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Shift work and risk of metabolic syndrome in nursing professionals: A systematic review and meta-analysis

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ADMINISTRATIVE INFORMATION

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Review Stage at time of this submission - Risk of bias assessment.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 25 April 2026 and was last updated on 25 April 2026.

INTRODUCTION

Review question / Objective The objective of this study is to provide a synthesis of knowledge regarding the association between shift work and the risk of metabolic syndrome in nursing professionals through a systematic review and meta-analysis, guided by a research question formulated under the PICO framework (Population, Intervention, Comparator, and Outcome) where "P" represents nursing professionals, "I" encompasses shift work including rotating and night shifts, "C" denotes fixed day shifts or lack of exposure to night shifts, and "O" refers to the risk of developing metabolic syndrome.

Rationale Metabolic syndrome (MetS) has emerged as a major global public health challenge due to its strong association with an increased incidence of cardiovascular diseases and type 2 diabetes mellitus[1].

In the contemporary workplace, shift work—particularly night and rotating shifts—is an essential operational requirement in healthcare systems. However, this work modality induces circadian rhythm disruption, which alters critical metabolic processes, such as glucose regulation, lipid profiles, and blood pressure[2].

Nursing professionals constitute a particularly relevant study population; due to the nature of their practice, they are systematically exposed to work schedules that compromise sleep hygiene and dietary habits[3]. Although individual studies suggest a higher prevalence of MetS among night-shift nurses compared to day-shift counterparts, current evidence shows variability due to geographical, methodological, and sample size differences[4].

The rationale for this systematic review and meta-analysis lies in the need to synthesize the available evidence, both quantitatively and qualitatively, to precisely determine the magnitude of this risk. While previous reviews on shift work and health

exist, many are general or outdated relative to post-pandemic labor dynamics[5].
This research is fundamental not only for academic advancement but also for occupational health, as the results will determine if shift work acts as an independent, significant risk factor, thereby providing a robust scientific basis for healthcare institutions to develop preventive interventions, healthier shift rotation policies, and epidemiological surveillance programs to mitigate the metabolic impact on healthcare providers[3,6].

Condition being studied There is growing evidence linking circadian rhythm alterations to chronic metabolic dysfunctions, where the desynchronization of peripheral biological clocks disrupts glucose and lipid homeostasis[7]. In the workplace, shift work—including night and rotating shifts—has been identified as a critical exposure factor for nursing professionals, who, due to the nature of their work, face constant physiological dysregulation that directly impacts the circadian axis[8].

Unlike staff with fixed day shifts, this group shows greater vulnerability to the development of metabolic syndrome components, such as dyslipidemia, hypertension, and insulin resistance, exacerbated by sleep fragmentation and misaligned eating patterns[9,10]. Therefore, it is imperative to conduct a systematic review and meta-analysis to synthesize current evidence, allowing for the precise quantification of this risk and to inform occupational health strategies that protect the metabolic integrity of nursing staff in modern healthcare systems[11].

METHODS

Search strategy For the PubMed search, the following strategy was used: (("Metabolic, Syndrome" OR "Metabolic X Syndrome"[TiAb] OR "Cardiovascular, Diseases"[MeSH] OR "Cardiometabolic, Risk" OR "Cardiometabolic Syndrome Indicators") AND ("Health Personnel"[MeSH] OR "Healthcare workers"[TiAb] OR "Nursing staff"[TiAb] OR "Nurses"[TiAb] OR "Medical Staff"[TiAb] OR "Hospital staff"[TiAb] OR "Hospital personnel"[TiAb] OR "Hospital employees") AND ("Shift Work Schedule"[MeSH] OR "Night Shift"[TiAb] OR "Night Work"[TiAb] OR "Shift work"[TiAb] OR "Chronotype"[TiAb] OR "Circadian Rhythm"[TiAb])) NOT Review. A search of gray literature was also conducted to identify unpublished studies that could potentially be included in the review. The titles and abstracts obtained through the search strategy were independently evaluated by two reviewers (F.A.B., G.R.M.A.). Once the titles and abstracts that met the selection criteria were selected, the full texts of the articles potentially relevant to the review were obtained.

Participant or population Studies conducted on active nursing professionals (registered nurses, technicians, or assistants) were included, regardless of age, gender, or area of clinical specialization (hospital or community). Studies that grouped nurses with other healthcare professionals without disaggregating data specific to nursing staff were excluded.

Intervention The exposure of interest is shift work, which includes permanent night shifts (work performed exclusively at night) and rotating shifts (cycles that alternate between morning, afternoon, and night). Exposure was considered regardless of the duration of the workday or seniority in the position, although these data were extracted for subsequent analysis.

Comparator The comparison group consists of nursing professionals who work fixed day shifts (morning and/or afternoon schedules) and who have not been exposed to night or rotating shifts during the study period.

Study designs to be included Primary observational studies were included: cohort studies (prospective and retrospective), case-control studies, and cross-sectional studies. Case reports, case series, editorials, letters to the editor, and previous reviews were excluded (though their references will be consulted).

Eligibility criteria Studies using standardized diagnostic criteria for metabolic syndrome were included, such as those from the WHO, ATP III, IDF, or harmonized criteria. As a secondary outcome, the analysis of the individual components that make up metabolic syndrome according to the applied criteria was included. Exclusions: participants with a prior diagnosis of metabolic syndrome at the start of follow-up (in cohort studies), non-qualified nursing students, and studies that do not provide sufficient data for risk calculation (OR, RR, or confidence intervals).

Information sources An exhaustive search was conducted in the following electronic databases: PubMed/MEDLINE, Scopus, Web of Science, LILACS, and SciELO. Additionally, gray literature will be searched in TESIUNAM and Google Scholar, and the reference lists of the included articles will be manually reviewed.

Main outcome(s) The primary outcome is the incidence or prevalence of Metabolic Syndrome (MetS). Risk is evaluated using effect measures such as the Odds Ratio (OR) or Relative Risk (RR) with their respective 95% confidence intervals.

Additional outcome(s) The individual components of MetS will be analyzed secondarily: increased waist circumference (central obesity), elevated triglyceride levels, low HDL cholesterol levels, elevated blood pressure, and elevated fasting blood glucose.

Data management The selection and extraction process was described using a double-blind review system. Two researchers will independently examine titles and abstracts to determine eligibility, subsequently extracting relevant data from the selected articles. A third reviewer will act as a mediator to resolve any discrepancies through consensus. In case of missing or incomplete information in the manuscripts, we will contact the corresponding authors to request the original data.

Quality assessment / Risk of bias analysis Currently, the methodological quality and risk of bias of the included studies are being evaluated using the Newcastle-Ottawa Scale (NOS), analyzing the dimensions of selection, comparability, and exposure (or outcomes). If the studies demonstrate sufficient clinical and methodological homogeneity, a meta-analysis will be conducted using a random-effects model, given the intrinsic variability expected in populations of nursing professionals. Statistical heterogeneity will be quantified using the I^2 statistic. All quantitative analyses will be performed using RevMan 5.4 software.

Strategy of data synthesis A narrative description of the included studies will be presented, detailing the population characteristics (nursing staff), the type of shift evaluated, and the definitions of metabolic syndrome used. Summary tables will be used to display the main findings of each primary study. Quantitative synthesis (Meta-analysis): For dichotomous variables, the Odds Ratio (OR) or Relative Risk (RR) will be calculated with their respective 95% confidence intervals. For the secondary outcome (metabolic syndrome components), if reported as continuous variables, the Standardized Mean Difference (SMD) will be used.

Subgroup analysis Subgroup analyses are planned to explore sources of heterogeneity according to: (Shift type: Rotating vs. Fixed night, Geographic area: Continent or country of origin of the study, Seniority: More than 5 years of shift work, Diagnostic criteria: Comparison of results based on ATP III vs. IDF criteria, Gender: Differentiated analysis between men and women if the data allow).

Sensitivity analysis A sensitivity analysis will be performed by omitting one study at a time to verify the robustness of the overall results and to determine whether any individual study disproportionately influences the combined effect or the observed heterogeneity.

Language restriction Spanish, English, and Portuguese.

Country(ies) involved México.

Keywords Metabolic Syndrome; Metabolic X Syndrome; Cardiovascular Diseases; Cardiometabolic Risk; Cardiometabolic Syndrome Indicators; Health Personnel; Healthcare workers; Nursing staff; Nurses.

Dissemination plans The findings of this systematic review and meta-analysis will be disseminated through publication in a peer-reviewed, indexed nursing or medical journal. Additionally, the results will be presented at national and international nursing and occupational health conferences. Furthermore, the findings will be integrated into the doctoral thesis of the primary investigator and made available through the institutional repository of the National Autonomous University of Mexico (UNAM). We also plan to share key summaries with professional nursing organizations to facilitate evidence-based practice implementation.

Contributions of each author

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References

1. Saklayen MG. The global epidemic of the metabolic syndrome. Curr Hypertens Rep. 2018 Feb 26;20(2):12.

2. Inchingolo AD, Inchingolo AM, Fatone MC, Ferrante L, Casamassima L, Trilli I, et al. Guidelines for reducing the adverse effects of shift work on nursing staff: a systematic review. Healthcare (Basel). 2025 Aug 28;13(17):2148.

3. Dall'Ora C, Ball J, Recio-Saucedo A, Griffiths P. Characteristics of shift work and their impact on employee performance and wellbeing: a literature review. Int J Nurs Stud. 2016 May;57:12-27.

4. Zhang Q, Chair SY, Lo SHS, Chau JP, Schwade M, Zhao X. Association between shift work and obesity among nurses: a systematic review and meta-analysis. Int J Nurs Stud. 2020 Dec;112:103757.

5. Lajoie P, Aronson KJ, Day A, Tranmer J. A cross-sectional study of shift work, sleep quality and cardiometabolic risk in female hospital employees. BMJ Open. 2015 Mar 10;5(3):e007327.

6. Schettini MAS, Passos RFDN, Koike BDV. Shift work and metabolic syndrome updates: a systematic review. Sleep Sci. 2023 Jul 6;16(2):237-247.

7. Poggiogalle E, Jamshed H, Peterson CM. Circadian regulation of glucose, lipid, and energy metabolism in humans. Metabolism. 2018 Jul;84:11-27.

8. Ganesan S, Magee M, Stone JE, Mulhall MD, Collins A, Howard ME, et al. The impact of shift work on sleep, alertness and performance in healthcare workers. Sci Rep. 2019 Mar 15;9(1):4635.

9. Liu Q, Shi J, Duan P, Liu B, Li T, Wang C, et al. Is shift work associated with a higher risk of overweight or obesity? A systematic review of observational studies with meta-analysis. Int J Epidemiol. 2018 Dec 1;47(6):1956-1971.

10. Ye BJ. Association between shift work and metabolic syndrome: a 4-year retrospective cohort study. Healthcare (Basel). 2023 Mar 9;11(6):802.

11. Cheng WJ, Liu CS, Hu KC, Cheng YF, Karhula K, Härmä M. Night shift work and the risk of metabolic syndrome: findings from an 8-year hospital cohort. PLoS One. 2021 Dec 13;16(12):e0261349.