

## The Assessment of Sleep Quality among Anesthesia Nurses in the Central Surgical Installation Room at Banyumas Region Hospital

Panji wicaksono aji<sup>1</sup>, Dwi Novitasari<sup>1</sup>, Roro Lintang Suryani<sup>1</sup>

<sup>1</sup>Faculty of Health, Universitas Harapan Bangsa, Purwokerto, Central Java, Indonesia.

Correspondence author: Dwi Novitasari

Email: [dwinovitasari@uhb.ac.id](mailto:dwinovitasari@uhb.ac.id)

Address : Raden Patah St, No.100, Kedunglongsir, Banyumas, 53182, Central Java, Indonesia, (081901415177)

DOI: <https://doi.org/10.56359/gj.v4i2.285>



This work is licensed under a [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/).

### ABSTRACT

**Introduction:** Invertebrate creatures and humans still conserved sleep. Sleep time in humans becomes shorter, faster, and the quality decreases with age. Good quality sleep can improve mental health. Fatigue can result in poor sleep quality of nurse anesthiologist which can certainly endanger the patient and nurse anesthiologist himself.

**Objective:** This study aims to identify the description of sleep quality based on gender, age, and period of work in the Central Surgical Installation Room at Banyumas Regional Hospital.

**Method:** This research method is descriptive quantitative, data was collected online using googleform giving questionnaires with a cross sectional approach design.

**Result:** The results showed that the sleep quality of nurse anesthiologists based on sex was most in the male sex as many as 16 (41%) results were poor. The highest age category was in late adulthood as many as 11 (28%) respondents with poor sleep quality. The category of working time is the most in 5 years of work as many as 16 (41%) respondents with poor sleep quality. As a result of the sleep disorders component, anesthiologists experienced many bad sleep disorders as many as 30 (76.9%) respondents.

**Conclusion:** The quality of sleep in the anesthiologist of the Central Surgical Installation Room at Banyumas Regional Hospital was classified as poor sleep quality.

**Keywords:** anesthetist, nurse, sleep quality, surgery

## Introduction

Providing anesthesia services is a medical process that requires the involvement of a specialist anesthesiologist, as mandated in the 2020 Decree of the Minister of Health of the Republic of Indonesia. Anesthesia services are provided in accordance with established service standards due to the risks associated with this special health service in the hospital environment (Kirlan & Sanjoyo, 2022). Hospital anesthesia services cover a wide range of medical interventions, both inside and outside the operating room. Services include the administration of anesthesia, the provision of perioperative medical care, the management of acute and chronic pain, cardiopulmonary and cerebrovascular system resuscitation procedures, emergency medical care, and critical care interventions (Peraturan Menteri Kesehatan Republik Indonesia, 2011).

Health workers who prioritize providing services to patients in health facilities are those who have a strong sense of compassion and empathy. Caring refers to health professionals' sincere and attentive actions towards patients, which include qualities such as empathy, compassionate communication, and nurturing (Faridasari et al., 2021). The demands placed on anesthesiologists in the healthcare system contribute to significant burnout among CRNAs. This phenomenon was seen in a group of 29 CRNAs with an average age of 44 years, consisting of 15 men and 14 women (Boyd, 2019). Anesthesiologists are susceptible to work fatigue and circadian rhythm disturbances, such as circadian phase shift and nocturnal melatonin suppression. The above-mentioned phenomena undoubtedly have a negative influence on the physical well-being and professional progress of anesthesiologists. However, the most significant consequence is endangering the safety of the patients they care for (Lee et al., 2013).

Sleep is a universally observed behavioral phenomenon that occurs in animals, some invertebrates, and humans. According to Bah et al., (2019) sleep duration in humans tends to decrease, become more fragmented, and decrease in quality as individuals age. Sleep is a complex phenomenon characterized by a series of physiological processes that are regulated by neurobiological mechanisms and exert a significant influence on several physiological systems (Lee-Chiong & Krieger, 2022). According to the Ministry of Health of the Republic of Indonesia, individuals aged 18 to 40 years are recommended to sleep around 7-8 hours every day to achieve optimal sleep quality (UPK KEMENKES RI, 2021).

The quality and amount of sleep have the potential to affect a person's overall health and quality of life. Insufficient sleep duration has been linked to the development of several medical and mental illnesses, as well as daytime fatigue and lethargy (Huda, 2020). The benefits of adequate and quality sleep have the potential to improve a person's mental well-being (Scott et al., 2021). Anesthesiologists who experience poor sleep quality tend to experience decreased focus, potentially posing a risk to patient safety (Valente et al., 2019). Additionally, the adverse impacts of inadequate sleep quality on anesthesiologists include increased irritation, reduced alertness, and potential disruption to interpersonal relationships (Robin et al., 2020).

A survey was distributed to a sample of 979 anesthesiologists using an internet platform to ensure the anonymity of respondents. The response rate observed in this study was 38.0%. The majority of participants demonstrated consistent engagement in work exceeding 40 hours per week. Specifically, male participants reported spending five additional hours working each week compared to female participants. Fatigue is influenced by several factors, including the

length of work, psychological pressure at work, and personal and family obligations. According to Stuetzle et al., (2018), there is a higher prevalence of fatigue-related behaviors among men.

A study conducted in Italy revealed statistically significant variations in sleep quality in the average age group of 32.27  $\pm$  6.2 years, especially in the field of anesthesiology (Costa et al., 2021). According to research conducted in Portugal, involving senior anesthesiologists and residents, the average sleep duration was approximately 6.37  $\pm$  0.80 hours. Of the total sample size of 118 participants, 46.1% demonstrated a PSQI index score exceeding 5. In this particular group, the majority of individuals, specifically 77.1%, reported a habitual sleep duration of less than 7 hours. per night throughout the previous month. Most of the entire sample, namely 41.0%, reported experiencing excessive sleepiness during the day. In addition, 23.0% of participants indicated daily sleepiness (Valente et al., 2019).

## **Objective**

The general purpose of this research is to determine the quality of sleep for the anesthetists in the Central Surgical Installation Room at the Banyumas Regional Hospital. Specifically, Identifying descriptions of sleep quality based on gender, age, and length of work in the Central Surgical Installation Room at Banyumas Regional Hospital.

## **Method**

### ***Study Design and Setting***

Research design is the part that describes the framework for solving the problem to be investigated (Jayanti, 2021). To overcome this problem, the author applies quantitative descriptive methods. The quantitative method is a research method based on the philosophy of positivism that is used to study a certain population or sample, collect data using research instruments, and perform statistical data analysis (Sugiyono, 2019). Sampling was carried out for 3 days in July 2023.

### ***Measurements and Statistical Analyses***

Data was collected online using a Google form with a cross-sectional approach designed to determine the quality of sleep in anesthetists in the Central Surgical Installation Room at the Banyumas Regional Hospital. The sampling technique in this research was carried out using the total sampling method. The total sampling technique is a method of taking samples or samples for research that are the same number as the population (Syahza, 2021). The reason for using total sampling is because the population in the study is less than 100 people (Sugiyono, 2019). The sample in this study was the anesthetists in the Central Surgical Installation Room at the Banyumas Regional Hospital who met the criteria for 39 anesthetists. The measuring tool in this study was a questionnaire from the Pittsburgh Sleep Quality Index (PSQI).

## **Result**

Data obtained from observations were analyzed by categorizing the characteristics of respondents according to gender, age, and length of service. These attributes are not used for direct analysis but rather serve as additional data.

## Sociodemographic of Respondent – Univariate Analyses

Table 1. Sociodemographic of Respondent – Univariate Analyses

Variables	N	%
<b>Gender</b>		
Man	29	74,4
Woman	10	25,6
<b>Age</b>		
20-35 (Early adulthood)	10	25,6
36-45 (Late adulthood)	21	53,8
46-55 (Early seniors)	7	17,9
56-65 (Late seniors)	1	2,6
<b>Length of working</b>		
≤ 5 years	9	23,1
> 5 years	30	76,9
<b>Sleep Quality</b>		
Good	18	46,2
Poor	21	53,8

Table 1 presents the distribution of respondents in the study, totaling 39 participants. The majority of respondents, namely 29 people, were male (74.4%) of the total sample. The age group most frequently sampled was late adulthood, totaling 21 respondents, namely (53.8%) of the total respondents. The dominant categorization of employment duration was more than 5 years, with 30 respondents, covering (76.9%) of the total. The majority of anesthetists in the Banyumas area reported experiencing suboptimal sleep quality. Specifically, 21 respondents, accounting for 53.8% of the sample, demonstrated this result.

## Cross Tabulation – Bivariate Analyses

Table 2. Cross Tabulation – Bivariate Analyses

The cross-distribution of respondent characteristics	Sleep Quality	
	Good F (%)	Poor F (%)
<b>Gender</b>		
Man	13 (44.8%)	16 (55.2%)
Woman	5 (50.0%)	5 (50.0%)
<b>Age</b>		
Early adulthood (26-35 years)	4 (40.0%)	6 (60.0%)
Late adulthood (36-45 years)	10 (47.6%)	11 (52.4%)
Early seniors (46-55 years)	3 (42.8%)	4 (57.2%)
Late seniors (56-65 years)	1 (100.0%)	0 (0.0%)
<b>Years of service</b>		
≤5 years	3 (33.3%)	6 (66.7%)
>5 years	14 (46.7%)	16 (53.3%)

Crosstabulation shows that male respondents are the majority, 16 men have poor sleep quality (55.1%). Respondents in the majority age group in late adulthood with poor sleep quality were 11 (52.3%) respondents. Most of respondents classified by length of work had worked for more than 5 years, totaling 16 (53.3%) respondents with poor sleep quality.

### ***Frequency Distribution based on Questionnaire***

Table 3. Frequency Distribution based on Questionnaire

<b>Questionnaire Components</b>		<b>N</b>	<b>(%)</b>
<b>Subjective sleep quality</b>	Very good	4	10.3
	Good enough	28	71.8
	Bad enough	5	12.8
	Very bad	2	5.1
<b>Sleep latency</b>	0 (very good)	15	38.5
	1-2 (good enough)	18	46.2
	3-4 (bad enough)	5	12.8
	5-6 (very bad)	1	2.6
<b>Sleep duration</b>	> 7 hours	9	23.1
	6-7 hours	13	33.3
	5-6 hours	11	28.2
	< 5 hours	6	15.4
<b>Sleep efficiency</b>	Very good (> 85 %)	30	76.9
	good enough (75-84 %)	5	12.8
	bad enough (65-74 %)	3	7.7
	very bad (<65%)	1	2.6
<b>Sleep Disorders</b>	Very good	4	10.3
	Good enough	0	0.0
	Bad enough	30	76.9
	Very bad	5	12.8
<b>Drug use</b>	Never	38	97.4
	1x a week	1	2.6
	2x a week	0	0.0
	>3x a week	0	0.0
<b>Daytime dysfunction</b>	0 (very good)	3	7.7
	1-2 (good enough)	27	69.2
	3-4 (bad enough)	6	15.4
	5-6 (very bad)	3	7.7

Most of anesthesiologists in the Banyumas area reported a subjective sleep quality score of 28, with 71.8% of respondents falling into this category. Most of respondents, including 46.2% (n=38), achieved a score of 1 (indicating a fairly good sleep latency component) in the assessment. Sleep duration: Most anesthesiologists, namely 13 respondents (33.3%), reported

a sleep duration of 6-7 hours. Sleep efficiency findings for anesthesiologists were favorable, with most of respondents (76.9%), (n=30) reporting positive results. Findings related to sleep disturbance components showed that most of hairdressers, namely 30 people (76.9% of total respondents), reported experiencing detrimental sleep disturbances. The use of sleeping pills was mostly found to be low, with 38 of 39 respondents (97.4%) reporting not taking sleeping pills. Anesthesiologists in Banyumas demonstrated the highest prevalence of daytime dysfunction components, with a score of 2 on the scale indicating a somewhat poor level of functioning. This finding was seen in 27 respondents, which covered 69.2% of the total sample.

## **Discussion**

### ***Description of the sleep quality of anesthetist nurses***

The findings of this study indicate that the majority of anesthesiologists in Banyumas have suboptimal sleep quality, with 22 people (56.4% of the sample) reporting this experience. This research is in line with previous research conducted on anesthesiologists in Turkey, where it was found that the anesthesiologists included in this study generally reported less than optimal sleep quality. Specifically, the average Pittsburgh Sleep Quality Index (PSQI) score among participants was 75.2%, with 75.2% of respondents scoring above the threshold of 5 on the PSQI (Cebeci et al., 2023). Likewise, research conducted in Portugal revealed that 53% of anesthesiologists reported experiencing suboptimal sleep quality (Valente et al., 2019).

The negative impacts of inadequate sleep quality include various medical illnesses and mental problems, as well as daytime symptoms such as drowsiness and dizziness (Huda, 2020). Apart from that, anesthesiologists also experience stress, which has the potential to endanger patient safety (Valente et al., 2019).

### ***Description of the sleep quality of anesthetist nurses on gender***

The findings of this study indicate that the sample size consisted of 39 participants, categorized according to gender, age, and years of service. The study found that the majority of participants were male, with 29 people representing 74.4% of the total replies. Researchers generally believe that male respondents have greater dexterity and strength than female respondents.

This observation is in line with existing data indicating that men tend to occupy a larger proportion of the population due to their greater involvement and dominance in productive endeavors. The dominance shown by males can be attributed to their high levels of responsiveness and dexterity. Likewise, with human resources, there is greater male dominance, so obtaining resources is relatively easier because their level of knowledge is higher than that of women (Nilamcahya, 2017).

A survey was distributed to a sample of 979 anesthesiologists using an internet platform to ensure respondent anonymity. The percentage of respondents who took part in the research was 38.0%. The majority of participants demonstrated consistent engagement in work exceeding 40 hours per week. It can be seen that men report an average of five additional hours of work per week compared to women. Burnout is influenced by the length of work, psychological pressure at work, and the expectations placed on individuals due to personal and family responsibilities. There is a higher prevalence of fatigue-related behaviors among men (Stuetzle et al., 2018). The above-mentioned phenomena undoubtedly have a negative influence on the physical well-being and professional progress of anesthesiologists. However,

the most significant consequence is endangering the safety of the patients they care for (Lee et al., 2013).

#### ***Description of the sleep quality of anesthetist nurses based on age***

The age group with the largest number of respondents in this study was the late adult group, totaling 21 respondents, namely 53.8% of the sample. The researchers postulated that most anesthesiologists in the Banyumas region were actively practicing their profession during periods of high productivity due to their deep expertise and superior cognitive abilities.

Based on empirical evidence showing a significant correlation between age and productivity, it is known that individuals reach their peak productivity at around 30 years of age. At this stage, the labor force exhibits higher levels of production due to factors such as accumulated work experience and increased cognitive maturity, which surpass those of younger workers. Advanced age can also have an impact on work productivity. The aging process is associated with a decrease in energy and physical strength, which results in a decrease in productivity (Pranata, 2017).

A study conducted in Italy revealed statistically significant variations in sleep quality among the average age group (mean age:  $32.27 \pm 6.2$  years) of individuals practicing anesthesiology (Costa et al., 2021).

The group of respondents with the most years of work in this study were those who had work experience of more than 5 years, totaling 30 people or covering 76.9% of the total respondents. According to research conducted on individuals in China across various age groups, it was observed that nurse anesthetists with less than 10 years of work experience had a lower frequency of sleep disorders (53.3%). On the other hand, nurses with work experience of more than 10 years have a greater incidence of sleep disorders (62.7%) (Shi et al, 2020).

#### ***Description of the sleep quality of anesthetists based on length of work***

The group of respondents with the most years of work in this study were those who had work experience of more than 5 years, totaling 30 people, or 76.9% of the total respondents. According to research conducted on individuals in China across various age groups, it was observed that nurse anesthetists with less than 10 years of work experience had a lower frequency of sleep disorders (53.3%). On the other hand, nurses with work experience of more than 10 years have a greater incidence of sleep disorders (62.7%) (Shi et al., 2020).

The researchers suggest that individuals who work for more than five years may exhibit less than optimal sleep quality due to their tendency to perform an excessive number of work shifts that exceed the permitted daily work hours, resulting in fatigue. Based on research conducted on PPDS participants in the fields of anesthesiology and intensive therapy, it was found that 55.6% of individuals reported experiencing fatigue after working at RSCM for more than 24 hours. The mean fatigue score, as measured by the Fatigue Assessment Scale (FAS), was determined to be  $23.6 \pm 4.2$ . This score exceeds the specified fatigue limit, namely a score of more than 22 on the FAS. The average value of physical fatigue ( $15.19 \pm 2.7$ ) is higher than the average value of mental fatigue ( $10.61 \pm 2.2$ ) (Heriwardito et al., 2022).

### ***Description of the sleep quality of anesthetist nurses based on PSQI components***

The findings of this study revealed that the majority of anesthesiologists, namely 30 respondents (76.9%), reported experiencing severe sleep disturbances as indicated by the sleep disturbance component. The researchers postulated that anesthesiologists often experience disturbed sleep patterns because their sleep is frequently disrupted, causing changes in their circadian rhythms.

The findings of this study are in line with previous studies showing that anesthesiologists are susceptible to work-related fatigue and circadian rhythm disturbances, such as changes in circadian phase and suppression of melatonin during the evening hours. The above circumstances have a negative impact on the physical health and professional progress of anesthesiologists. However, what is more important is the potential compromise to patient safety (Lee et al., 2013). Anesthetists often perform operations in confined spaces, experiencing long shifts that contribute to significant and persistent sleep loss and sleep disorders (Costa et al., 2021).

### **Conclusion**

Based on the findings of the research entitled "Overview of Sleep Quality in Anesthesia Specialist Doctors in the Central Surgical Installation Room at Banyumas Regional Hospital", the following conclusions can be drawn: Findings from the analysis of the seven components of the PSQI questionnaire showed that the majority of anesthesiologists in the Banyumas area reported experiencing suboptimal sleep quality, with 21 people (53.8%) falling into this category. The majority of male respondents, namely 16 people, showed poor sleep quality, as seen from the calculation results. In addition, the sample consisted of 11 participants belonging to the late adult majority age group, which showed less than optimal sleep quality results. Based on the categorization of work duration, most participants reported having worked for more than 5 years, so cumulatively, there were 16 respondents who had less than optimal sleep quality.

### ***Source of Funding***

-

### ***Conflict of interest***

There is no conflict of interest.

### ***Ethical approval***

This research has approved ethical by IRB of Universitas Harapan Bangsa with number B.LPPM-UHB/2227/08/23.

### ***Authors' contribution***

Each author contributed equally in all the parts of the research. All authors have critically reviewed and approved the final draft and are responsible for the content and similarity index of the manuscript.



## References

1. Ansri Jayanti, S. S. (2021). Jenis Dan Desain Penelitian. In *Metodologi Penelitian Bidang Muamalah, Ekonomi Dan Bisnis* (pp. 37–42). Media Sains Indonesia.
2. Bah, T. M., Goodman, J., & Iliff, J. J. (2019). Sleep as a therapeutic target in the aging brain. *Neurotherapeutics*, 16(3), 554–568.
3. Boyd, C. A. S. (2019). Burnout and the nurse anesthetist: An integrative review. *AANA Journal*, 87(3), 205.
4. Cebeci, Z., Canakci, E., Taş, N., & Coşkun, İ. (2023). Evaluation of Sleep Quality of Anesthesiologists Working in Turkey. *Middle Black Sea Journal of Health Science*, 9(1), 147–153. <https://doi.org/10.19127/mbsjohs.1226260>
5. Costa, C., Teodoro, M., Briguglio, G., Vitale, E., Giambò, F., Indelicato, G., Micali, E., Italia, S., & Fenga, C. (2021). Sleep quality and mood state in resident physicians durincovid-19 pandemic. *International Journal of Environmental Research and Public Health*, 18(15). <https://doi.org/10.3390/ijerph18158023>
6. Faridasari, I., Herlina, L., Supriatin, & Pirianiti, F. (2021). Dalam Pelayanan Keperawatan. *Jurnal Kesehatan*, 12(2), 137–144.
7. Heriwardito, A., Sugiarto, A., Setiadi, B., Dwiputra, A. G., Hafidz, N., & Ramlan, A. A. W. (2022). Skor Kelelahan pada Peserta Didik Anestesiologi dan Terapi Intensif dan Faktor-Faktor yang Mempengaruhi. *Majalah Anestesia & Critical Care*, 40(1), 28–35.
8. Huda, M. (2020). *Mengatasi Insomnia Secara Alami*. New Media.
9. Kirlan, S. M., & Sanjoyo, S. (2022). Pemenuhan Standar Akreditasi Pelayanan Anestesi dan Bedah. *The Journal of Hospital Accreditation*, 4(1), 28–31.
10. Lee-Chiong, T., & Krieger, A. C. (2022). *Commemorative Issue: 15 years of the Sleep Medicine Clinics Part 1: Sleep and Sleep Disorders, An Issue of Sleep Medicine Clinics, E-Book* (Vol. 17, Issue 2). Elsevier Health Sciences.
11. Lee, K. Y., Chen, P. P., & Tse, L. A. (2013). Insomnia and Associated Factors among Anaesthetists in Hong Kong. *Anaesthesia and Intensive Care*, 41(6), 750–758. <https://doi.org/10.1177/0310057X1304100610>
12. Nilamcahya, D. R. (2017). *Pembuka Wawasan Pembagian Kerja Berdasarkan Gender Di Kelompok Pengolah Dan Pemasar (POKLAHSAR) Peni, Desa Hadiluwih, Kecamatan Ngadirojo, Kabupaten Pacitan, Jawa Timur*. Universitas Brawijaya.
13. PERATURAN MENTERI KESEHATAN REPUBLIK INDONESIA. (2011). *Peraturan Menteri Kesehatan Republik Indonesia Nomor 519/MENKES/PER/III/2011 Tentang Pedoman Penyelenggaraan Pelayanan Anestesiologi dan Terapi Intensif di Rumah Sakit* (Issue 224, pp. 1–31). [https://legalitas.org/download/write\\_pdf.php?url=pdf/peraturan\\_menteri/kementerian\\_kesehatan/2011/Peraturan-Menteri-Kementerian-Kesehatan-519-MENKES-PER-III-2011-tahun-2011.pdf](https://legalitas.org/download/write_pdf.php?url=pdf/peraturan_menteri/kementerian_kesehatan/2011/Peraturan-Menteri-Kementerian-Kesehatan-519-MENKES-PER-III-2011-tahun-2011.pdf)
14. Pranata, H. (2017). *Pengaruh Pendidikan, Upah, Usia, Dan Masa Kerja Terhadap Produktivitas Tenaga Kerja (Studi Kasus di Unit Industri Rokok Cerutu Bobbin Kabupaten Jember)*. Universitas Brawijaya.
15. Robin, F., De Courson, H., Roy, M., Lemeux, J., Philip, P., Bioulac, S., & Nouette-Gaulain, K. (2020). EQSAR: A national survey of sleep duration among French Anaesthesiologists and Intensivists. *Anaesthesia Critical Care and Pain Medicine*, 39(6), 759–764.

<https://doi.org/10.1016/j.accpm.2020.04.020>

16. Scott, A. J., Webb, T. L., Martyn-St James, M., Rowse, G., & Weich, S. (2021). Improving sleep quality leads to better mental health: A meta-analysis of randomised controlled trials. *Sleep Medicine Reviews*, 60, 101556. <https://doi.org/10.1016/j.smr.2021.101556>
17. Shi, L., Liu, Y., Jiang, T., Yan, P., Cao, F., Chen, Y., Wei, H., & Liu, J. (2020). Relationship between Mental Health, the CLOCK Gene, and Sleep Quality in Surgical Nurses: A Cross-Sectional Study. *BioMed Research International*, 2020. <https://doi.org/10.1155/2020/4795763>
18. Stuetzle, K. V., Pavlin, B. I., Smith, N. A., & Weston, K. M. (2018). Survey of occupational fatigue in anaesthetists in Australia and New Zealand. *Anaesthesia and Intensive Care*, 46(4), 414–423.
19. Sugiyono, P. D. (2019). Metode penelitian kuantitatif kualitatif dan r&d (DI Sutopo. In CV Alfabeta.
20. Syahza, A. (2021). *Buku Metodologi Penelitian, Edisi Revisi Tahun 2021*.
21. UPK KEMENKES RI. (2021). *Lama Waktu Tidur yang Dibutuhkan oleh Tubuh*. Unit Pelayanan Kesehatan Kemenkes. <https://upk.kemkes.go.id/new/lama-waktu-tidur-yang-dibutuhkan-oleh-tubuh>
22. Valente, F., Batista, C., Simões, V., Tomé, I., & Carrilho, A. (2019). Quality of sleep among Portuguese anaesthesiologists: A cross-sectional study. *Acta Medica Portuguesa*, 32(10), 641–646. <https://doi.org/10.20344/amp.11468>