ALJERIAN, Khaldoon, ALHOGAIL, Norah, ALAQEEL, Saud, ALDERAAN, Khayyal, AL-HAWAMDEH, Abdulla & ALHUDHAIF, Hani. The association between taking a death certificate course and practical knowledge about death certificate among Saudi medical students. Quality in Sport. 2022;8(2):73-80. eISSN 2450-3118. DOI http://dx.doi.org/10.12775/QS.2022.08.02.008
https://apcz.umk.pl/QS/article/view/41213

The journal has had 20 points in Ministry of Education and Science of Poland parametric evaluation. Annex to the announcement of the Minister of Education and Science of December 21, 2021. No. 32582.
Has a Journal's Unique Identifier: 201398. Scientific disciplines assigned: Economics and finance (Field of social sciences); Management and Quality Sciences (Field of social sciences).
Punkty Ministerialne z 2019 - aktualny rok 20 punktów. Załącznik do komunikatu Ministra Edukacji i Nauki z dnia 21 grudnia 2021 r. Lp. 32582. Posiada Unikatowy Identyfikator Czasopisma: 201398.
Przypisane dyscypliny naukowe: Ekonomia i finanse (Dziedzina nauk społecznych); Nauki o zarządzaniu i jakości (Dziedzina nauk społecznych).

The authors declare that there is no conflict of interests regarding the publication of this paper.
Received: 01.10.2021. Revised: 19.11.2022. Accepted: 07.12.2022.

The association between taking a death certificate course and practical knowledge about death certificate among Saudi medical students

1. Khaldoon Aljerian (Corresponding)
MD MHSc FRCPC FCAP; Forensic Medicine Unit ,Department of Pathology, College of Medicine, King Saud University, Riyadh 12372, Saudi Arabia Kaljerian@ksu.edu.sa , +966555494649.

2.Norah AlHogail:
College of Medicine, King Saud University, Riyadh, Saudi Arabia
nourah.al.hogail@gmail.com,

3.Saud Abdulaziz Alaqeel
College of Medicine, King Saud University, Riyadh, Saudi Arabia
saud.a.alaqeel@gmail.com

4. Khayyal Mohammed Alderaan
College of Medicine, King Saud University, Riyadh, Saudi Arabia
Khyyyal@hotmail.com ,

5.Abdulla Taher Al-hawamdeh
College of Medicine, King Saud University, Riyadh, Saudi Arabia
Alhawamdeh@protonmail.com,

6.Hani Jamal Alhudhaif
College of Medicine, King Saud University, Riyadh, Saudi Arabia
Hanijh10@hotmail.com

Abstract
In Saudi Arabia, family members, general practitioners, morticians, or police officer, who are eligible to request autopsies, refrain from doing so to expedite the burial of the deceased. Inaccurate entries into the medical death certificate facilitate so. The reason for ignoring the completion of death certificates is not fully explored. Yet, incompetence or avoiding medicolegal allegations seem to be causative factors. In this study, we conducted a cross-sectional study on 335 medical students from all years of medical school to determine the association between taking the death certificate course and the level of knowledge about death certificates among medical students. The results showed an increase in the level of knowledge of students who took the course compared to the students who did not. Among the students who have seen death certificates, the majority have not seen enough number of death certificates. Cultural mores of the medical students are expected to govern their carefulness in filling out the death certificates.
Keywords: Death Certificates, Medical Students, Saudi Arabia

1. Introduction

A medical death certificate (MDC) is a public health surveillance tool that has legal, social, and medical aspects. They give proof of death still as a measure of closure to the decedent's family. They are also the source of national and regional mortality data, which are used for epidemiological studies and monitoring public health. Incorrect entries into the certificate will result in gross errors in legal scrutiny in medico-legal deaths[1,2].

The cause of death should reveal the specific etiologic of death and it can be divided into the immediate and the proximate cause of death. The former relates to a disease or injury, which is present at the time of death. The latter is the original natural disease process, injury, or event that led to consequences of events over an unlimited time that eventually led to the individual's death. The manner of death refers to the fashion in which the cause of death arose, and can be listed as natural, accident, suicide, or homicide. MDCs are divided into "Part 1" for the cause of death, and "Part 2" for the contributory or other significant conditions. Filling out an MDC with a nonspecific term such as "cardiopulmonary arrest," "respiratory arrest," "cardiac arrest," "cardiorespiratory failure," or "brain death." is not acceptable [3].

Many studies have illustrated that teaching medical students the theoretical and practical aspects of MDCs will help to improve our national mortality statistics[4–6]. One way to investigate the issues above is to study the course offered to the medical students as an intervention. This should equip medical students with adequate knowledge about the accuracy of completing the MDCs before graduation. In many countries, emergency physicians limit themselves to issuing a provisional death certificate without determining the cause. At the same time, the provisional death certificate decouples the determination of death from the autopsy, in which the manner of death and also the cause of death are documented[7]. Requesting autopsy in Saudi Arabia is not reported to be as frequent as in Europe or the USA. It is rather so rare that performing hospital autopsy based on suspecting a homicide could be observed once annually[8,9].

In this article, we conducted a cross-sectional study on medical students of King Saud university (KSU) to determine the association between taking the death certification course and level of knowledge, and to estimate the level of knowledge among different years of medical students.

2. Methods

2.1. Study design

We performed a cross-sectional (quantitative, observational) study using a structured, self-administered, multiple-choice questionnaire that used an online self-administered questionnaire located in Google forms. The questionnaire was composed of questions on demographic, post-mortem medicine (cause-of-death awareness, time of death, manner of death), medico-legal awareness and charting MDCs. Our study was carried on medical students at King Saud University, Riyadh, Saudi Arabia. The study was conducted in August 2021–May 2022. The Institutional Review Board at college of medicine reviewed and approved our study.

2.2. Study population

Our target population is male and female medical students at King Saud University. Using convenient random sampling, sample size was calculated considering 5% significance, 95% confidence level and an estimated population of 1400 students. After adding 10% for lost and incomplete data, the sample size will be 335.Our inclusion criteria students at KSU in Medicine College was 1st to 5th-year students.

2.3. Instrument and Procedure

The volunteers in this study signed electronic informed consent before responding to the survey anonymously. The questionnaire had items related to the knowledge about MDCs and post-mortem medicine All metadata obtained from the survey remained confidential and was only accessed by principal investigators. Follow-up questions and feedback were arranged through email correspondences. We performed data analysis using SmarPLS software to determine the cause-effect relationship between taking the MDC course and the acquired corresponding knowledge. The following hypotheses were postulated.

H1a.MDC knowledge positively influences future foresight
H1b.MDC knowledge positively affects MDC completion
H1c.MDC knowledge has a positive impact on medicolegal investigation
H2a.Medicolegal investigations positively influence mores
H2b. Medicolegal investigations positively affect MDC completion
H2c. Medicolegal investigations have a positive impact on future foresight
H3. Mores positively affect MDC completion
H4. MDC completion positively influences future foresight.

Figure 1 demonstrate the conceptual model.

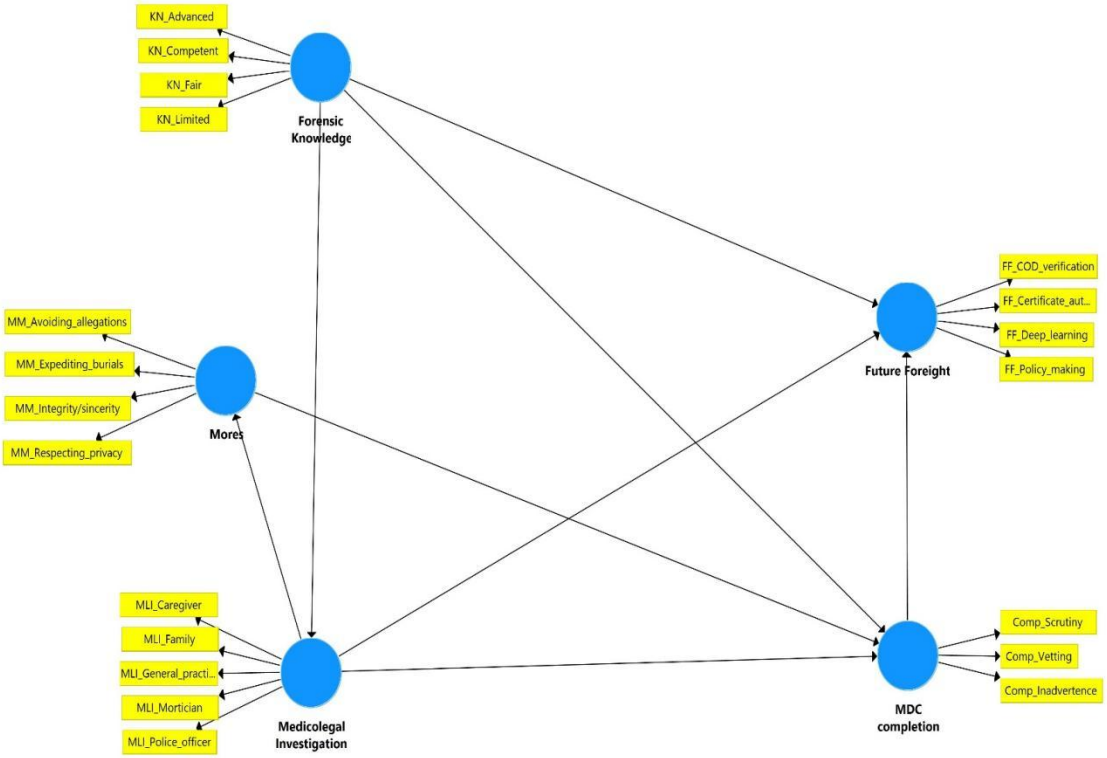

Figure 1. Conceptual model.

3. Results

Out of a total of 335 students from different academic years of medical school (males = 213, female = 122), (36.4%). Only 101 students (30.1%) have seen a death certificate of a patient in a hospital or relative and 46 students (13.7%) have browsed online to see versions of death certificates.

Either way, the majority of students think that an electronic form of death certificate is easier to be filled out. This reveals that most students did not have enough active training in death certification.

The first hypothesis examined the impact of medical student's MDC knowledge on future foresight (H1a), MDC completion (H1b), and requesting further medicolegal investigation (H1c). The student's MDC knowledge was self-reported as advanced, competent , fair or limited. H1a and H2b were supported. H1c was not supported.

The second hypothesis investigated the impact of requesting further medicolegal investigations on cultural mores (H2a), MDC completion (H2b), and future foresights (H2c). Further medicolegal investigations, other than the external examination, was MDC knowledge that was requested by caregivers, family members, general practitioner, mortician, or the police officer. This hypothesis was supported as many of the parties eligible to request autopsies refrained from doing so to expedite the burial of the deceased.

Whether cultural mores of the medical students may govern their carefulness of filling out the MDC or not was examined under the third hypothesis. Some aspects of the mores of MDC writers included willingness to avoid future allegation, willingness to expedite the burial, inclination to seek integration and sincerity and respecting privacy of the deceased and bereavement of the family members. H3 was supported. Figure 2 shows the measurement model.

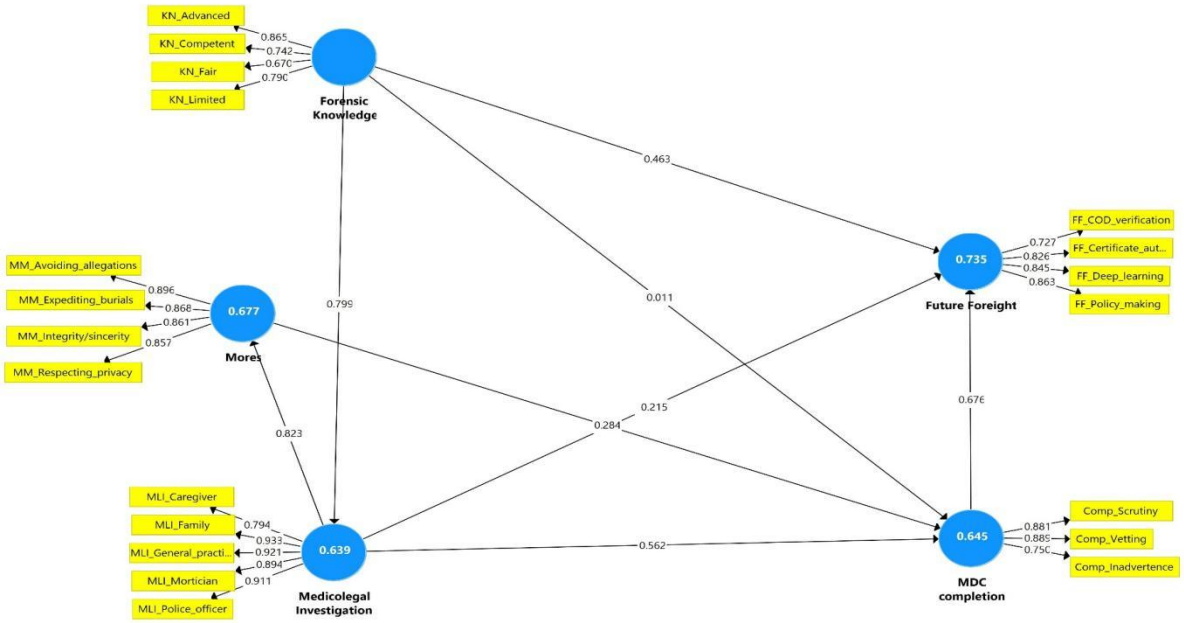

Figure 2. Measurement model

4. Discussion

This study revealed an association between taking the MDC course and the level of knowledge about the death certificates. Moreover, students who took the course demonstrated better knowledge about classifying undetermined poisoning deaths[10], death certificates completion[11], and importance of recording details accurately without requesting autopsy [1], as compared to the students who did not. The results showed that there were statistically significant differences in the level of knowledge about completing MDC among different years of medical students. Within-group analysis was in favor of senior students who have already passed the MDC course. Similar results were reported after studying post-mortem examination[7].

A study was conducted on third year medical students at Mercer University School of Medicine at the Medical Center of Central Georgia in 2009. Students were presented with a tutorial from the National Association of Medical Examiners website(www.thename.org) to teach them how to complete a death certificate. Students were asked to complete a death certificate both before and after the tutorial. The mean difference in pre- and post-tutorial scores were significant and using these tutorials was effective in increasing death certificate accuracy. Using tutorials in early stages of a physician's training in medical schools could be beneficial[4].

Non-medical knowledge about completing MDC could influence the decisions of the accuracy of filling out the certificates by emergency doctors or medicolegal staff especially that some physicians tended to cognitively be biased to exclude the possibility of "homicide" among deaths of Black children [12]. With this influence of cultural mores, many rights could go unattainable.

In France, digitization of MDC data and coding causes of death affected the accuracy of filling the MDCs in practice. Many pathologists expressed refusal to remove forensic obstacles instead of the magistrate and the ignorance of the interest for public health were the main concerns[13].

In Tunisia, errors in charting 757 certificates were analyzed. The mechanism of death and cause of death were incorrect in one-fifth of the MDCs[5].

Students' performance regarding the completion of MDC prior and after a tutorial was measured. Accuracy increased by 30% indicating that such solutions could be effective in improving accuracy of filling MDCs[4]. This technique was applied to interns as well[14].

Technically, preparing death certificates corresponds to the accuracy of future mortality statistics. Therefore, multiple demands and problems should be openly communicated and taken into account to improve the efficacy of filling these certificates. When non-medical personnel have previously established the alleged death, caution should be exercised. In the case of an unconscious person with minimal signs of life, also called vita minima, death is otherwise falsely certified. However, due to the detectable, certain signs of death, such cases can usually be ruled out. Difficulties may arise in special situations such as hypothermia and/or poisoning[10,15]. The practicing physician, who neither has sufficient training nor has ever performed a necropsy on a hypothermic or poisoned person, is objectively overtaxed in this situation[16,17].

All that needs to be established is the time at which the deceased was last seen alive and the time at which the deceased was found dead. MDCs show this item in some countries. Teaching the MDCs explore the standard form as well as the cross-cultural variances. In many countries, the family physician is dependent on the information provided by third parties and is obligated to match this information on the time of death by third parties with the condition of the mortuary stains and/or rigor mortis[15,18]. If these do not match or if the approximate time of death cannot be determined either (e.g. in the case of decomposition), the time at which the person concerned was still alive must be determined by the police. For a more precise determination of the time of death, the practicing physician lacks the experience and also, for example, the instruments necessary for determining the core temperature[19].

Experience with low-trace non-natural deaths, such as poisoning or electrocution, is virtually always lacking. Teaching comprehensive MDC course provide insights and hints on how family physicians should not expect glaring manifestation of homicide, especially with infant deaths [8]. In the expected death of a dying patient who has received palliative care in the last weeks and days, as opposed to deaths from accidents or falls, general practitioners may refrain from investigating the cause of death, fearing that this would not be understood by relatives and caregivers, morticians and sometimes even police officers. In general, the course of the dying process witnessed by the general practitioner is given little consideration in the course of the postmortem examination and in the death certificate although contextual findings can reorient the physicians to consider criminal activities with least possible traces and clues, instead of overlooked conspicuous evidence (e.g., suffocation). Psychological dimensions are always overlooked in Saudi Arabia because homicide among critically sick patients is a taboo [18,20].

Even in deaths from accidents, pandemic or falls, details might be missed by new general practitioners and junior pathologists[8,21,22].

For example, aspiration pneumonia is clearly a nonnatural cause of death if it occurs because of severe brain damage, which in turn is the result of a fall. Conversely, aspiration in the setting of dementia is a natural cause of death. However, the complication of the accident or consequence of the accident may occur years after the fall event, which complicate the physician’s task of completing the MDC without requesting further investigations[6,23–25]. The public prosecutor's office usually discontinues the proceedings because there is no evidence of suspicion of a non-natural cause of death or even an unexplained cause of death. With that said, medicolegal investigations should be considered a priority in undergraduate medical education[26].

5. Pedagogical implications

Conducting simulation-based learning sessions on completing death certificates for students, interns, and physicians with limit knowledge about the medico-legal significance is recommended. Many advances have been implemented successfully in relevant subdomains[27]. Integration of interdisciplinary work such as computational applications, algorithmic predilection of the causes of death and efficient automatization of checking MDCs is mandatory. Some efforts have been exerted to this end [24].

7. Conclusion

Learning completion of death certificates via a forensic medicine course is an extremely important part of the curriculum of any medical student. All medical students should know the basic principles of filling out a death certificate because they will apply this knowledge in their daily medical practice, regardless of their future subspecialty. The results of our research were limited to medical students. Further studies must assess the importance of teaching forensic medicine courses for undergraduate medical students. Modern pedagogical techniques for materializing the concept of careful completion of MDCs in theory and practice must be proposed.

Acknowledgments:

We would like to acknowledge College of Medicine Research Center (CMRC), King Saud University, Riyadh, Saudi Arabia.

References

[1] M.B. Nashelsky, C.H. Lawrence, Accuracy of Cause of Death Determination Without Forensic Autopsy Examination, Am. J. Forensic Med. Pathol. 24 (2003) 313–319. https://doi.org/10.1097/01.paf.0000097857.50734.c3.

[2] J. Goodin, R. Hanzlick, Mind your manners Part II: General results from the national association of medical examiners manner of death questionnaire, 1995, Am. J. Forensic Med. Pathol. 18 (1997). https://doi.org/10.1097/00000433-199709000-00002.

[3] G.P. Nielsen, J. Björnsson, J.G. Jonasson, The accuracy of death certificates - Implications for health statistics, Virchows Arch. A Pathol. Anat. Histopathol. 419 (1991). https://doi.org/10.1007/BF01600228.

[4] A.T. Degani, R.M. Patel, B.E. Smith, E. Grimsley, The effect of student training on accuracy of completion of death certificates., Med. Educ. Online. 14 (2009) 17. https://doi.org/10.3402/meo.v14i.4510.

[5] M. Ben Khelil, M. Kamel, S. Lahmar, A. Mrabet, N.B. Falfoul, M. Hamdoun, Death certificate accuracy in a Tunisian emergency department, Tunisie Medicale. 95 (2017) 422–428.

[6] S. Walker, R. Rampatige, I. Wainiqolo, A. Aumua, An accessible method for teaching doctors about death certification, Heal. Inf. Manag. J. 41 (2012) 4–10. https://doi.org/10.1177/183335831204100101.

[7] S. Anders, D. Fischer-Bruegge, M. Fabian, T. Raupach, C. Petersen-Ewert, S. Harendza, Teaching post-mortem external examination in undergraduate medical education-The formal and the informal curriculum, Forensic Sci. Int. 210 (2011) 87–90. https://doi.org/10.1016/j.forsciint.2011.02.008.

[8] K. Aljerian, SIDS in Saudi Arabia: Reality or Myth?, Fetal Pediatr. Pathol. (2022). https://doi.org/10.1080/15513815.2022.2053917.

[9] A.A. BinSaeed, M.M. Al-Saadi, K.A. AlJerian, S.A. Al-Saleh, M.A. Al-Hussein, K.S. Al-Majid, Z.S. Al-Sani, K.A. Al-Rabeeah, K.A. Arab, K.A. Al-Sheikh, S.S. Ahamed, Assessment of the accuracy of death certification at two referral hospitals, J. Fam. Community Med. 15 (2008).

[10] A.E. Donaldson, G.Y. Larsen, L. Fullerton-Gleason, L.M. Olson, Classifying undetermined poisoning deaths, Inj. Prev. 12 (2006). https://doi.org/10.1136/ip.2005.011171.

[11] K. Aljerian, Death certificate errors in one Saudi Arabian hospital, Death Stud. 43 (2019) 311–315. https://doi.org/10.1080/07481187.2018.1461712.

[12] I. Dror, J. Melinek, J.L. Arden, J. Kukucka, S. Hawkins, J. Carter, D.S. Atherton, Cognitive bias in forensic pathology decisions, J. Forensic Sci. 66 (2021). https://doi.org/10.1111/1556-4029.14697.

[13] E. Richaud-Eyraud, V. Gigonzac, C. Rondet, I. Khireddine-Medouni, C. Chan-Chee, L. Chérié-Challine, B. Ludes, G. Rey, Overview on forensic institutes' practices and drafting of death certificates, in France, in 2016, with the aim to implement a supplementary form to the death certificate, Rev. Med. Leg. 9 (2018) 1–9. https://www.scopus.com/inward/record.uri?eid=2-s2.0-85037980934&doi=10.1016%2Fj.medleg.2017.11.001&partnerID=40&md5=eef6025a91a9d0a9f5c76c3b0ea43055.

[14] M. Alonso-Sardón, H. Iglesias-de-Sena, M. Sáez-Lorenzo, A.J.C. Fernández, J. Salvat-Puig, J.A. Mirón-Canelo, B-learning training in the certification of causes of death, J. Forensic Leg. Med. 29 (2015) 1–5. https://doi.org/10.1016/j.jflm.2014.10.003.

[15] B. Karger, G.L. De La Grandmaison, T. Bajanowski, B. Brinkmann, Analysis of 155 consecutive forensic exhumations with emphasis on undetected homicides, Int. J. Legal Med. 118 (2004). https://doi.org/10.1007/s00414-003-0426-z.

[16] K. Aljerian, R.A. Almohammed, T.M. Alghaith, Q. Al-Saffer, N.M. Alazmi, A.S. BaHammam, Unifying the death notification form: Recommendations by the Saudi Health Council task force, J. Taibah Univ. Med. Sci. 16 (2021) 672–682. https://doi.org/10.1016/j.jtumed.2021.06.001.

[17] K. Aljerian, Saudi physicians' perceptions of the validity of autopsy and its implications - Structural equation modeling, J. Forensic Leg. Med. 86 (2022). https://doi.org/10.1016/j.jflm.2022.102320.

[18] A.S. Schröder, S. Wilmes, S. Sehner, M. Ehrhardt, H. Kaduszkiewicz, S. Anders, Post-mortem external examination: competence, education and accuracy of general practitioners in a metropolitan area, Int. J. Legal Med. 131 (2017). https://doi.org/10.1007/s00414-017-1559-9.

[19] A.I. Alami, "Illegal" crossing, historical memory and postcolonial agency in Laila Lalami's Hope and other dangerous pursuits, J. North African Stud. 17 (2012). https://doi.org/10.1080/13629387.2011.584472.

[20] L. Lohner, J.P. Sperhake, K. Püschel, A.S. Schröder, Autoerotic Deaths in Hamburg, Germany: Autoerotic accident or death from internal cause in an autoerotic setting? A retrospective study from 2004-2018, Forensic Sci. Int. 313 (2020). https://doi.org/10.1016/j.forsciint.2020.110340.

[21] D.W.A. AlRajban, D.K.A. AlJerian, D.Z.Z. AlZaher, D.W.M. AlEithan, D.L.H. AlAmoudi, Assessing

Turnover Time, Communication and Report Quality among Histopathologists and Their Clients., J. Curr. Med. Res. Opin. 4 (2021). https://doi.org/10.15520/jcmro.v4i02.393.
[22] K. Aljerian, A.S. BaHammam, COVID-19: Lessons in laboratory medicine, pathology, and autopsy, Ann. Thorac. Med. 15 (2020). https://doi.org/10.4103/atm.ATM_173_20.
[23] G. Di Vella, C. Pietro Campobasso, Death Investigation and Certification in Italy, Acad. Forensic Pathol. 5 (2015) 454–461. https://doi.org/10.23907/2015.050.
[24] M. Schön, K. Steinestel, D. Spiegelburg, A. Risch, M. Seidel, L. Schurr, U.K. Fassnacht, N. Golenhofen, T.M. Böckers, A. Böckers, Integration of Scientific Competence into Gross Anatomy Teaching Using Poster Presentations: Feasibility and Perception among Medical Students, Anat. Sci. Educ. 15 (2022) 89–101. https://doi.org/10.1002/ase.2031.
[25] E.W. Matshes, E.O. Lew, Homicide by unspecified means, Am. J. Forensic Med. Pathol. 31 (2010) 174–177. https://doi.org/10.1097/PAF.0b013e3181df62da.
[26] K. Aljerian, Factors Influencing Residents' Specialty Choices and Satisfaction: Impact of Gender, Career Motivation and Life Goals, J. Surg. Educ. 79 (2022) 302–308. https://doi.org/10.1016/j.jsurg.2021.09.018.
[27] J.M. Jeffers, S. Bord, J.E. Hooper, C. Fleishman, D. Cayea, B. Garibaldi, End-of-Life Care: A Multimodal and Comprehensive Curriculum for Graduating Medical Students Utilizing Experiential Learning Opportunities, MedEdPORTAL J. Teach. Learn. Resour. 17 (2021) 11149. https://doi.org/10.15766/mep_2374-8265.11149.

Tables

Table 1. Reliability measures

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
MDC Knowledge	0.772	0.815	0.852	0.593
Future Foreight	0.833	0.845	0.889	0.667
MDC completion	0.792	0.788	0.879	0.709
Medicolegal Investigation	0.935	0.935	0.951	0.796
Mores	0.894	0.9	0.926	0.758

Table 2. Fornell's matrix (Validity)

	1	2	3	4	5
MDC Knowledge	0.77				
Future Foresight	0.729	0.817			
MDC completion	0.648	0.807	0.842		
Medicolegal Investigation	0.799	0.687	0.787	0.892	
Mores	0.736	0.704	0.739	0.823	0.871

Table 3. Outer loading and VIF

	Outer loading	VIF
Comp_Scrutiny	0.881	3.242
Comp_Vettin g	0.889	3.293
FF_COD_verification	0.727	1.727
FF_Certificate_automation	0.826	1.995
FF_Deep_learning	0.845	2.728
FF_Policy_making	0.863	2.863
KN_Advanced	0.865	1.904
KN_Competent	0.742	1.479
KN_Fair	0.67	1.499
KN_Limited	0.79	1.591
MLI_Caregiver	0.794	1.942
MLI_Family	0.933	3.481
MLI_General_practitioner	0.921	3.02
MLI_Mortician	0.894	3.298
MLI_Police_officer	0.911	4.328
MM_Avoiding_allegations	0.896	2.859
MM_Expediting_burials	0.868	2.576
MM_Integrity/sincerity	0.861	2.605
MM_Respecting_privacy	0.857	2.55
Comp_Inadvertence	0.75	1.245

Table 4. Hypothesis validation

	B	M	SD	T	P
H1a. MDC Knowledge -> Future Foresight	0.463	0.462	0.053	8.752	0.000
H1b. MDC Knowledge -> MDC completion	0.011	0.015	0.065	0.167	0.000
H1c. MDC Knowledge -> Medicolegal Investigations	0.799	0.8	0.024	32.931	0.868
H2a. Medicolegal Investigations -> Mores	0.823	0.826	0.022	7.625	0.000
H2b. Medicolegal Investigations -> MDC completion	0.562	0.556	0.07	8.04	0.000
H2c. Medicolegal Investigations -> Future Foresight	0.215	0.213	0.063	3.446	0.001
H3. Mores -> MDC completion	0.284	0.294	0.075	3.81	0.000
H4. MDC completion -> Future Foresight	0.676	0.676	0.047	14.381	0.000