

From care to screens: assessing computer vision syndrome among health workers in Mengwi II Community Health Center (2025)

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Abstract

Background: Digital transformation through Electronic Medical Records (EMR) has shifted healthcare work toward prolonged screen use, reducing natural eye breaks and increasing the risk of Computer Vision Syndrome (CVS). Untreated CVS can impair concentration, productivity, and patient safety.

Objective: To analyze the prevalence and risk factors of CVS among administrative staff and healthcare workers at Mengwi II Community Health Center, Badung, Bali, in 2025.

Methods: This quantitative, descriptive observational study used a cross-sectional design with 77 respondents selected through convenience sampling. CVS was assessed using the CVS-Smart questionnaire, covering visual, ocular, and extraocular symptoms.

Results: Most respondents were female (63.3%), aged 25–35 years (72.7%), and held a bachelor's/D4 degree (42.8%). Nearly half (48.1%) used digital devices for more than 4 hours daily. The prevalence of positive CVS (score 7–10) was 28.57%, increasing to 50.64% when including high-probability cases (score 5–6). The most common symptoms were extraocular (68.9%), visual (68.9%), and ocular surface complaints (59.8%).

Conclusion: Over half of employees at Mengwi II Community Health Center show indications of poor ocular health related to digital workloads. Management interventions, including ergonomic improvements and structured rest practices such as the 20-20-20 rule, are recommended to support employee well-being in the digital era.

Keywords: Computer Vision Syndrome; Health Workers; Community Health Center; Electronic Medical Records; Cvs-Smart.

1. Introduction

Digital transformation in the health sector in Indonesia, particularly through the implementation of Electronic Medical Records (EMR), has changed the working paradigm of health workers from conventional paper-based documentation methods to computer-based service systems. This transition requires medical personnel and administrative staff to spend most of their working time in front of monitors to input clinical data in real time, which drastically increases the duration of visual exposure to digital devices. The change in work patterns from manual writing to digital typing has indirectly eliminated the natural eye breaks that are usually obtained when shifting focus between patients and paper, so that the burden on the eyes becomes heavier and continuous throughout working hours ^[1].

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Despite the efficiency it offers, this intensive exposure to monitor screens triggers ocular and extraocular health problems known as Computer Vision Syndrome (CVS). Computer Vision Syndrome (CVS) is defined as a complex set of eye and vision disorders resulting from prolonged use of computers, laptops, tablets, and mobile phones. Clinically, this syndrome is classified into three main categories of symptoms, namely: visual symptoms (such as blurred vision and diplopia), ocular or surface eye symptoms (such as dry, red, and irritated eyes), and extraocular symptoms involving musculoskeletal disorders (such as neck, shoulder, and back pain). Although often considered a minor complaint, the global prevalence of CVS has reportedly reached an alarming 71%, while in specific healthcare worker groups, this figure can jump to 76.9% due to high visual workload without adequate breaks [2,3].

The high risk of CVS among health center employees is triggered by a combination of duration, physiological, and ergonomic factors. Continuous use of digital devices for more than 4 hours a day is known to be a critical threshold that significantly increases visual fatigue. This condition is exacerbated by a decrease in blink rate of up to 60% when staring at a screen, which causes faster evaporation of tears and triggers symptoms of dry eyes. In addition to ocular aspects, static sitting positions and non-ergonomic work environment settings also contribute to muscle tension in the neck and back (extraocular symptoms). The health condition of health center employees has a direct correlation with the quality of health services provided to the community. The manifestations of CVS in the form of chronic eye fatigue and neck pain are not only a burden on individual health, but also cause a significant decrease in concentration. This risks increasing the number of human errors, especially in terms of the accuracy of inputting patient medical data into digital systems, which in turn can hamper work productivity and threaten patient safety [4,5].

Computer Vision Syndromes are not only affects the physical comfort of employees, but also has the potential to reduce concentration and accuracy in patient care. Given the important role of community health centers as the frontline of health services, research on the description of risk factors and prevalence of CVS using the CVS-Smart instrument is crucial as a basis for improving ergonomics and occupational health policies in community health centers. This phenomenon triggers the need for an in-depth analysis of the extent to which the digitization of health services affects the physical well-being of employees in public service units such as the Mengwi II Community Health Center. Therefore, identifying the prevalence of CVS at the Mengwi II Community Health Center is not only a matter of individual occupational health, but also a strategic investment to ensure accurate, fast, and safe primary health care services for the community.

2. Method

This study is a quantitative study with a descriptive observational design using a cross-sectional approach. The study was conducted at the Mengwi II Community Health Center in November 2025. The population in this study consisted of all employees, including health workers and administrative staff, with a sample size of 77 respondents selected using convenience sampling. The instrument used to identify the occurrence of Computer Vision Syndrome (CVS) was the CVS-Smart questionnaire. This questionnaire was chosen because it has been validated and has good reliability in detecting visual, ocular, and extraocular symptoms resulting from the use of digital devices. CVS-Smart consists of 5 questions, each with 3 answer choices. Data were collected through questionnaires filled out independently by respondents. The diagnosis of CVS was based on the total score obtained. Respondents were categorized as having CVS if their final total score was between 7 and 10 points. The collected data were then processed using descriptive statistics using Microsoft Excel software to determine the frequency distribution and percentage prevalence of CVS.

3. Results

The characteristics of respondents based on age groups show that the majority of employees at the Mengwi II Community Health Center UPTD are in the early productive age range. The highest percentage is in the 25-35 age group, namely 72.7% (56 respondents), followed by the 36-45 age group at 12.9% (10 respondents), the 46-55 age group at 11.6% (9 respondents), and the smallest percentage in the 56-65 age group at 2.6% (2 respondents). Based on gender characteristics, the majority of respondents in this study were female. Of the total 77 respondents, 63.3% (49 people) were female, while male respondents accounted for 36.3% (28 people). The distribution of respondents based on their highest level of education shows the diversity of academic qualifications at the Mengwi II Community Health Center. The group of respondents with a Bachelor's degree (S1)/D4 was the largest group with a percentage of 42.8% (33 respondents), followed by the group of high school/vocational school/equivalent graduates at 37.6% (29 respondents), and the Diploma (D1/D2/D3) group at 19.5% (15 respondents).

Table 1 Respondent Characteristics

Variable	N (%)
Gender	
Male	28 (36.3)
Female	49 (63.3)
Age	
25-35 years old	56 (72.7)
36-45 years old	10 (12.9)
46-55 years old	9 (11.6)
56-65 years old	2 (2.6)
Highest Education	
High School/ Vocational School	29 (37.6)
Diploma (D1/D2/D3)	15 (19.5)
Bachelors's Degree (S1)/D4	33 (42.8)

Table 2 Characteristics of daily digital device use

Variable	N (%)
Average Digital Device Use	
<2 hours	16 (20.8)
2-4 hours	24 (31.2)
4-6 hours	18 (23.4)
>6 hours	19 (24.7)

Data on the duration of daily digital device use shows that most respondents use monitor screens for quite a long time. The largest group is respondents who use devices for 2-4 hours per day, accounting for 31.2% (24 respondents). This is followed by the group with usage of >6 hours, accounting for 24.7% (19 respondents), the group with usage of 4-6 hours, accounting for 23.4% (18 respondents), and the group with the shortest duration of <2 hours, accounting for 20.8% (16 respondents).

Analysis of visual complaints covering nine indicators (including blurred vision, eye fatigue, double vision, and light sensitivity) shows that the majority of respondents experience visual impairment. A total of 37.7% (29 respondents) reported two or more visual complaints, followed by respondents with one complaint at 31.2% (24 respondents), and respondents who did not experience any complaints at all at 31.2% (24 respondents). These findings indicate that more than two-thirds of employees at the Mengwi II Community Health Center UPTD have experienced visual effects due to digital screen exposure.

Table 3 CVS Variables

Variable	N (%)
Visual Complaints	
2 or more complaints	29 (37.7)
1 complaint	24 (31.2)
No complaint	24 (31.2)
Ocular Surface Complaints	
2 or more complaints	23 (29.9)
1 complaint	23 (29.9)

No complaint	31 (40.2)
Extraocular complaints	
2 or more complaints	24 (31.2)
1 complaint	29 (37.7)
No complaint	24 (31.2)
Frequency	
Frequent	6 (7.8)
Infrequent	45 (58.4)
Rare	26 (33.8)
Screen-associated	
Always	3 (3.9)
Sometimes	61 (79.2)
Never	13 (16.9)
Total Score (CVS-case probability status)	
7-10 points (Positive CVS-case)	22 (28.57)
5-6 points (High probability)	17 (22.07)
3-4 points (Low probability)	16 (20.77)
1-2 points (Not CVS-case)	12 (15.58)
0 points (Normal subject)	10 (12.98)

The evaluation of ocular surface complaints included nine indicators, including dry eyes, red eyes, burning sensation, and lacrimation (watery eyes). The results showed that 29.9% (23 respondents) reported two or more eye surface complaints, and another 29.9% (23 respondents) experienced one complaint. Meanwhile, 40.2% (31 respondents) stated that they had no complaints in this dimension. Cumulatively, nearly 60% of employees at the Mengwi II Community Health Center experienced at least one symptom of irritation on the surface of the eye due to the use of digital devices.

The extraocular complaint dimension in the CVS-Smart instrument includes nine indicators that assess the impact of digital device use outside the visual system, such as musculoskeletal pain (neck, shoulders, back, hands) as well as psychological and sleep disorders. The results of the study show that the majority of respondents felt these physical effects, with 37.7% (29 respondents) reporting one complaint and 31.2% (24 respondents) reporting two or more complaints. Meanwhile, the remaining 31.2% (24 respondents) stated that they had no complaints in this dimension. This indicates that approximately 68.9% of employees at the Mengwi II Community Health Center experienced physical or psychological discomfort related to their digital work activities.

Based on the frequency of symptom occurrence reported through the CVS-Smart questionnaire, the majority of respondents were in the "Infrequent" category, namely 58.4% (45 respondents). Meanwhile, respondents who reported symptoms in the 'Rare category accounted for 33.8% (26 respondents), and the "Frequent" category was experienced by 7.8% (6 respondents). This data shows that almost all employees (92.2%) at the Mengwi II Community Health Center UPTD have begun to experience symptoms of Computer Vision Syndrome, albeit with varying degrees of frequency.

Based on the screen-associated of complaints felt by respondents, the majority of employees at the Mengwi II Community Health Center reported symptoms in the "Sometimes" category, namely 79.2% (61 respondents). Conversely, respondents who stated that they 'Never' experienced symptoms amounted to 16.9% (13 respondents), and only a small number of respondents felt that they 'Always' experienced complaints, namely 3.9% (3 respondents). This shows that nearly 83% of the study population has been exposed to symptoms of Computer Vision Syndrome with an intensity level dominated by intermittent frequency.

Based on the final CVS-Smart questionnaire scores, it was found that most respondents showed a strong tendency to experience computer vision syndrome. A total of 28.57% (22 respondents) were declared CVS Positive (score 7-10) and 22.07% (17 respondents) were in the High Probability category (score 5-6). Meanwhile, the low probability group (score 3-4) accounted for 20.77% (16 respondents), the non-CVS case group (score 1-2) accounted for 15.58% (12 respondents), and only 12.98% (10 respondents) were included in the normal subject category with a score of 0.

4. Discussion

The results of the study at the Mengwi II Community Health Center show that the prevalence of Computer Vision Syndrome (CVS) reaches 28.57%. This finding reinforces the evidence that health workers are a high-risk group that is greatly affected by the digitization of health services. Furthermore, the study found a significant prevalence rate, with the combined group of CVS Positive and High Probability reaching 50.64% of the total employees at the Mengwi II Community Health Center. This high rate confirms that more than half of the health center employees are experiencing impaired ocular health due to digital workloads. When compared to the study by Arttime-Ríos et al.^[2] conducted on healthcare workers in Spain using the CVS-Q instrument, the prevalence rate found was 76.9%. This difference in figures indicates a difference in workload or duration of exposure between healthcare workers in primary healthcare facilities in Bali and in European hospitals. The high prevalence rates in both studies are most likely due to the implementation of Electronic Medical Records (EMR). As explained by Arttime-Ríos, the use of video display terminals (computers) for continuous clinical data entry without adequate breaks is a major trigger for eye fatigue and other ocular symptoms among nurses and doctors ^[2].

The dominance of respondents in the 25-35 age group (72.7%) provides an important picture of the risk profile for Computer Vision Syndrome (CVS) at the Mengwi II Community Health Center. This finding is in line with the research by Arttime-Ríos et al.^[2], which shows that younger age groups have a higher tendency to report CVS symptoms. This is thought to be related to the intensity of digital device use, not only for medical purposes (Electronic Medical Records) but also for personal use outside of working hours. Physiologically, although the younger age group has better eye accommodation than the older age group (pre-presbyopia), longer screen exposure and an intensive digital lifestyle make them more prone to visual fatigue. In addition, healthcare workers in this age group often have greater administrative and operational responsibilities in operating digital systems at health centers, resulting in higher frequency of interaction with monitor screens ^[5,6]

The dominance of female respondents (63.3%) in this study is in line with the profile of health workers in primary health care facilities, which are generally staffed by more women. This is an important point because several studies, such as those by Asgari et al.^[1] and Arttime-Ríos et al.^[2], show that women have a significantly higher risk of experiencing Computer Vision Syndrome (CVS) symptoms than men. The high prevalence of CVS in women is often associated with physiological and ocular factors. Women have a higher tendency to experience dry eye conditions, which are influenced by hormonal fluctuations. In addition, different corneal sensitivity makes symptoms such as sore eyes, burning sensations, and visual fatigue more frequently reported by women. In the context of services at the Mengwi II Community Health Center, female respondents, who mostly work in administration and clinical services (RME), are exposed to monitor screens for long periods of time, so the combination of biological factors and digital workload reinforces the emergence of CVS complaints.

The educational characteristics of the respondents, which were dominated by Bachelor's/D4 graduates (42.8%) and high school/equivalent graduates (37.6%), reflect the organizational structure of the health center, which consists of medical professionals and administrative or support staff. This is relevant to the risk of Computer Vision Syndrome (CVS) due to the different types of tasks performed. Respondents with a Bachelor's degree background (such as Doctors, Nurses, and Midwives) have a big responsibility in filling out Electronic Medical Records (EMR), which requires high visual focus on patient clinical details. Meanwhile, the high school/equivalent education group, which mostly fills administrative or registration desk positions, is exposed to continuous computer use for demographic data and queue input.

The duration of digital device use is one of the most crucial risk factors in the development of Computer Vision Syndrome (CVS). In this study, it was found that nearly half of the total respondents (48.1%) used monitor screens for more than 4 hours a day (combined groups of 4-6 hours and >6 hours). This finding is in line with a meta-analysis by Ccami-Bernal et al., which states that exposure to digital screens for more than 6 hours a day significantly increases the risk of CVS. This is associated with the workload of the ciliary muscles of the eye, which continuously perform accommodation without pause^[3]. At the Mengwi II Community Health Center, the high duration of use in the >4 hours group is likely due to the demands of administrative and clinical work, which are now fully integrated with Electronic Medical Records (EMR).

The high percentage of respondents experiencing two or more visual complaints (37.7%) confirms the excessive accommodation burden on the eyes of health center employees. The emergence of symptoms such as blurred vision, difficulty refocusing the eyes, and eye strain is a physiological compensation due to the ciliary muscles contracting continuously to maintain focus at close range. This phenomenon is consistent with the explanation in the meta-analysis by Ccami-Bernal et al.^[3] which states that visual fatigue is the most common clinical manifestation of CVS due to low

contrast on digital screens and decreased blink frequency. At the Mengwi II Community Health Center, this complaint is likely exacerbated by the use of Electronic Medical Records (EMR), which require high visual accuracy. As explained by Artime-Ríos et al., healthcare workers who work with video display terminals tend to experience 'visual stress' because they have to shift focus quickly between the monitor screen and the physical condition of the patient or other printed documents [2].

The emergence of ocular surface complaints in most respondents (59.8%) is closely related to the mechanism of tear film instability during interaction with monitor screens. Symptoms such as dry eyes, burning sensation, and foreign body sensation are direct effects of decreased blink rate, which naturally occurs when a person focuses on a digital screen. This phenomenon is supported by the findings Ccami-Bernal et al., which explain that under normal conditions, humans blink about 15-20 times per minute, but when using a computer, this frequency can decrease dramatically by up to 60%. This decrease causes faster evaporation of tears (evaporative dry eye), triggering a mild inflammatory response on the surface of the eye, which manifests as red and itchy eyes[3].

In the environment of the Mengwi II Community Health Center, this complaint is likely exacerbated by workplace factors. The use of air conditioning (AC) in service and administrative rooms reduces air humidity, which significantly increases the severity of dry eye symptoms in healthcare workers[2,4]. Additionally, the transition to Electronic Medical Records (EMR), which requires continuous focus, causes employees to 'blink frequently' (symptom number 9) as a compensatory effort by the ocular system to rewet the cornea surface that has begun to dry out [5,7].

The high number of extraocular complaints (68.9% cumulatively) indicates that Computer Vision Syndrome (CVS) problems at the Mengwi II Community Health Center are not limited to eye strain, but also involve musculoskeletal and systemic disorders. The emergence of pain in the neck, shoulders, and back is closely related to ergonomic aspects and static positions maintained for long periods of time when entering data into Electronic Medical Records (EMR). This finding is supported by Artime-Ríos et al. who stated that healthcare workers often work in less than ideal postures due to the poor ergonomic design of computer equipment, which triggers neck and back muscle tension. Additionally, reports of joint pain in the fingers and wrists align with the risk of Repetitive Strain Injury (RSI) due to intensive use of keyboards [2].

The high prevalence of visual (37.7%) and extraocular (31.2%) symptoms at the Mengwi II Community Health Center confirms that the digital transition through Electronic Medical Records (EMR) poses new health challenges for healthcare workers and administrative staff. The loss of natural eye rest breaks previously available in the manual system, coupled with continuous screen exposure, has placed health center employees at significant risk of visual and musculoskeletal fatigue. These findings not only confirm the global trend regarding the urgency of Computer Vision Syndrome (CVS) in the healthcare sector but also highlight the need for immediate intervention. Adjusting workplace ergonomics, implementing active rest patterns such as the 20-20-20 rule, and providing ongoing education about digital eye health are crucial steps that health center management must take to maintain employee productivity and well-being in this era of digital transformation [8].

5. Conclusion

Based on the results of research conducted at the Mengwi II Community Health Center in 2025, it was found that the prevalence of Computer Vision Syndrome (CVS) reached 28.57%, but this figure increased significantly to 50.64% when including groups with high probability. This phenomenon was triggered by the implementation of Electronic Medical Records (EMR), which requires continuous exposure to monitor screens, with 48.1% of respondents using digital devices for more than 4 hours a day. The majority of employees reported various complaints covering extraocular dimensions such as neck and back pain (68.9%), visual disturbances such as blurred vision (68.9%), and eye surface irritation due to decreased blink frequency (59.8%). This high risk is particularly concentrated among the productive age group of 25-35 years old and female employees, necessitating immediate intervention in the form of workplace ergonomics improvements and the implementation of active rest patterns such as the 20-20-20 rule to maintain productivity and patient safety.

Compliance with ethical standards

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Disclosure of conflict of interest

The author confirms that no financial or personal interests exist that could have influenced the outcomes or interpretation of the present study.

Statement of informed consent

All data information provided by respondents has received written consent from respondents and has been approved by the Director of Mengwi II Health Center, Badung Regency, Bali Province, Indonesia.

References

- [1] Asgari E, Kaur J, Nuredini G, Balloch J, Taylor AM, Sebire N, et al. Impact of Electronic Health Record Use on Cognitive Load and Burnout Among Clinicians: Narrative Review. *JMIR Medical Informatics*. JMIR Publications Inc.; 2024. doi:10.2196/55499
- [2] Artime-Ríos E, Suárez-Sánchez A, Sánchez-Lasheras F, Seguí-Crespo M. Computer vision syndrome in healthcare workers using video display terminals: an exploration of the risk factors. *J Adv Nurs*. 2022;78(7): 2095–110. doi:10.1111/jan.15140 PubMed PMID: 35112736.
- [3] Ccami-Bernal F, Soriano-Moreno DR, Romero-Robles MA, Barriga-Chambi F, Tuco KG, Castro-Diaz SD, et al. Prevalence of computer vision syndrome: A systematic review and meta-analysis. *Journal of Optometry*. Spanish Council of Optometry; 2024. doi:10.1016/j.optom.2023.100482 PubMed PMID: 37866176.
- [4] Kahal F, Al Darra A, Torbey A. Computer vision syndrome: a comprehensive literature review. *Future Science OA*. Taylor and Francis Ltd.; 2025. doi:10.1080/20565623.2025.2476923
- [5] Beeson D, Wolffsohn JS, Baigum T, Qureshi T, Gohil S, Wahid R, et al. Digital eye strain symptoms worsen during prolonged digital tasks, associated with a reduction in productivity. *Computers in Human Behavior Reports*. 2024;16. doi:10.1016/j.chbr.2024.100489
- [6] Faturahman Y, Purwanto A. Deskripsi Faktor-Faktor Yang Berhubungan dengan Keluhan Computer Vision Syndrome (CVS) (Studi pada Karyawan Universitas Siliwangi). *Jurnal Kesehatan komunitas Indonesia*. 2023.
- [7] Yusuf MA, Akib MNR, Syahrudin FI, Maharani RN, Namirah HA. Prevalence of Computer Vision Syndrome Among Medical Students at Universitas Muslim Indonesia. *Green Medical Journal*. 2025;7(1):31–9. doi:10.33096/gmj.v7i1.177
- [8] Safaryna AM, Kurniawati DP, Syahrul F, Prastyani R. Risk Factors for Computer Vision Syndrome (CVS) among College Students during the Covid-19 Pandemic. *Media Gizi Kesmas*. 2023; 12(1): 200–6. doi:10.20473/mgk.v12i1.2023.200-206