

ORIGINAL ARTICLE

The impacts of working 12-hour shifts in the emergency Department on physicians' health, social life, and decision-making: a cross-sectional study

Yahia Akeely^{1*} , Mutaz Mousa Alharbi², Swaid Raza Saulat¹,
Albaraa Mehdar¹, Naif Misfer Alzhrany¹, Fahad M. Samarkandy¹,
Gary M. Vilke³, Saleh Alesa⁴

ABSTRACT

Background: Currently, the demand for emergency medicine physicians is much higher than the available workforce. To overcome this issue, some institutions have increased their working hours. No previous study in Saudi Arabia addresses this issue and its impacts on physicians.

Aim of the study: this study evaluates physicians health, social life, and decision making in 12 hours shifts compared against regular 8 hours.

Methods: This cross-sectional study was conducted in various cities and hospitals in the Kingdom of Saudi Arabia using a questionnaire that surveyed 173 emergency physicians working in different hospitals across Saudi Arabia.

Results: There were many similarities and differences between the participants who worked 12-hour shifts and those who worked 8-hour shifts. The most significant differences were that those who worked 12-hour shifts were more likely to be male than female and more likely to be married than unmarried. In addition, the 12-hour working physicians had more nonworking partners than the 8-hour group. Furthermore, they had less time for socialization with friends. Changes in blood sugar levels and headache were more common in the 12-hour group. Both groups had a similar incidence of COVID-19, physical illnesses, and the use of sedative medications. The two groups showed almost the same decision-making abilities. On the other hand, only 8.1% of those working 12-hour shifts wanted to continue working 12-hour shifts, and 69.1% in the 8-hour group wanted to continue working 8-hour shifts.

Conclusion: Both 8- and 12-hour shifts appear feasible and safe.

Keywords: Emergency physician, 12-hour shift, physician performance, shift's length, working hours.

Introduction

There is a need to cover 24 hours of work each day by a necessary number of nurses and physicians in the emergency department. Unfortunately, there is still a major shortage of emergency medical personnel [1]. To overcome this shortage, some workplaces have started to increase the number of working hours. Another reason for increasing the number of working hours is to decrease exposure to infectious disease by reducing the total number of shifts per month [2]. Furthermore, other administrators prefer longer working hours to facilitate their monthly scheduling and to have two daily shifts rather than three daily shifts [3]. Some physicians prefer

longer shifts to have more days off for their families and social lives. Additionally, part-time physicians perform

Correspondence to: Yahia Akeely

*Department of Emergency Medicine, Security Forces Hospital. Kingdom of Saudi Arabia.

Email: yahiaakeely@hotmail.com

Full list of author information is available at the end of the article.

Received: 21 April 2021 | **Accepted:** 22 July 2021



This is an open access article distributed in accordance with the Creative Commons Attribution (CC BY 4.0) license: <https://creativecommons.org/licenses/by/4.0/> which permits any use, Share — copy and redistribute the material in any medium or format, Adapt — remix, transform, and build upon the material for any purpose, as long as the authors and the original source are properly cited. © The Author(s) 2021.



extra shifts in other cities, so it is better to have fewer shifts by working 12-hour shifts.

For these reasons, 12-hour shifts have been implemented in the emergency departments of some hospitals. The average working hours in the emergency department in Saudi Arabia is 8 hours a shift. To determine the effects of such changes and whether they affect physician wellbeing and decision-making, a cross-sectional study was conducted in different hospitals and cities in Saudi Arabia in December 2020. To the authors' knowledge, no previous study has been published to examine this issue in Saudi Arabia. Additionally, most previous international studies addressed nurses more often than physicians [4-6].

Methods

This study started after Institutional review board approval was obtained. The researcher distributed the questionnaire to two groups of working emergency physicians: one group worked 12-hour shifts and the other group worked 8-hour shifts. There were 62 participants in the 12-hour group and 111 participants in the 8-hour group. This distribution reflected the population's actual distribution because fewer hospitals have implemented 12-hour shifts. This study included all physicians certified in emergency medicine. It consisted of all physicians who worked the intended hours in the last 3 months of the survey. The study excluded nurses, medical students, interns, and training residents.

The researcher distributed the questionnaire through a Survey Monkey link to physicians who work in the hospitals in Riyadh city, including KING Khalid University, Security Forces Hospital, King Saud Medical, Prince Mohammad bin Abdulaziz in Riyadh, King Fahad Medical City, Prince Sultan Medical City, King Faisal Specialist Hospital, King Abdulaziz Medical City in Riyadh city, as well as hospitals outside Riyadh city, including General Hospital in Madina Munawrah city, Aseer Hospital in Aseer Region, and King Fahad Central Hospital in Jazan City.

The questionnaire was based on the previously validated Standard Shiftwork Index [7]. The questionnaire was

modified to be short and easy to complete. The modified questionnaire was distributed as a part of a pilot study for ten expert emergency medicine senior physicians in the field. The appropriate changes were made based on their feedback and their relevance scoring for each question.

The questionnaire was distributed to all participants, who were told that their participation was voluntary and anonymous. The questionnaire variables were demographic data, sleeping related, transportation, fatiguability, decision-making, feelings of stress, and health-related illnesses. Social life was also assessed. The other questions assessed COVID-19 history, the workload in the shift, and preference for having the same working hours.

Data Analysis and Results

Data were collected through Survey Monkey. The statistical analysis was performed with Statistical Package for the Social Science version 22. The participants were contacted via personal mobile devices. The response rate was 63%. The questionnaire was distributed through Survey Monkey, and all data were collected accordingly.

Demographic information

Female participants were more common in the 8-hour group than in the 12-hour group, with a prevalence of 17.12%, and 5.6%, respectively, and a p -value of 0.012 (Figure 1). The age distribution in the two groups indicated that there was a greater proportion of individuals aged over 46 years in the 12-hour group than in the 8-hour group, at 20.8% and 14.41%, respectively. The prevalence of senior staff (emergency medicine consultant works more than 5 years as a consultant) versus junior staff was greater in the 12-hour group than in the 8-hour group, as 80% of the 12-hour group was the senior staff, and 69% of the 8-hour group was the senior staff. The prevalence of married staff was greater in the 12-hour shift group (89%) than in the 8-hour shift group (74%), with a p -value of 0.029 (Figure 2). The prevalence of staff with a nonworking partner were 54.4% versus 43.2% in the 12-hour shift group compared with the 8-hour shift group, with a p -value of 0.047 (Figure 3).

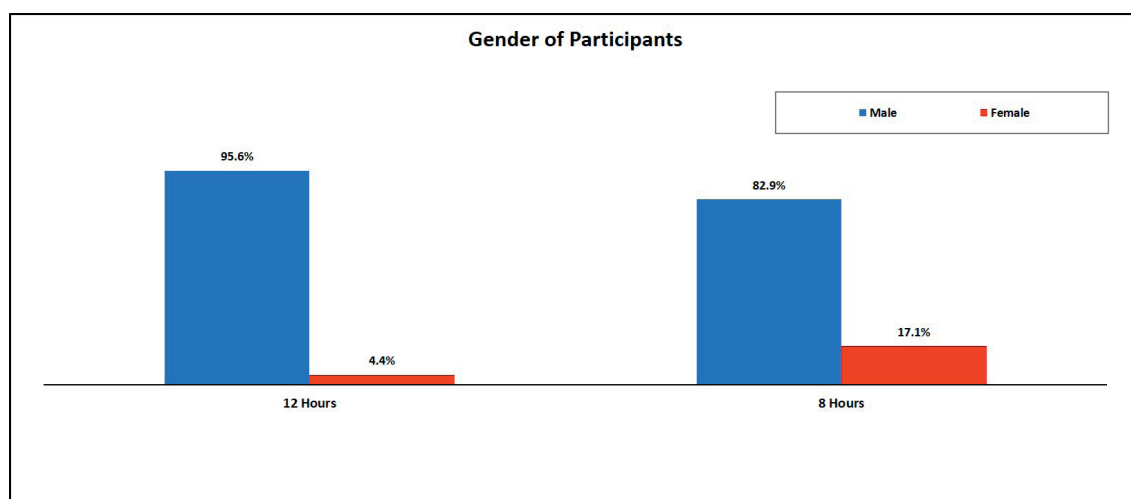


Figure 1. Gender of participants.

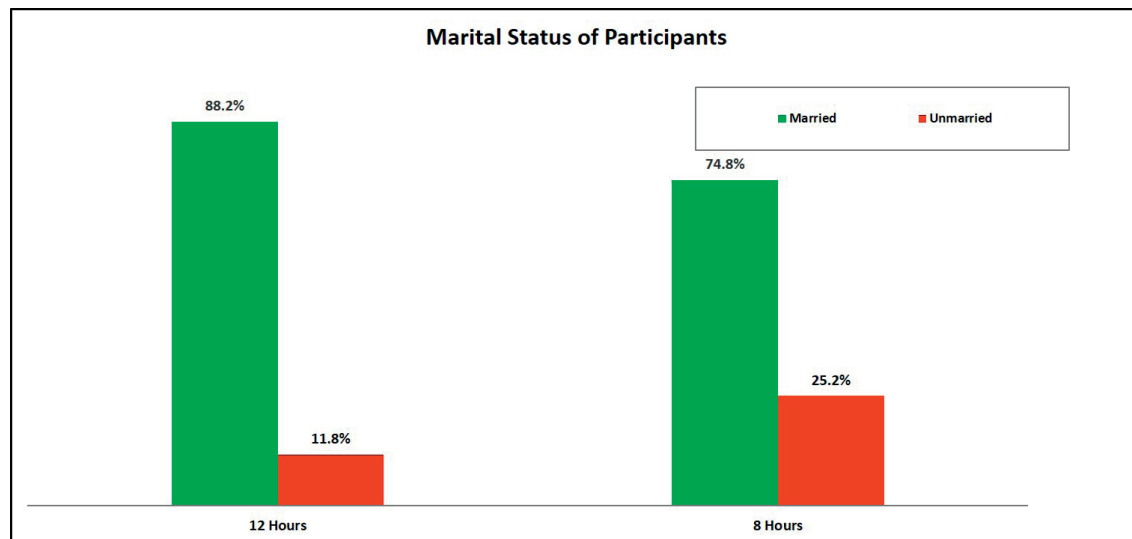


Figure 2. Marital status of participants.

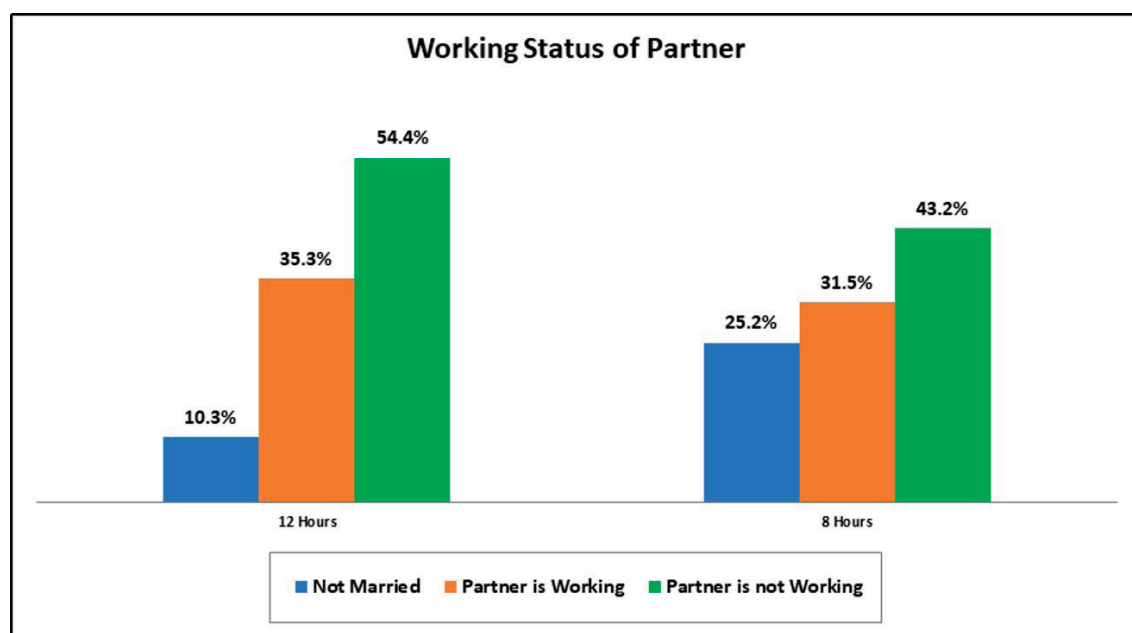


Figure 3. Working status of partner.

Transportation

The main form of transportation in both groups was private cars. Both groups were almost equal in the incidence of reporting falling asleep while driving home, with a prevalence of 25% in the 12-hour group and 27% in the 8-hour group. There was no statistically significant difference, with a p -value of 0.55.

During and toward the end of the shift

The survey results indicated that both groups enjoyed the shift similarly, with prevalence of 57.4% in the 12-hour group and 64.9% in the 8-hour group and a p -value of 0.168. There were no differences between the two groups regarding decision-making, stress, and fatigue at the end of the shift. Additionally, there was no difference

between the two groups regarding being sleepy at the end of the shift, with a p -value of 0.24. There was also no difference in feeling decreased energy toward the end of the shift, with a p -value of 0.412.

Physical health and sleep illnesses

No significant differences in neck, shoulder, or chest pain were observed. A similar percentage of the participants in both groups complained of insomnia, with a prevalence of 29.5% for the 12-hour group and 22.5% for the 8-hour group and a p -value of 0.19. Headaches and changes in blood glucose levels were more common in the 12-hour group, with p -values of 0.041 and 0.037, respectively. There were no differences in nervousness, anxiety, blood pressure, or depression between the two groups. Similar percentages of those in the 12- and 8-hour groups reported using

hypnotics and sedatives, at 3.1% and 4.5%, respectively, with a *p*-value of 0.37. There were no significant differences in falling asleep after the clinical shift or waking up to go to work, with *p*-values of 0.509 and 0.105, respectively.

Social life

There was no difference between groups in the percentage of participants who reported having time to spend with their husbands or wives, with a prevalence of 41.8% and 42.3% and *p*-value of 0.23. A similar result was found for time spent with children, with a similar prevalence of participants in the 12- and 8-hour groups reporting having time to spend with their children, at 34.3% and 30.6%, respectively, and a *p*-value of 0.36. On the other hand, the prevalence of participants who had time for friends were 46% in the 8-hour group and 30.4% in the 12-hour group, with a *p*-value of 0.02 (Figure 4). Furthermore, the prevalence of participants who had time for relaxation and themselves were 51.4% in the 8-hour group and 41.8% in the 12-hour group, with a *p*-value of 0.32. The prevalence of participants with time for sports and hobbies were 38.7% in the 8-hour group and 25.4% in the 12-hour group, with a *p*-value of 0.085.

COVID-19 positivity

The incidence of COVID-19 positivity was similar in both groups, at 22.7% in the 12-hour group and 23.64% in the 8-hour group, with a *p*-value of 0.73.

Preferred shift

There was a statistically significant difference in shift preferences, with a *p*-value of 0.0001. For those who worked 12-hour shifts, only 8.15% wanted to continue working 12 hours. On the other hand, 68.6% of those

currently working 8-hour shifts wished to continue working only 8-hour shifts (Figure 5).

Emergency department volume

The distribution was almost equal in both groups, with 59.7% of participants in the 12-hour group and 69.1% in the 8-hour group working in a high-volume department. Additionally, 32.3% of participants in the 12-hour group and 27.3% in the 8-hour group worked in a moderate = -volume department. A total of 8.1% of participants in the 12-hour group and 3.6% in the 8-hour group worked in a low-volume department.

Discussion

Emergency medicine is a crucial specialty that requires physicians’ physical and mental wellbeing. Emergency medicine also requires high concentration and vigilance for the team to make the right decisions in a critical and short time [8].

This study showed a few differences and similarities between 8- and 12-hour shifts in some areas. However, the study shows that a 12-hour shift appears to be a feasible and safe option.

The results in the previous studies vary. Some previous findings indicate that increasing work hours are associated with increased sleepiness and medical errors [9-11]. That is different than our study. Moreover, other studies have shown that working 12-hours shifts increases fatigue [12-15]. It is different than our study which shows that no difference in the fatigue incidence between the two groups. Additionally, in other studies, headache, sleeplessness, anxiety, and depression were more common among individuals who had extended working hours [16-18]. It is again different than our study

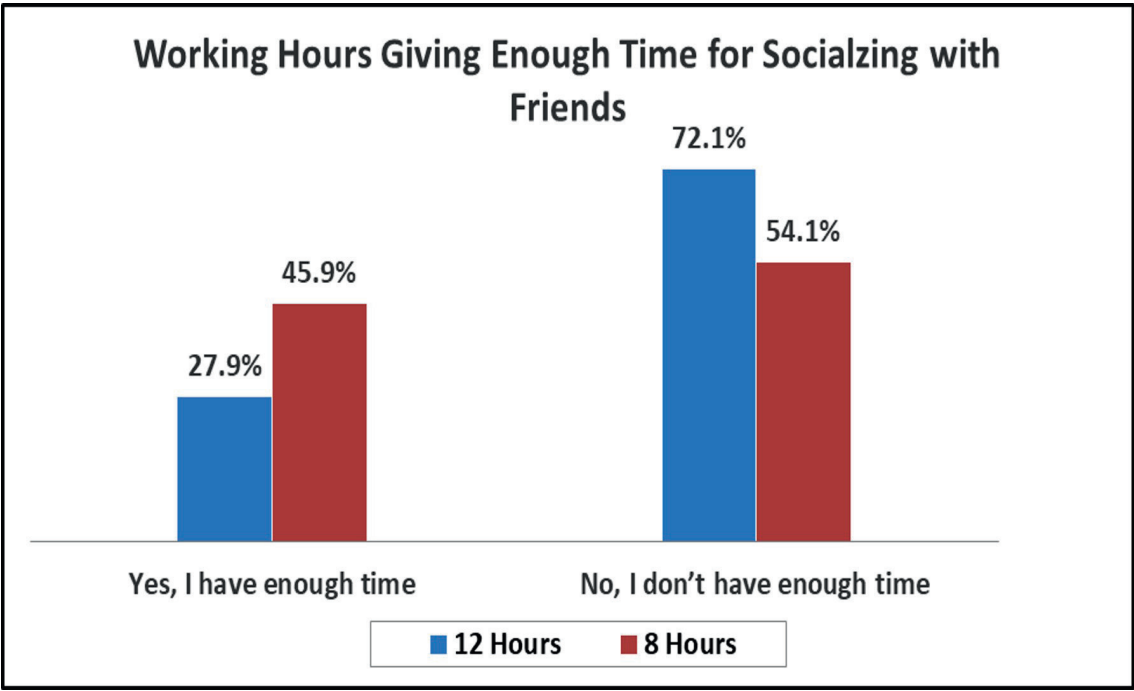


Figure 4. Working hours and enough time for socializing with friends.

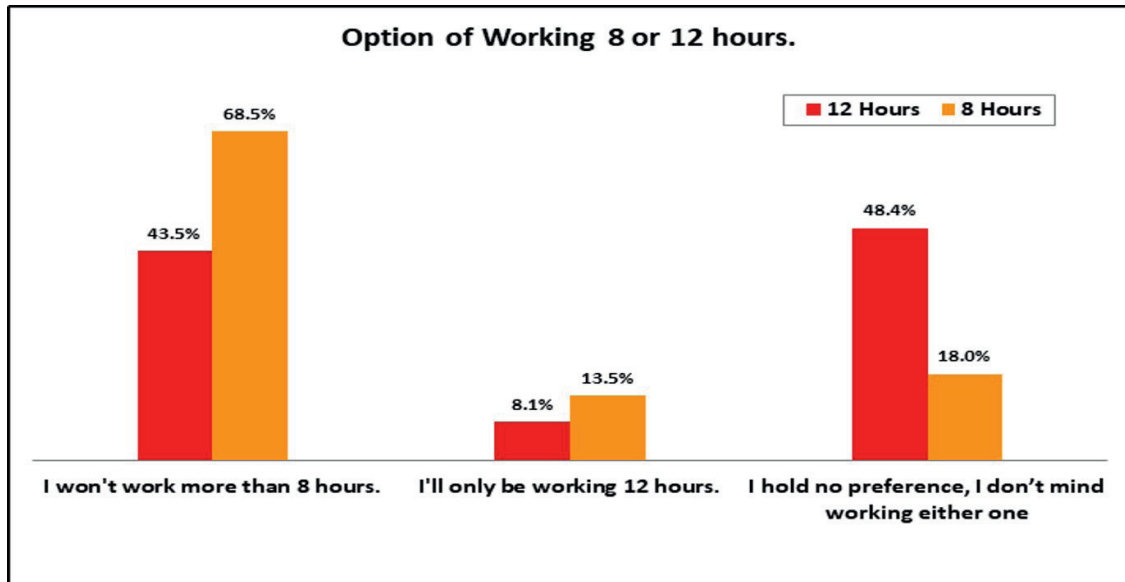


Figure 5. Option of working either 12 or 8 hours if the physician has the full option.

results. The previous differences compared to our study could be for the differences in the study population. Our study's population are emergency physicians whereas the previous studies were about the nurses. Other studies found similar correlations when individuals worked for more than 12 hours [4-6].

In a scoping review analysis study, there was not enough evidence to justify withdrawal or implementing the 12-hour shift [19]. This scoping review supported our results and conclusion that working 12 hours is feasible and safe. Important factors make the 12 hours shift acceptable and safe depend on the physicians themselves and the work environment. Lifestyles vary among physicians. Some physicians prefer working 12 hours, while others prefer 8-hour shifts. Each shift schedule has advantages and disadvantages. Consequently, every physician will have their preference based on their health issues, family situation, and social life [20,21].

Interestingly, the number of consecutive working days appears to be more important than the actual length of each shift [22]. Other factors that could affect an emergency physician's wellbeing include workload, infrastructure resources, and number of staff members working per shift [23].

Conclusion

This study assessed the feasibility and safety of doing 12 hours shift by the emergency physician. Our study indicates that 8- and 12-hour shifts are feasible and safe options. Furthermore, most of the physician prefer working 8 hours. If an emergency department planning to do a 12 hours shift, we recommend to address all previous mentioned different factors in the discussion section making the 12 hours shift an acceptable option.

Conflict of interests

The authors declare that there is no conflict of interest regarding the publication of this article.

Funding

None.

Consent to participate

Written consent was obtained from all the participants.

Ethical approval

Ethical approval was granted by Institutional Review Board at Security Forces Hospital via reference # 20-476-88, dated: 5 Oct 2020.

Author details

Yahia Akeely¹, Mutaz Mousa Alharbi², Swaid Raza Saulat¹, Albaraa Mehdar¹, Naif Misfer Alzhrary¹, Fahad M. Samarkandy¹, Gary M. Vilke³, Saleh Alesa⁴

1. Department of Emergency Medicine, Security Forces Hospital, Riyadh, Kingdom of Saudi Arabia
2. Department of Academic Affairs and Training, General Directorate of Health Affairs in Riyadh Region, Ministry of Health, Riyadh, Saudi Arabia
3. Professor of Clinical Emergency of Medicine, Health System, University of California San Diego, California
4. Emergency and Disaster Medicine Consultant, Security Forces Hospital, Riyadh, Saudi Arabia

References

1. Almalki M, FitzGerald G, Clark M. Health care system in Saudi Arabia: an overview. *East Mediterr Health J.* 2011;17(10):784–93. <https://doi.org/10.26719/2011.17.10.784>
2. Kluger DM, Aizenbud Y, Jaffe A, Parisi F, Aizenbud L, Minsky-Fenick E, et al. Impact of healthcare worker shift scheduling on workforce preservation during the COVID-19 pandemic. *Infect Control Hosp Epidemiol.* 2020;41(12):1443–5. <https://doi.org/10.1017/ice.2020.337>
3. Keller SM, Berryman P, Lukes E. Effects of extended work shifts and shift work on patient safety, productivity, and employee health. *Aaohn J.* 2009;57(12):497–504. <https://doi.org/10.1177/216507990905701204>

4. Griffiths P, Dall'Ora C, Simon M, Ball J, Lindqvist R, Rafferty AM, et al. Nurses' shift length and overtime working in 12 European countries: the association with perceived quality of care and patient safety. *Med Care*. 2014;52(11):975. <https://doi.org/10.1097/MLR.0000000000000233>
5. Thompson BJ. Does work-induced fatigue accumulate across three compressed 12 hour shifts in hospital nurses and aides? *PLoS One*. 2019;14(2):e0211715. <https://doi.org/10.1371/journal.pone.0211715>
6. Ball J, Day T, Murrells T, Dall'Ora C, Rafferty AM, Griffiths P, et al. Cross-sectional examination of the association between shift length and hospital nurses job satisfaction and nurse reported quality measures. *BMC Nurs*. 2017;16(1):1–7. <https://doi.org/10.1186/s12912-017-0221-7>
7. Tucker P, Knowles SR. Review of studies that have used the Standard Shiftwork Index: evidence for the underlying model of shiftwork and health. *Appl Ergon*. 2008;39(5):550–64. <https://doi.org/10.1016/j.apergo.2008.02.001>
8. Lowe DJ. Exploration of expert decision making in emergency medicine. University of Glasgow. Glasgow, UK; 2020.
9. Amalean A, Pavuluri H, Schmidt WM, Fowler LA. The effects of sleepiness, time of day, and 12-h shifts on affective and cognitive empathy in emergency medical technicians. *Sleep Biol Rhythms*. 2021;19(1):105–7. <https://doi.org/10.1007/s41105-020-00280-y>
10. Hayashi R, Fujita S, Iida S, Nagai Y, Shimamori Y, Hasegawa T. Relationship of patient safety culture with factors influencing working environment such as working hours, the number of night shifts, and the number of days off among healthcare workers in Japan: a cross-sectional study. *BMC Health Serv Res*. 2020;20:1–9. <https://doi.org/10.1186/s12913-020-05114-8>
11. Son YJ, Lee EK, Ko Y. Association of working hours and patient safety competencies with adverse nurse outcomes: a cross-sectional study. *Int J Environ Res Public Health*. 2019;16(21):4083. <https://doi.org/10.3390/ijerph16214083>
12. Gander P, O'Keeffe K, Santos-Fernandez E, Huntington A, Walker L, Willis J. Fatigue and nurses' work patterns: an online questionnaire survey. *Int J Nurs Stud*. 2019;98:67–74. <https://doi.org/10.1016/j.ijnurstu.2019.06.011>
13. Caruso CC. Negative impacts of shiftwork and long work hours. *Rehabilitation Nurs*. 2014;39(1):16–25. <https://doi.org/10.1002/rnj.107>
14. Stimpfel AW, Sloane DM, Aiken LH. The longer the shifts for hospital nurses, the higher the levels of burnout and patient dissatisfaction. *Health Aff*. 2012;31(11):2501–9. <https://doi.org/10.1377/hlthaff.2011.1377>
15. Geiger-Brown J, Rogers VE, Trinkoff AM, Kane RL, Bausell RB, Scharf SM. Sleep, sleepiness, fatigue, and performance of 12-hour-shift nurses. *Chronobiol Int*. 2012;29(2):211–9. <https://doi.org/10.3109/07420528.2011.645752>
16. Nagaya T, Hibino M, Kondo Y. Long working hours directly and indirectly (via short sleep duration) induce headache even in healthy white-collar men: cross-sectional and 1-year follow-up analyses. *Int Arch Occup Environ Health*. 2018;91(1):67–75. <https://doi.org/10.1007/s00420-017-1255-6>
17. Wagstaff AS, Sigstad Lie JA. Shift and night work and long working hours-a systematic review of safety implications. *Scand J Work Environ Health*. 2011;37(3):173–85. <https://doi.org/10.5271/sjweh.3146>
18. Virtanen M, Ferrie JE, Singh-Manoux A, Shipley MJ, Stansfeld SA, Marmot MG, et al. Long working hours and symptoms of anxiety and depression: a 5-year follow-up of the Whitehall II study. *Psychol Med*. 2011;41(12):2485–95. <https://doi.org/10.1017/S0033291711000171>
19. Harris R, Sims S, Parr J, Davies N. Impact of 12 h shift patterns in nursing: a scoping review. *Int J Nurs Stud*. 2015;52(2):605–34. <https://doi.org/10.1016/j.ijnurstu.2014.10.014>
20. Bloom B. Work shifts in hospitals' emergency departments: the UK experience. *Eur J Emerg Med*. 2019;26(6):392–3. <https://doi.org/10.1097/MEJ.0000000000000638>
21. Ferguson SA, Dawson D. 12-h or 8-h shifts? It depends. *Sleep Med Rev*. 2012;16(6):519–28. <https://doi.org/10.1016/j.smrv.2011.11.001>
22. Richardson A, Turnock C, Harris L, Finley A, Carson S. A study examining the Impact of 12-hour shifts on critical care staff. *J Nurs Manag*. 2007;15(8):838–46. <https://doi.org/10.1111/j.1365-2934.2007.00767.x>
23. Manyisa ZM, van Aswegen EJ. Factors affecting working conditions in public hospitals: a literature review. *Int J Africa Nurs Sci*. 2017;6:28–38. <https://doi.org/10.1016/j.ijans.2017.02.002>