

Medical error tendency levels and associated factors in surgical nurses from different generations

Aylin Aydın Sayılan¹, Selin Orhan², Nursen Kulakac³, Neriman Akyolcu⁴

¹ Kırklareli University Faculty of Health Sciences,
Nursing Department, Kırklareli, Turkey

² Kırklareli University Institute of Health
Sciences, Nursing Department, Kırklareli, Turkey

³ Gümüşhane University Faculty of Health
Sciences, Nursing Department, Gümüşhane,
Turkey

⁴ İstinye University Faculty of Health Sciences,
Nursing Department, İstanbul, Turkey

ORCID of the author(s)

AAS: <https://orcid.org/0000-0003-0576-8732>

SO: <https://orcid.org/0009-0000-6543-5388>

NK: <https://orcid.org/0000-0002-5427-1063>

NA: <https://orcid.org/0000-0003-2194-8637>

Corresponding Author

Aylin Aydın Sayılan

Kırklareli University Faculty of Health Science,
Nursing Department, Kırklareli, Turkey

E-mail: aylin.sayilan@klu.edu.tr

□

Ethics Committee Approval

The study was approved by the Kırklareli
University Health Sciences Institute ethical
committee, Türkiye (PR0462R01-2023).

All procedures in this study involving human
participants were performed in accordance with
the 1964 Helsinki Declaration and its later
amendments.

□

Conflict of Interest

No conflict of interest was declared by the
authors.

□

Financial Disclosure

The authors declared that this study has received
no financial support.

□

Published

2025 October 4

Copyright © 2025 The Author(s)



This is an open-access article distributed under the terms of the
Creative Commons Attribution-NonCommercial-NoDerivatives
4.0 International (CC BY-NC-ND 4.0).

<https://creativecommons.org/licenses/by-nc-nd/4.0/>



Abstract

Background/Aim: Since experience is acquired over time, characteristics deriving from intergenerational differences play an important role in medical errors. This study was performed to determine tendency to medical error levels and associated factors in surgical nurses from two different generations (Y and Z).

Methods: This cross-sectional, correlational study was conducted with 168 nurses working in a public and a training and research hospital between 1 May and 30 June, 2023, and selected using the random sampling method. A sociodemographic data form and the Medical Error Tendency Scale were employed for data collection. The data analysis was performed with number, percentage, and mean values and using Student's t test, ANOVA, and Pearson's correlation analysis.

Results: Seventy-two percent of the nurses were from Generation Y. Mean tendency to medical error scores were 231.23 (11.25) in the nurses from Generation Y and 225.59 (11.76) in those from Generation Z. The difference in mean total Medical Error Tendency Scale scores between the two generations was statistically significant ($P=0.005$). A significant difference in favor of Generation Y was observed in the Medical Error Tendency Scale 'drug and transfusion practices' ($P=0.006$), 'prevention of infections' ($P=0.004$), and 'patient monitoring and equipment safety' subdimensions ($P=0.008$). Nurses who enjoyed working in their clinics and who had sufficient sleep status also registered higher mean Medical Error Tendency Scale scores ($P<0.05$).

Conclusions: The nurses in this study exhibited a moderate tendency to medical error, the difference between the two groups being significantly in favor of Generation Y. Enjoying their work and sufficient sleep status had a positive effect on nurses' performance by reducing their tendency to medical error.

Keywords: surgical nurse, generational (Y, Z) difference, medical error, patient safety, nursing workforce

Introduction

Medical error is defined as the exhibition of unethical behavior inappropriate to a professional providing a health service, with a patient suffering harm due to inadequate and/or neglectful behaviors in medical practice [1]. Incorrect medical practice emerges as the result of neglect, inattention, lack of knowledge, skills deficits, and inadequate patient care [2,3].

A retrospective study of medical errors between 2000 and 2007 determined that 49.4% of individuals exposed to such errors died, while 31.4% suffered disability. That research also showed that 13.4% of errors led to another disease and 1.7% to an infectious disease [4]. Although adequate and recent data concerning the reporting of medical errors in Türkiye are not fully available, studies of patient safety have increased in recent years. The Turkish Ministry of Health Safety Reporting System report and analysis for 2016 reported a medical error rate of approximately 16.6%, and concluded that this was compatible with those of other countries [5].

Preventing medical errors and the effects thereof is the main aim of patient safety. Preventing such errors before they affect patients is a responsibility incumbent on all health professionals. From that perspective, determining the attitudes of health professionals in different medical spheres is of great importance to lowering the rates of such errors, and thus ensuring patient safety and improving trust in health institutions [6]. Nurses, who constitute the majority of individuals working in health care, are more frequently at risk of medical errors due to factors such as their numerous dependent and independent tasks, their being in constant contact with patients, and intense working hours [7].

The most frequent error reports in the Turkish Ministry of Health Safety Reporting System report and analysis for 2016 were those deriving from nurses [5]. The reported causes of errors made by nurses include low numbers of working nurses, the imposition of non-core duty tasks, fatigue, and inexperience [8-11]. Previous studies have also shown that nurses with fewer years' professional experience have a greater tendency to medical errors [12].

Since experience is acquired over time, characteristics deriving from inter-generational differences play an important role in this process, and this also impacts on individuals' attitudes toward events, cases, and concepts. The essentially age-dependent concept of the 'generation' is applied to groups of individuals born within a specific period, who are affected by events within that time frame, and who share common characteristics and perspectives as a result. Generations' characteristics and expectations are reported to be capable of leading to intergenerational variation [13-15].

Different generations in nursing are affected by curriculum models that emphasize different aspects of care, and this can potentially increase inter-generation variation. When nurses from different generations work together, differences between them can therefore affect their professional well-being, performance, and productivity [16].

Although generations X, Y, and Z are currently actively present in the workforce, this study was performed for the purpose

of determining differences in surgical nurses' tendency to medical errors and associated factors by examining generations Y and Z.

The research questions were;

1. What are nurses' tendency to medical error levels?
2. Do nurses' sociodemographic and working characteristics affect their tendencies to medical error?

Materials and methods

Type of research

This descriptive, correlational study was performed in order to determine the tendency to medical error levels and associated factors of surgical nurses from different generations.

Research Population and Sample

The research population consisted of nurses working in surgical clinics in Türkiye. Data were collected from nurses consenting to take part in the study between 01 May and 30 July, 2023, using the random sampling method. Data collection forms produced by means of Google Forms were sent to nurses' mobile phones via messaging software. The data from 168 nurses were included in the research. The inclusion criteria were voluntary participation in the study, age 18 years or older, working in a surgical unit, and answering all the questions fully. The response rate was 87.96%.

Data Collection Tools and Data Collection

The research data were collected using a nurse description form and the Medical Error Tendency Scale.

Nurse description form: This contained five questions investigating sociodemographic characteristics such as age, sex, marital status, sleep status, and contentment with working in the particular unit.

Medical Error Tendency Scale: This scale measures health professionals' tendencies to commit medical errors. This five-point Likert-type tool was developed by Özata and Altunkan and consists of 49 items [9]. The lowest possible score is 49 and the highest 245. The scale consists of five subdimensions – 'Drug and transfusion practices,' 'Prevention of infections,' 'Prevention of Falls,' 'Patient monitoring and equipment safety,' and 'Communication.' It has no cut-off point, but higher scores indicate a lower tendency among nurses to commit medical errors. The scale has a Cronbach alpha coefficient of 0.95 [9]. The Cronbach alpha coefficient in the present study was 0.93.

Ethical Considerations

Approval for the study was received from the Kırklareli University Health Sciences Institute ethical committee, Türkiye (PR0462R01-2023). Consent was received from all participants in the first part of the questionnaire prior to commencement. Participants were able to discontinue the questionnaire at any time, with no justification being required. The study was performed in compliance with the principles of the Declaration of Helsinki.

Statistical Analysis

Statistical analyses were performed on Statistical Package for the Social Sciences (SPSS) version 23 software. Descriptive statistical methods such as frequency, percentage, mean, and standard deviation were employed during the data analysis, and the Kolmogorov-Smirnov test was used to examine normality of distribution. The data were found to be normally distributed. Relationships between nurses of different generations' descriptive characteristics and two or more variables were

evaluated using the chi-square test. Student's t test was applied to determine relationships between the nurses' scale scores and sociodemographic variables. Multivariate linear regression analysis (method: enter) was applied to identify factors associated with nurses' tendency to commit medical errors. *P*-values <0.05 were considered statistically significant.

Results

The mean age of the participants was 35.30 (8.72) years. Women represented 62.8% of the Generation Y nurses enrolled in the study and 72.3% of the Generation Z nurses. No statistically significant differences were determined between the generations in terms of sociodemographic characteristics (*P*>0.05) (Table 1).

The mean total Medical Error Tendency Scale scores of the nurses working in surgical units were 231.23 (11.25) for Generation Y and 225.59 (11.76) for Generation Z. The mean total score was significantly higher in the nurses from Generation Y (*P*=0.005) (Table 2).

A significant weak, positive correlation was observed between age and Medical Error Tendency Scale scores in the nurses working in surgical units (*P*<0.001) (Table 3).

The multilinear regression results show that the tendencies to commit medical errors of nurses working in surgical units were positively and significantly affected by age (VIF: 1.014), increased sleep hours (VIF: 1.057), and contentment with working in the particular unit (VIF: 1.059) (*P*<0.05). These variables explained 15% of the total variance (Table 4).

Table 1: A comparison of the surgical unit nurses' demographic characteristics by generations (n=168)

		Generation Y (n=121)		Generation Z (n=47)		Statistics
		n	%	n	%	
Sex	Female	76	62.8	34	72.3	$\chi^2=1.360$ <i>P</i> =0.224
	Male	45	37.2	13	27.7	
Marital status	Married	37	31.4	6	12.8	$\chi^2=2.417$ <i>P</i> =0.120
	Single	83	68.6	41	87.2	
Sufficient sleep	Yes	17	14	6	9.9	$\chi^2=0.047$ <i>P</i> =0.828
	No	104	86	41	90.1	
Content working in the unit	Yes	92	76	32	68.1	$\chi^2=1.106$ <i>P</i> =0.293
	No	29	24	15	31.9	

Table 2: A comparison of surgical unit nurses' Medical Error Tendency Scale scores by generations

Medical Error Tendency Scale	Generation Y	Generation Z	Statistics
	Mean (SD)	Mean (SD)	
Drug and transfusion practices	82.19 (4.47)	79.74 (4.41)	<i>P</i> =0.006
Prevention of infections	58.00 (2.94)	56.35 (3.58)	<i>P</i> =0.004
Prevention of falls	24.01 (1.78)	23.64 (1.84)	<i>P</i> =0.157
Patient monitoring and equipment safety	42.85 (2.80)	41.44 (3.04)	<i>P</i> =0.008
Communication	24.49 (1.11)	24.38 (1.04)	<i>P</i> =0.473
Total score	231.55 (11.36)	225.56 (11.28)	<i>P</i> =0.005

Table 3: Correlations between surgical unit nurses' sociodemographic characteristics and Medical Error Tendency Scale scores

	1	2	3
(1) Medical Error Tendency Scale	1		
(2) Age	$r=0.236$ <i>P</i> <0.001	1	
(3) Weekly working hours	$r=-0.010$ <i>P</i> =0.875	$r=-0.153$ <i>P</i> =0.157	1

Table 4: Multilinear regression analysis findings between surgical unit nurses' tendencies to medical errors and independent variables

Model	B	SE	β	t	P-value	VIF
Fixed	242.162	3.493		69.328	<0.001	
Age	4.186	1.496	0.159	2.798	0.006	1.014
Sleep hours	6.608	1.496	0.257	4.417	<0.001	1.057
Contentment with working in the unit	-4.902	1.476	-0.193	-3.322	0.001	1.059

Model *R*=0.388; *R*²=0.150; Adjusted *R*²=0.141; *F*=15.688; *P*<0.001; Durbin Watson=1.655. Independent variable: Medical Error Tendency Scale, Independent variables (contentment with working in the unit: 1 yes, 2 no)

Discussion

Generations are regarded as referring to a period of 15-20 years. The nurses in this study were from generations Y and Z.

The total Medical Error Tendency Scale scores of the surgical unit nurses in this study were significantly higher for the Generation Y nurses, at 231.23 (11.25), compared to those from Generation Y at 225.59 (11.76) (*P*=0.005). Differences in perception among nurses from different age groups and who were raised under different conditions also affect their attitudes toward medical errors. Generation Y is described as disposed to teamwork and self-confident [17]. Some studies have reported low tendencies to medical error levels irrespective of generations [2, 18-20], while one study reported a high medical error tendency [21]. However, there are also studies concluding that the age factor does not affect the tendency to medical error [22]. The variation in our study results may derive from the tendency to medical error being multifactorial in nature.

Tendencies to commit medical errors associated with drug and transfusion practices (*P*=0.006), prevention of infections (*P*=0.004), and patient monitoring and equipment safety (*P*=0.008) were lower in the nurses from Generation Y than in those from Generation Z. One study of tendencies to medical errors involving nurses and physicians reported that such errors most frequently involved administration of the wrong drug or administration to the wrong patient. The authors also concluded that age was not a factor affecting medical errors practices, and that the basic cause was lack of communication [23]. Similarly, another study reported that nurses most frequently committed drug administration errors, although errors involving sharp object injuries, the prevention of infections, and transfusion errors also occurred. Factors such as excessive workloads and lack of communication were described as the main causes of error [24]. Lack of communication may be the principal reason for nurses most frequently making errors in drug administration in those studies.

Due to the rapid development of the workforce and global change, workplaces can contain several different generations. There are approximately 20 years between each generation, and perspectives change according to life events. Specifically in terms of nursing, research has reported inter-generation differences in areas such as leadership, patient safety, flexibility and accessibility, and professional approach. It is important for managers and leaders to consider these difference in the workplace and to make arrangements accordingly [25, 26].

A significant weak, positive correlation was observed between age and Medical Error Tendency Scale scores among the surgical unit nurses in this study, with older nurses exhibiting lower tendencies to medical error. In their study examining surgical nurses' attitudes and tendencies to medical errors, Kandemir and Yüksel [22] reported significantly lower tendencies to such errors among nurses aged 35 or older. Another study from the Turkish Republic of Northern Cyprus also reported that the tendency to medical error decreased in line with factors such as age and work experience [24]. A different study reported a lower tendency to medical errors among individuals with 13 or more years' professional experience [27]. Our findings are compatible with the previous literature and suggest that the tendency to

medical error is positively affected by factors such as age and greater professional experience.

Multilinear regression analysis showed that the tendency to medical error among surgical unit nurses was positively and significantly affected by greater age, increased sleep hours, and contentment with working in the particular unit. These variables explained 15% of the total variance. A Japanese study investigating the importance of nurse health and its potential impact on patient services found that insufficient sleep, shift working, and poor mental health increased the tendency to medical error [28]. Another study, involving nurses working in Canada, also found a lower medical error rate among individuals who enjoyed their work and reported a healthy working environment [29]. Other research from Australia, a country where tendencies to medical errors appear to be widespread, reported a significant increase in such tendencies among nurses with lengthy experience in the profession and those with insufficient sleep [30]. Studies have shown that sleep adequacy also affects job satisfaction. It is important to plan appropriate measures and to regulate nurses' working hours to ensure that they obtain enough sleep [31,32]. Our finding was consistent with the previous literature and showed that the tendency to medical error is positively affected by such factors as age, sufficient sleep, and contentment with one's work.

Limitations

The data from this research involve only two hospitals and are cross-sectional in nature. They cannot therefore be generalized to all surgical unit nurses. Additionally, the method of survey distribution (Google Forms) may introduce potential biases.

Conclusion

The tendency to medical error in this study was at a moderate level, and Generation Y exhibited a better performance than Generation Z. Greater age, sufficient sleep, and contentment with working in their particular unit reduced nurses' tendencies to medical error. Considering the high circulation in surgical unit staff, and that these may have a high tendency to medical errors, it is of great importance that nurses' generational differences be taken into account. We would also recommend that nurses work in the units they prefer, that their working hours be regulated, and that obstacles to their obtaining sufficient sleep be identified. Finally, we recommend that further studies involving different generations and wider samples now be performed.

References

1. The Joint Commission, 2010. Available from: <https://www.jointcommission.org/about/jointcommissionfaqs.aspx?faq#324>. Accessed: 20 October 2023.
2. Ta'an W. Medical error prevalence, nursing power, and structural empowerment: A serial mediation analysis. *Scientific World Journal*. 2024;1554373. doi: 10.1155/2024/1554373.
3. Gaffney TA, Hatcher BJ, Milligan R. Nurses' role in medical error recovery: an integrative review. *J Clin Nurs*. 2016;25(7-8):906-17. doi: 10.1111/jocn.13126.
4. Ertem G, Oksel E, Akbiyik A. Hatalı tıbbi uygulamalar (malpraktis) ile ilgili retrospektif bir inceleme. *Dirim Tıp Dergisi*. 2009;84(1):1-10.
5. Turkish Ministry of Health. GRS Güvenlik raporlama sistemi 2016 yılı istatistik ve analiz raporu, 2016. Available from: http://grs.saglik.gov.tr/BM/Reports/GRS2016rapor_R1.pdf. Accessed: 22 April 2023.
6. Kalra J, Kalra N, Baniak N. Medical error, disclosure and patient safety: a global view of quality care. *Clin Biochem*. 2013;46(13-14):1161-9. doi: 10.1016/j.clinbiochem.2013.03.025.
7. Oliveira AC, Garcia PC, Nogueira LS. Nursing workload and occurrence of adverse events in intensive care: a systematic review. *Rev Esc Enferm USP*. 2016;50(4):683-94. doi: 10.1590/S0080-623420160000500020.

8. Al-Kandari F, Thomas D. Adverse nurse outcomes: correlation to nurses' workload, staffing, and shift rotation in Kuwaiti hospitals. *Applied Nursing Research*. 2008;21:139-46.
9. Özata M, Altunkan H. Frequency of medical errors in hospitals, determination of medical error types and medical errors: Konya sample. *Medical Research Journal*. 2010;8(2):100-11.
10. Mauti G, Githae M. Medical error reporting among physicians and nurses in Uganda. *Afr Health Sci*. 2019;19(4):3107-17. doi: 10.4314/ahs.v19i4.33.
11. Mohsenpour M, Hosseini M, Abbaszadeh A, Shahboulagh FM, Khankeh H. Nursing error: an integrated review of the literature. *Indian J Med Ethics*. 2017;2(2):75-81. doi: 10.20529/ijme.2017.020.
12. Dikmen DY, Yorgun S, Yeşilçam N. Hemşirelerin tıbbi hatalara eğilimlerinin belirlenmesi. *Hacettepe Üniversitesi Hemşirelik Fakültesi Dergisi*. 2014;32(1):44-56.
13. So Hee L, Yeojin Y. Work values and communication styles among Generation X, Y, and Z nurses: A cross-sectional study. *Int Nurs Rev*. 2024;71(1):115-21. doi: 10.1111/inr.12863.
14. Şenturan Ş, Köse A, Dertli E, Başak S, Şentürk N. X ve Y kuşağı yöneticilerinin iş değerleri algısı ve farklılıkları üzerine inceleme. *Business & Economics Research Journal*. 2016;7(3):171-82.
15. Tan SHE, Chin GF. Generational effect on nurses' work values, engagement, and satisfaction in an acute hospital. *BMC Nurs*. 2023;22(1):88. doi: 10.1186/s12912-023-01256-2.
16. Grubb VM. The new workplace reality. In: *Clash of the generations*. Hoboken, NJ, USA: John Wiley & Sons, 2016.
17. Haydari SM, Kocaman G, Tokat MA. Farklı kuşaklardaki hemşirelerin işten ve meslekten ayrılma niyetleri ile örgütsel ve mesleki bağlılıklarının incelenmesi. *Sağlık ve Hemşirelik Yönetimi Dergisi*. 2016;3(3):119-31.
18. Işık Andsoy I, Kar G, Öztürk Ö. Hemşirelerin tıbbi hata eğilimlerine yönelik bir çalışma. *Sağlık Bilimleri Ve Meslekleri Dergisi*. 2015;1(1):17-27. doi: 10.17681/hsp.06267.
19. Yüksel A, Akbulut T, Bahadır Yılmaz E. Hemşirelerde stresle baş etme ve tıbbi hataya eğilim düzeyleri arasındaki ilişkinin belirlenmesi. *Sağlık Akademisyenleri Dergisi*. 2016;6(4):288-94.
20. Karacabay K, Sancı A, Çömez S, Çelik N. Cerrahi hemşirelerinin iş yükü algıları ile tıbbi hata eğilimleri arasındaki ilişkinin belirlenmesi. *Mersin Üniversitesi Sağlık Bilimleri Dergisi*. 2020;13(3):404-17.
21. Şahin ZA, Özdemir FK. Hemşirelerin tıbbi hata yapma eğilimlerinin incelenmesi. *Hemşirelikte Eğitim Ve Araştırma Dergisi*. 2015;12(3):210-4.
22. Kandemir A, Yüksel S. Cerrahi hemşirelerinin tıbbi hata tutum ve eğilimlerinin belirlenmesi. *Anadolu Hemşirelik ve Sağlık Bilimleri Dergisi*. 2020;23(2):287-9.
23. Topcu I, Turkmen AS, Sahiner NC, Savaser S, Sen H. Physicians' and nurses' medical errors associated with communication failures. *J Pak Med Assoc*. 2017;67(4):600-4.
24. Bilgic N, Altun S. Determination of nurses' tendency to medical error and the factors affecting this in the Turkish Republic of Northern Cyprus. *J Pak Med Assoc*. 2022;72(7):1335-9.
25. Stevanin S, Voutilainen A, Bressan V, Vehviläinen-Julkunen K, Rosolen V, Kvist T. Nurses' generational differences related to workplace and leadership in two European Countries. *West J Nurs Res*. 2020;42(1):14-23.
26. Huber P, Schubert HJ. Attitudes about work engagement of different generations-A cross-sectional study with nurses and supervisors. *J Nurs Manag*. 2019;27(7):1341-50.
27. Özen N, Onay T, Terzioğlu F. Hemşirelerin tıbbi hata eğilimlerinin ve etkileyen faktörlerin belirlenmesi. *Sağlık Bilimleri Ve Meslekleri Dergisi*. 2019;6(2):283-92.
28. Arimura M, Imai M, Okawa M, Fujimura T, Yamada N. Sleep, mental health status, and medical errors among hospital nurses in Japan. *Ind Health*. 2010;48(6):811-7.
29. Phillips LA, de Los Santos N, Ntanda H, Jackson J. The impact of the work environment on the health-related quality of life of Licensed Practical Nurses: a cross-sectional survey in four work environments. *Health Qual Life Outcomes*. 2022;20(1):44.
30. Dorrian J, Lamond N, van den Heuvel C, Pincombe J, Rogers AE, Dawson D. A pilot study of the safety implications of Australian nurses' sleep and work hours. *Chronobiol Int*. 2006;23(6):1149-63.
31. Labrague LJ. Pandemic fatigue and clinical nurses' mental health, sleep quality and job contentment during the covid-19 pandemic: The mediating role of resilience. *J Nurs Manag*. 2021;29(7):1992-2001.
32. Karagozoglu S, Bingöl N. Sleep quality and job satisfaction of Turkish nurses. *Nurs Outlook*. 2008;56(6):298-307.e3.

Disclaimer/Publisher's Note: The statements, opinions, and data presented in publications in the *Journal of Surgery and Medicine (JOSAM)* are exclusively those of the individual author(s) and contributor(s) and do not necessarily reflect the views of JOSAM, the publisher, or the editor(s). JOSAM, the publisher, and the editor(s) disclaim any liability for any harm to individuals or damage to property that may arise from implementing any ideas, methods, instructions, or products referenced within the content. Authors are responsible for all content in their article(s), including the accuracy of facts, statements, and citations. Authors are responsible for obtaining permission from the previous publisher or copyright holder if re-using any part of a paper (e.g., figures) published elsewhere. The publisher, editors, and their respective employees are not responsible or liable for the use of any potentially inaccurate or misleading data, opinions, or information contained within the articles on the journal's website.