in low- and middle-income countries (LIC and MIC), risk factors for chronic diseases, obesity included, are now extremely frequent among adolescents and children, which will likely have an impact on the prevalence of OSA.[4]

OSA is associated to multiple chronic conditions that represent a burden in themselves to healthcare systems, including hypertension, atrial fibrillation, diabetes mellitus, obesity, hyperlipidemia, GERD (Gastroesophageal Reflux Disease), asthma; and psychiatric disorders including depression and anxiety.[5,6]

Currently, OSA diagnosis requires overnight polysomnography as the gold-standard. Treatment varies depending on specific pathophysiologic mechanisms on a case-by-case basis, the severity of the condition and the possibility of adherence to therapy. Treatment could involve relatively inexpensive non-invasive measures, from lifestyle changes and traditional methods of weight loss all the way to costly invasive and non-invasive devices.

Not addressing conditions like OSA can create a serious impact on the quality of life and the economy of the American continent. Exploring options for addressing the under-diagnosis of OSA in the Americas can first be achieved by implementing low-cost strategies in specific countries that would later on help to develop similar improved interventions in others.

OSA problem in Panama:

To our knowledge, there is scarce data on prevalence and impact of OSA in Panama and the rest of the American continent. In Panama, research suggests that more than one quarter of the population has obesity (Body Mass Index ³ 30 kg/m² prevalence of 27.1%), at least in two of the most populated regions of the country, addressing underdiagnosis is of utmost importance.[7] It is not possible to develop interventions to tackle management implied by OSA and its related comorbid conditions unless an estimate of the prevalence and current reasons for under-diagnosis are addressed. In a resource-limited setting, it is important to approach the situation wisely and develop a plan that would be feasible and sustainable for the system.

Implications for the health system:

Panama is a country with a complex health system; the State has the constitutional duty to provide health-care to the population, (Ministerio Público. Constitución Política de la República de Panamá. Procuraduría General de la Nación; 2016 [cited 2022 December 8]. Available from: https://ministeriopublico.gob.pa/wp-content/uploads/2016/09/constitucion-politica-con-indice-analitico.pdf) but allows existence of private insurance and private health-care. The public health system is divided in two branches; a majority of the population has public insurance paid through the worker's salary, which is managed by the government, providing direct care to the governmental insured population. In certain circumstances, third parties are used to provide certain services; the second majority of the population receives

care through a public care system financed through the budget of the Ministry of Health; the remaining minority of the population is the one with the economic means or employer benefits to pay for private medical care (Pan American Health Organization. Health Systems Profile Panama. PAHO; 2007 [cited 2022 December 8]. Available from: https://www3.paho.org/hq/dmdocuments/2010/Health_System_Profile-Panama_2008.pdf), (Pan American Health Organization. Country Profile Panama. PAHO; 2021 [cited 2023 September 15]. Available from: https://hia.paho.org/en/countries-22/panama-country-profile#situation). Private medical care can be obtained either through private health insurance or out of pocket without mediation of health insurance. The vast majority of the population relies on the public sector for their care. Establishing a public health network for the management of OSA would need to carefully address these divisions in order to allocate resources wisely in areas where they will be better used.

Feasible approaches

Underdiagnosis of OSA in this setting can be initially approached by implementation of tools that would not represent a significant increase in cost. Application of screening tools during office visits can increase the required time per patient; in a limited-resource setting, with under-staffed units and decreased physician/population ratio, the time dedicated to every office visit is significantly important. However, the use of screening tools is of no real value if there is no established sleep medicine network to act on detected cases, and given the significant cost that definitive diagnosis and treatment entails, resources should be allocated cautiously (figure 1).

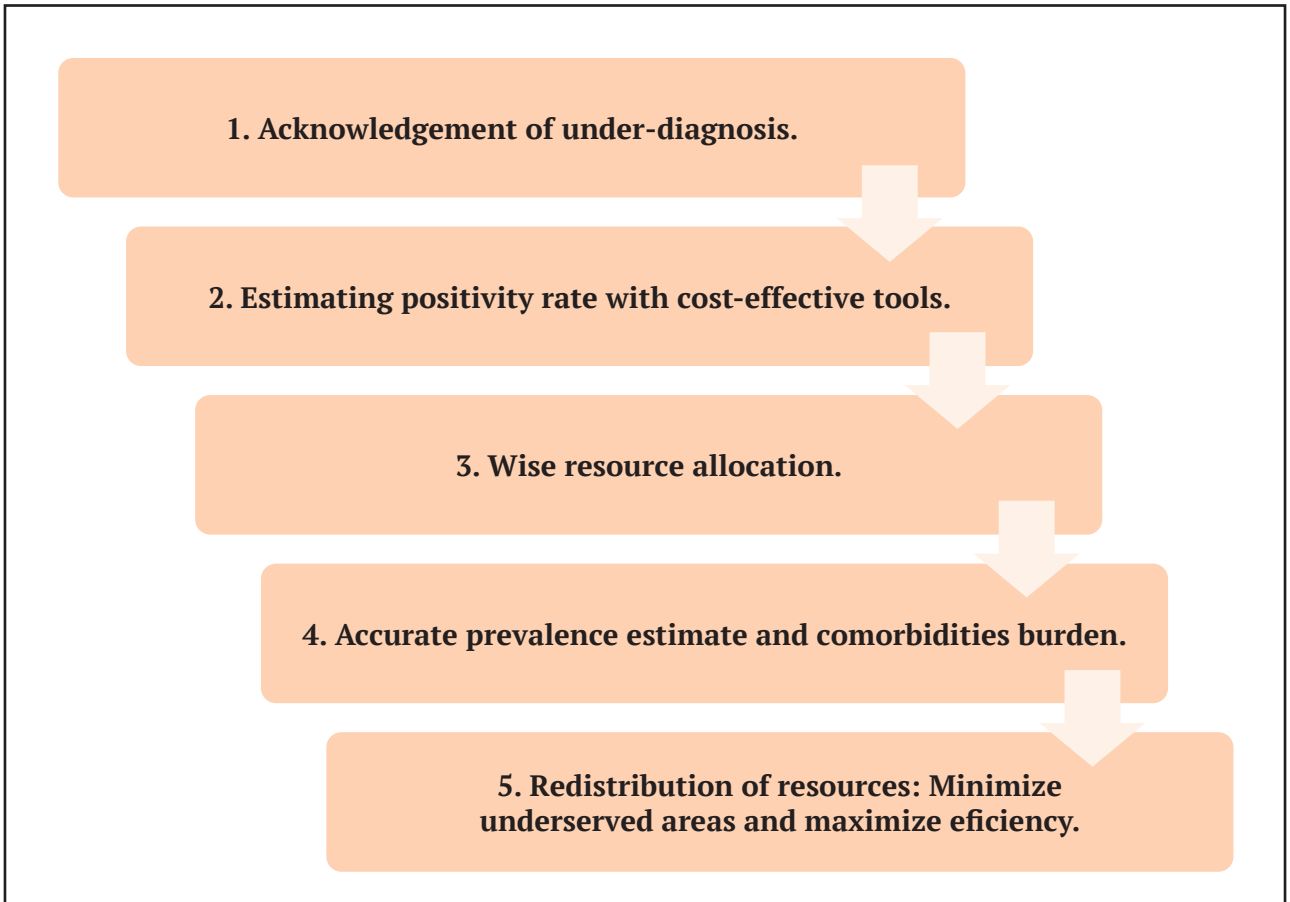

Figure 1. Steps in establishing a public healthcare network for obstructive sleep apnea: A stepwise approach to understand the burden of the condition is required to efficiently allocate resources and avoid excessive cost in a condition that is already significantly expensive for diagnosis and treatment.

Several questionnaire tools have been developed to assess for OSA; one that is quick, efficient, and without technical difficulty in its implementation would be ideal. Perhaps due to its practical approach, the most popular tool appears to be the Stop/Stop-Bang questionnaire, which has been useful for screening among

office patients and in classification of disease severity,[8,9] even though other options could also be considered. The single STOP-Bang version has a sensitivity of 93%, but a specificity of only 43%, making its alternate scoring system more useful.[9,10] The alternative scoring systems of the tool has been proven to improve the specificity of it to acceptable levels. Chung et al studied and published a two [2] step application of the STOP-Bang questionnaire to maximize its usefulness as screening tool.[11] According to Chung et al results, probability of moderate to severe OSA in pre-surgical patients using a STOP-Bang score of ⩾ 5 was 51.5%, and for those who were initially classified as intermediate risk for OSA and underwent step 2 with a positive result, the risk was 42.0%.[10,11]

Evidently, the so far unknown disease prevalence can affect positive predictive value (PPV) of the STOP-Bang questionnaire and of any other questionnaire used for sleep apnea, not to mention that they are designed as screening tests and not as gold standard diagnostic tools; yet in OSA's scenario in Panama (similar situation to other countries in America), it is reasonable to use initial low-cost tools to help guide resource allocation.

A Spanish version of the STOP-Bang questionnaire has already been validated and compared to home respiratory polysomnography with adequate results.[12,13] Despite the literature showing the usefulness of the Spanish version of the tool, it will also be necessary to validate versions for indigenous communities in areas where Spanish is not the main language.

Would this tool, or any other affordable screening tool, give an accurate estimate of the prevalence of the condition? The answer is no; as a screening test with high sensitivity and not great specificity, it will overestimate the prevalence, but its positivity rate can help in guiding initial decision making. In the mental health field, screening tests are many times used for approximation of prevalence in certain conditions, but they are known to overestimate prevalence and do not distinguish between high or low risk populations.[14] Several authors have described the use of Bayesian methods to estimate disease prevalence without using gold standard tests, requiring the use of two tests for adequate estimates.[15] In the situation that we face, it could be an option to lean towards a second complementary test to estimate prevalence of OSA, but this might significantly increase the cost of the intervention given the complexity of these diagnostic tests.

The two steps method for the STOP-Bang questionnaire could be used to identify high risk patients for moderate to severe OSA in the country. It can be easily used and integrated to the office visit of primary care physicians or general practitioners and does not require the presence of experienced clinicians; it could be applied by mid-level providers such as first and second year intern physicians or by nursing staff and is cheaper than high tech methods used to get a definitive diagnosis.

A cross-sectional study using a representative sample of the population can be used to apply the STOP-Bang questionnaire two steps approach. This can guide in the allocation of resources to eventually establish a public network for accurate prevalence estimation, referral to sleep medicine specialists, definitive diagnosis and treatment options. Without it, resources and planning would be done blindly and inefficiently. This approach will require involvement of the two administrative bodies of the different branches of the public health system: The Social Security Fund (*Caja de Seguro Social*) and the Ministry of Health.

Particular circumstances:

Panama has different local primary, secondary, tertiary and specialized care centers under the two administrative branches, receiving different names depending on the level of complexity of care offered, and on the administrative branch that operates the facility. (Pan American Health Organization. Health Systems Profile Panama. PAHO; 2007 [cited 2022 December 8]. Available from: https://www3.paho.org/hq/dmdocuments/2010/Health_System_Profile-Panama_2008.pdf) Characteristics such as socioeconomic status (formal salary vs informal salary), social benefits, and urban, sub-urban and rural living vary significantly between the populations under the care of one of the two branches, making it necessary for both administrative bodies and all health regions to be equally included in the assessment. Coordination with all these levels of care in different administrative bodies will be complex and will require significant effort.

Self-answering questionnaires or measurements would not be feasible, given the disproportionate level of disparity in education level and literacy between different geographic regions and ethnic groups in the country and the additional differences in spoken languages of members of indigenous communities that do not speak the Spanish language in which the vast majority of the documentation of the administrative bodies is written (figure 2). (Pan American Health Organization. Health Systems Profile Panama. PAHO; 2007 [cited 2022 December 8]. Available from: https://www3.paho.org/hq/dmdocuments/2010/Health_System_Profile-Panama_2008.pdf)

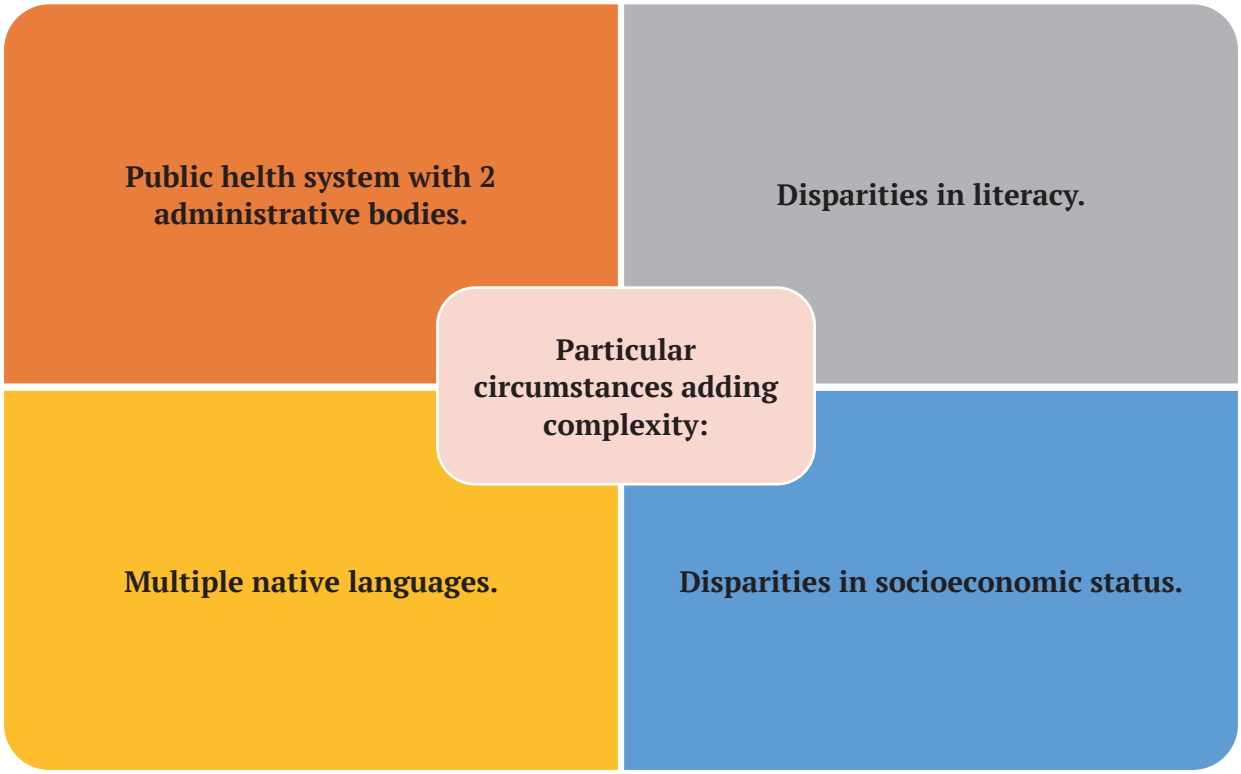

Figure 2. Particular circumstances: These characteristics add complexity to any intervention and need to be considered when designing strategies to understand the under-diagnosis and burden of the condition. Without it, biased assessment will increase gaps in care.

The results obtained should ultimately be integrated into the databases of each administrative body and assist with the eventual development of a sleep medicine public health network according to the policies of each entity, or a single sleep medicine public network if eventual integration of both systems happens.

Establishing definitive diagnosis and treatment:

Once realistic available resources are compared to the positivity rate per geographic region, an inter-institutional panel can decide where resources could be allocated to better serve communities, provide formal training to physicians and ancillary staff to run diagnostic and therapeutic centers/network for OSA, and make diagnostic and therapeutic devices available.

Because of the dual public health network that exists in Panama, it is possible that duplicated resources might be present in certain geographic regions, leaving other areas underserved. Permanent coordination between the two branches administering the public system can avoid duality, allowing for the population of one system to receive care in the other one in specific regions where only one of the public branches offers this service.

Due to the complex nature of OSA and the costly definitive diagnosis and treatment, it is reasonable to use the estimated positivity rate of simple tools to help on the design of a public health network that can address the condition and guide in resource allocation. Obtaining the resources to establish a functional, well-coordinated public network for diagnosis and treatment for OSA and sleep disorders could take several years. In the meanwhile, high risk patients could benefit from targeted non-invasive affordable treatment options such as diet, exercise, weight loss, postural changes and sleep hygiene. This approach could be considered in other American countries with similar health systems.

Final comments

The lifestyle transition observed worldwide will certainly increase the prevalence of OSA. Panama and other American countries have yet to develop efficient public health networks to approach it. The application of low-cost diagnostic and screening tools can help in

the allocation of resources that would eventually allow for future adequate disease prevalence estimation and establishment of an efficient public health network to address the condition, without perpetuating social disparities that currently impact several vulnerable members of the society. Parallel interventions can be considered in countries of the region that share social and health systems characteristics.

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