İSTANBUL UNIVERSITY PRESS

Acta Infologica,
ACIN 2025, 9 (2): 745–769

https://doi.org/10.26650/acin.1763293
Submitted: 12.08.2025
Revision Requested: 14.12.2025
Last Revision Received: 15.12.2025
Accepted: 23.12.2025

Acta Infologica

Research Article

Open Access

White Coat, Black Box: How Do Healthcare Workers Protect Personal Data?

Faruk Dursun [1]

[1] Sakarya University, Faculty of Business Administration, Management Information Systems, Sakarya, Türkiye

Abstract The protection of personal health data has become critical with the widespread adoption of EHRs in healthcare systems. This study evaluates the knowledge, attitudes, and awareness of healthcare professionals regarding the recording and protection of personal health data across diverse occupational groups and institutional contexts in Turkey. Data were collected from 346 healthcare professionals working in public and private hospitals through a structured questionnaire using a causal-comparative design. Statistical analyses included confirmatory factor analysis, independent samples t-tests, one-way analysis of variance, correlation analysis, and structural equation modeling. The scale demonstrated excellent reliability and structural validity, explaining 85.2% of variance across five dimensions: knowledge of personal health data, legal knowledge, legal data sharing, personal health data sharing, and personal health data recording. Significant differences were observed across educational levels, occupational groups, work units, and frequency of digital document usage. Postgraduate-educated professionals demonstrated higher awareness levels; however, this association may reflect confounding factors such as occupational role, professional responsibility levels, and work experience rather than education alone. Physicians exhibited significantly higher awareness levels than other healthcare professionals. Structural equation modeling revealed that PHDS, legal knowledge, and legal data sharing collectively explained 81.7% of variance in data recording awareness. The findings indicate that rather than isolated information acquisition, data protection awareness is shaped by an integrated framework of legal knowledge, ethical sensitivity, and institutional context. The study reveals critical awareness gaps among support staff and emergency service personnel, highlighting the need for profession-specific, unit-based educational interventions and strengthened data security culture across healthcare institutions.

Keywords Personal Health Data · Data Security · Health Information Systems · Jurisprudence · Confidentialy

Citation: Dursun, F. (2025). White Coat, Black Box: How Do Healthcare Workers Protect Personal Data?. *Acta Infologica*, *9*(2), 745-769. https://doi.org/10.26650/acin.1763293

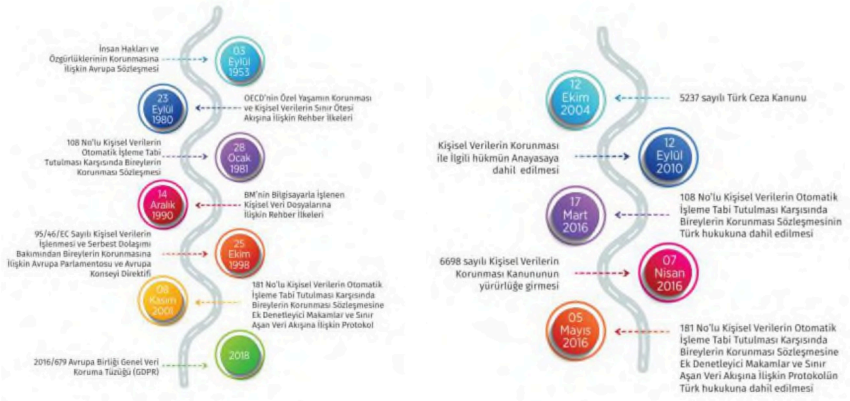
Corresponding author: Faruk Dursun : farukdursun@sakarya.edu.tr

INTRODUCTION

Personal data includes all types of information directly or indirectly related to an identifiable individual (Olğun and Adıbelli, 2022). Personal health data is defined as all information related to an identified or identifiable individual's physical, mental, and spiritual health (Kurt Konca and Badur, 2023). Personal health data have a data sharing framework that is limited to specific individuals and is only shared with carefully selected individuals. These data include all types of information that must be protected and that are important to the individual, provided that the patient has reasonable grounds for not sharing such information. In other words, laboratory tests performed on the individual, medications used, or illnesses suffered are considered personal health data (Atalay and Yücel, 2023). Personal health data are processed not only by healthcare institutions but also by data controllers in workplaces for purposes such as the fulfillment of employment contracts, occupational health and safety obligations, the determination of excuses, and emergency management. The limits of the "duty of confidentiality" under the KVKK must be clearly defined and evaluated in accordance with each processing purpose (Evci Eralp, 2023). International and national regulations are applied in this regard. In Turkey, the processing of personal health data is regulated by laws that emphasize the principles of necessity and sensitivity, ensuring that data are only collected for specific purposes (Alçin, 2022). The General Data Protection Regulation (GDPR) in the European Union (EU) enhances the protection of personal data, including health data, by establishing clear centers for individuals and obligations for data controllers (Mehmedović & Mehmedović, 2023).

Figure 1

Chronology of National and International Data Protection Regulations



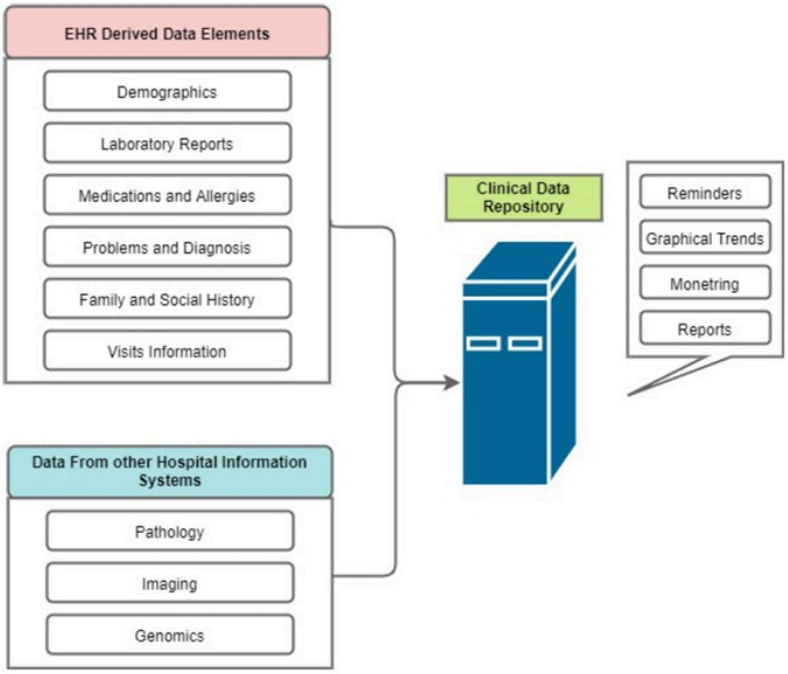
Based on these regulations and the concept of "secrecy" pointed out by Evci Eralp (2023), discussing privacy and patient privacy in this context seems inevitable. According to Atalay (2021), privacy refers to the center not to share information about one's private life with others and to protect one's personal boundaries. While privacy is based on the principle of not sharing information without consent, patient confidentiality refers to the confidential handling of all data related to an individual's health status, treatment process, and medical information, and sharing it only with relevant healthcare personnel. This principle is guaranteed by the Patient centers Regulation. Durmuş (2021) emphasized the need for patient confidentiality, highlighting that protecting the confidentiality of individuals' private health information is both an ethical obligation and one of the fundamental elements of trust in the patient-physician relationship. The violation of privacy may cause individuals to have reservations about seeking healthcare services,

which in turn may negatively affect the effectiveness of general healthcare services. This is because, in every examination or treatment process, all information about the individual's physical or mental health is required, and the individual's socio-demographic characteristics are also included in this data. Çavdar Lokumcu (2024) draws attention to a different dimension of privacy, pointing out that when doctors share videos, pictures, writings, etc. related to their patients on social media for the purpose of advertising themselves and reaching more patients, this violates the patient's center to respect for private life and patient privacy when done in violation of established principles.

EHRs are systems in which patients' medical histories are stored digitally and securely and can be accessed by authorized persons. They contain information such as diagnoses, treatments, medications, allergies, and test results. These records are important for both patients and doctors to make accurate diagnoses and provide appropriate treatment (Dutta and Barman, 2025). Maintaining personal health records is a fundamental aspect of modern healthcare, contributing to accessibility, efficiency, and the provision of necessary solutions (Ware et al., 2025). EHRs are highly sensitive as they contain patient identifiers and confidential information (Mahammad and Rani, 2025). The classification and collection of personal health data can support the development of personalized medicine by improving the accuracy and efficiency of medical decision-making processes (Xu and Zhao, 2024). Healthcare organizations and services rely on EHRs to manage, store, and transmit patient data. EHRs play a significant role in delivering high-quality services and ensuring the privacy and security of sensitive patient data (Silva, 2025). The electronic health record (EHR) system emerged as a solution for storing and managing patient health data (Keshta and Odeh, 2021). EHRs are structured electronic records that contain comprehensive information about patients, including their medical history (Fig. 2). This system facilitates easier and faster access to and sharing of information among different healthcare providers and allows access through connected sites when necessary (Shah and Khan, 2020). The rapid integration of digital technology has significantly improved patient care, information management, and research, driving healthcare sector transformation. Significant cybersecurity and privacy issues have emerged as a result of this digital revolution that greatly jeopardize the accessibility, integrity, and confidentiality of sensitive health data (Gupta et al., 2025). While health records play a critical role in facilitating individual health management, they are equally important for improving public health in medical institutions. These records are comprehensive and standardized documents that contain basic personal and family information at various stages of an individual's life, as well as data on illnesses, medical care, health services, physical examinations, and living/working conditions (Tao et al., 2025). Patient portals that provide secure online access to personal health records, laboratory results, and treatment plans are important components that enable patients to understand their health status and actively participate in their treatment processes. These platforms facilitate easy access to health data, assisting individuals in making informed and healthy decisions regarding care and treatment options. Patients can take a more active role in managing their own health thanks to the accessibility of personal health records (Shabir and Kenzie, 2025).

Figure 2

Electronic Health Record Systems



Maraş and Ceyhan (2021) conducted a study with nursing students and found that students had positive attitudes toward recording and protecting personal health data. However, a difference was found between students who had been exposed to the concept of personal health and those who had not. Demir Karabayır et al. (2023) conducted a study with the participation of students in health education and found that the participants' sensitivity to the protection of health data was insufficient. Eskimez and Köse Tosunöz (2023) found that nursing candidates studying at a state university had positive attitudes and high awareness toward the recording and protection of personal data. Basit (2021) found that nursing students had a positive attitude toward the recording and protection of patients' personal health data. Bilgiç et al. (2025) also found that female and final-year nursing students had higher attitudes toward the recording and protection of personal data. Dündar et al. (2024) conducted a study at a state hospital in Istanbul and found that healthcare workers had positive attitudes toward the recording and protection of personal health data. They also determined that age, education level, and professional training influenced attitudes toward the recording and protection of personal health data. İster (2022) found that university-enrolled nursing students had positive attitudes toward the recording and protection of personal health data. Türk and Topuz (2024) found that nursing students are sensitive to privacy issues. Tural Büyük and Ünaldı Baydın (2020) found that nursing students have a moderate level of ethical sensitivity regarding the recording and protection of patients' personal health data. Pakiş Çetin and Çevik (2021) found that students in the Nursing Department at the University of Health Sciences had a high level of awareness and positive attitudes toward the recording and protection of personal data. Kırca et al. (2025) conducted a study with the participation of fourth-year students studying at a university's nursing faculty and found that nursing students' attitudes toward privacy awareness and the recording and protection of personal data were high, and that as students' privacy awareness increased, their attitudes toward the recording and protection of personal data also increased. Ataklıoğlu Başkan et al. (2021) found that students studying at the Nursing Department of the Faculty of Health Sciences at Erzincan

Binali Yıldırım University had positive attitudes toward the recording and protection of personal data. Ülker and Korkut (2023) found that as the level of privacy of nursing department students increases, their attitudes toward the recording and storage of personal health data are also positively affected. Durmuş İskender and Durmuş (2022) identified a positive and significant relationship between midwifery and nursing students' privacy awareness at a university's Faculty of Health Sciences and their attitudes toward the recording and protection of personal health data. Additionally, it was found that midwifery and nursing students have a high level of privacy awareness, positive attitudes toward the recording and protection of personal health data, and high levels of awareness. Yılmaz and Uysal (2024) found that female nursing students in their second year, those who were knowledgeable about personal and health data, those who wanted to work in the field they were studying, and those with high levels of communication with patients had statistically significantly higher attitude scores than other students.

METHOD

Importance of the Research

In today's world, where digital transformation is reshaping healthcare services, the protection of personal health data is of critical ethical and legal importance. The widespread use of electronic health records places greater responsibility on healthcare professionals to protect the security and privacy of patient data. This situation requires a systematic assessment of the knowledge, attitudes, and awareness levels of healthcare personnel regarding data protection.

In the literature, the majority of studies examining the attitudes of healthcare professionals toward the protection of personal health data have focused on nursing students, whereas studies comprehensively addressing the views of healthcare professionals from different occupational groups who are actively working in the field remain limited. However, different professional groups, such as doctors, nurses, midwives, and healthcare technicians, have varying levels of access to patient data, areas of responsibility, and data security scenarios they encounter in a hospital setting. Understanding the impact of these differences in DPA is critical for developing institutional policies and designing training programs tailored to specific target groups.

The enactment of Turkey's Personal Data Protection Law No. 6698 (KVKK) and the European Union's General Data Protection Regulation (GDPR), which set international standards, are forcing healthcare institutions to be more careful about legal compliance. Data breaches carry serious consequences at both the institutional and individual levels within this legal framework, highlighting the importance of enhancing healthcare workers' competence in data protection.

In addition, the rapid spread of digital health platforms, the development of telemedicine, and the sharing of health data across multiple platforms during the COVID-19 pandemic have increased data security risks and increased awareness of this issue. In this context, up-to-date and comprehensive research is needed to determine the current level of knowledge and attitudes among healthcare workers, identify deficiencies, and develop improvement strategies.

This research fills an important gap by providing evidence-based information to policymakers, institutional managers, educators, and legislators on developing a data security culture in healthcare, protecting patient privacy, and ensuring legal compliance.

Purpose of the study

The main purpose of this study is to evaluate the knowledge levels, attitudes, and awareness of healthcare professionals working in public and private healthcare institutions in Turkey who have direct access to patient data regarding the recording and protection of personal health data from a multidimensional perspective.

The specific objectives of this study are as follows:

Knowledge of personal health data (Knowledge of Personal Health Data), awareness of legal regulations (Legal Knowledge), attitudes toward legal data sharing (Legal Data Sharing), perspectives on personal health data sharing (Personal Health Data Sharing), and approaches to data recording (Personal Health Data Recording) of healthcare workers.

To statistically examine the effects of demographic and professional variables, such as gender, age, education level, occupational group, type of institution (public/private), unit of employment, and level of professional experience, on the attitudes of healthcare workers toward data protection and identify differences.

The effects of healthcare workers' frequency of working with patient records, the information and training they receive on data protection procedures, and their digital document usage habits on their data protection awareness were evaluated.

This study aims to reveal the relational structures between the five basic dimensions of personal health data protection through correlation analysis and structural equation modeling, to understand the interactions between these dimensions, and to identify the key determinants that influence data protection awareness.

In light of the findings, develop concrete recommendations for developing a data protection culture in healthcare institutions, activating staff training programs, and improving institutional policies.

To create a data-driven framework for designing educational interventions focusing on target groups, considering the specific needs of different professional groups and work units.

In line with these objectives, the research aims to contribute to the field by filling theoretical gaps in the literature and providing practical insights to help raise data security standards in healthcare services.

Research Model

This study is structured within the causal-comparative design framework to identify the possible reasons underlying the differences between individuals or groups and to reveal the variables that shape these reasons. This model focuses on identifying the conditions that could lead to meaningful differences between groups by retrospectively analyzing the potential influencing factors behind the observed outcomes. The fundamental assumption of the research design is that it allows for the development of causal explanations based on existing groups without resorting to experimental intervention (Fraenkel et al., 2003; Büyüköztürk et al., 2008). This methodological approach offers an appropriate research strategy for obtaining meaningful conclusions about the origins of individual and structural differences, particularly in the social sciences, where experimental control is limited or ethically unfeasible.

Participants

The study group consists of healthcare professionals working in public and private hospitals in Turkey who have access to patient data. MacCallum and Widman (1999) argued that a sample size of 5 or 10 times the total number of items on the scale used to collect data is sufficient. There are 31 statements in this scale. The total number of participants in the study was 346. Based on this, the sample size is sufficient.

The descriptive analysis of the participants (N = 346) reveals that the sample predominantly consisted of female healthcare professionals (62.7%), with a significant majority being married (71.7%). In terms of educational attainment, 37.9% of the respondents held a bachelor's degree, and a noteworthy proportion (32.4%) had postgraduate qualifications, indicating a highly educated workforce. Regarding professional experience, more than half of the respondents (55.5%) were categorized as experienced healthcare professionals, with an additional 10.4% representing senior-level professionals. Health technicians constituted the largest occupational group (38.4%), followed by doctors and nurses (both 25.4%). A considerable proportion of the participants were affiliated with public healthcare institutions (64.5%), which aligns with the national distribution of healthcare services in many countries with public-dominant healthcare systems. Departmental distribution revealed a concentration in outpatient clinics (30.1%) and laboratories (18.5%), suggesting diverse exposure to clinical and diagnostic data environments.

Work experience classifications showed that over half of the participants (53.5%) occupied senior or strategic roles, indicating a mature engagement with institutional data protocols. Notably, a substantial majority of the professionals (80.9%) reported directly handling patient records and personal health information, underscoring the relevance of data protection practices within this cohort.

Institutional data privacy awareness appears to be well-integrated; 88.4% of the participants stated that they had been informed about data protection procedures, and 75.7% had received specific training on the protection of personal health data. These figures reflect a generally high level of organizational compliance with data privacy mandates.

Finally, digital handling of patient-related documents is routine, with 63.9% of respondents reporting daily engagement. This emphasizes the need for continuous reinforcement of digital security protocols, as frequent access to sensitive data increases vulnerability to breaches if not adequately managed. The demographic details of the participants are presented in Table 1.

Table 1

Demographic Findings

Variable	Category	Frequency (n)	Percentage (%)	Variable	Category	Frequency (n)	Percentage (%)
Gender	Female	217	62,7	Department	Emergency Service	57	16,5
	Male	129	37,3		Operating Room	42	12,1
Marital Status	Single	98	28,3		Laboratory	64	18,5
	Married	248	71,7		Outpatient Clinic	104	30,1
Educational Background	Associate Degree	103	29,8		Radiology	36	10,4

Variable	Category	Frequency (n)	Percentage (%)	Variable	Category	Frequency (n)	Percentage (%)
	Bachelor's Degree	131	37,9		Intensive Care Unit (ICU)	43	12,4
	Postgraduate	112	32,4	Level of Work Experience	Early-career Professionals	38	11,0
Age Group	Young healthcare professionals	118	34,1		Developing and Specializing in Professionals	123	35,5
	Experienced healthcare professionals	192	55,5		Senior and strategic personnel	185	53,5
	Senior healthcare professionals	36	10,4	Directly working with personal health records?	Yes	280	80,9
Profession	Doctor	88	25,4		No	66	19,1
	Midwife	37	10,7	Received Information on Workplace Data Protection Protocols?	Yes	306	88,4
	Nurse	88	25,4		No	40	11,6
	Health Technician	133	38,4	Have you received training on personal health data protection?	Yes	262	75,7
Type of institution	Public Hospital	223	64,5		No	84	24,3
	Private Hospital	123	35,5	Frequency of using digital documents containing patient information	Daily	221	63,9
					Several times per week	76	22,0
					Several times per month	49	14,2

Limitations

The study was conducted using data obtained from healthcare professionals working in public and private hospitals and family health centers across Turkey. Since the sampling strategy aimed to conduct representational analyses rather than generalizations, the findings should be evaluated contextually.

The causal comparison model required analysis based on naturally formed groups, and the structural model revealed statistically significant relationships. However, due to the structure of the model, focusing on explanatory interpretations rather than absolute causality is methodologically important.

A self-reporting method was used in the data collection process, and the research was conducted in strict adherence to the principles of anonymity and voluntariness. To improve data quality, the measurement process was structured and the internal consistency levels of the scales were tested.

The scale used in this study was originally developed for nursing students. Although MGCFA would constitute the most rigorous approach for definitively testing the scale's applicability across different professional groups, this analysis could not be conducted within the scope of the present study. The scale demonstrated exceptionally high internal consistency across all professional groups (Cronbach's alpha = 0.989), and the results of the CFA yielded acceptable model fit indices, collectively supporting the instrument's overall construct validity. Nevertheless, future research is strongly encouraged to examine measurement invariance across professional groups to further substantiate the scale's interdisciplinary applicability. This methodological limitation was carefully considered in the interpretation of the study findings.

Although the measurement instrument was originally developed for nursing students, it was adapted for use across diverse healthcare professional groups based on the interdisciplinary nature of healthcare data management and the scale's universal applicability of legal and ethical principles. However, this adaptation represents a methodological limitation that should be acknowledged. The psychometric properties of the scale were not revalidated for different professional groups or educational levels, which may affect the interpretation of between-group differences. Furthermore, the observed association between postgraduate education and higher awareness scores should be interpreted with caution, as this relationship may reflect confounding variables such as occupational position, scope of professional responsibility, years of experience, and selection effects rather than the direct impact of education itself. Therefore, all findings related to educational level represent associations rather than causal relationships.

The study data were collected in 2025 and reflect the current situation in the context of existing legal regulations and institutional practices. General trends in the use of digital systems by healthcare professionals were analyzed; however, the technical details of technological infrastructures and institutional data protection policies were not examined in depth.

Data Analysis

Various statistical techniques were applied in the data analysis using SPSS 25 software. In this context, CFA, independent samples t-test, one-way analysis of variance (ANOVA), and Scheffé post hoc test were performed. Additionally, hierarchical regression and multiple linear regression analyses were conducted, and SEM was used to examine the structural relationships between variables.

Findings

The Attitude Scale for the Recording and Protection of Personal Health Data for Nursing Students has a reliability of 0.989. This Cronbach's alpha value is considered excellent (Taber, 2018). The KMO value of the scale was 0.973. According to Kaiser (1974), this value is also excellent. Additionally, the scale explains 85.2% of the data.

Table 2

Factor Analysis

	Component						
	Knowledge of the Personal Health Data	Legal Knowledge	Legal data sharing	Sharing Personal Health Data	Recording of Personal Health Data	X	Std
At a health conference where scientific studies are presented, placing a cross or tape over images of patients is unlawful if it does not prevent the identification of the patient.	0,803					4,09	1,15
It is unlawful for retired healthcare personnel to disclose information about patients treated during their working life.	0,743						
If the boyfriend of a woman who is pregnant outside of marriage and wants to have an abortion requests information from a health center, it is against the law for health personnel to disclose information without the woman's consent.	0,73						
During pregnancy checkups, it is lawful for healthcare personnel to provide explanations to the patient's companion if the patient consent.	0,706						
Even if the patient does not suffer any harm from the disclosure of their personal health data to others, the disclosure constitutes a crime.	0,697						
It is unlawful to write patients' names and diagnoses on the doors of patient rooms without the patient's consent.	0,66						
If the patient has a condition that prevents them from safely driving or operating a vehicle, healthcare personnel should inform the relevant authorities.	0,649						
The patient has the center to learn about, request, and obtain a copy of all records kept about them, as well as the center not to learn about information related to them.	0,634						
Even if no complaint is filed, the Public Prosecutor's Office may initiate an investigation against a person who transfers the patient's health data to a private clinic without their consent.	0,598						
It is unlawful to disclose to the relevant unit for an MRI scan that the patient contracted the disease as a result of an extramarital affair.	0,588						
A healthcare professional who is assigned the role of "expert witness" or "preliminary investigator" in a case related to healthcare services may only disclose the information obtained during the performance of their duties to the assigned authority.	0,551						
It is unlawful for an intern to disclose patient information obtained during their internship to their family or friends.	0,513						
Concerns about the confidentiality of health information may prevent patients from receiving health services.		0,764				4,11	1,16

	Component						
	Knowledge of the Personal Health Data	Legal Knowledge	Legal data sharing	Sharing Personal Health Data	Recording of Personal Health Data	X	Std
Sharing a photograph taken by healthcare personnel with a patient on social media without the patient's consent is unlawful.		0,753					
Using information used in scientific research in the field of health in a way that reveals the patient's identity is unlawful.		0,725					
Photos of patients before and after cosmetic surgery may only be shown with the patient's consent, even for scientific purposes.		0,659					
Healthcare personnel are required to keep patient-related records to ensure the proper conduct of treatment and care and to provide evidence.		0,646					
Healthcare professionals, such as doctors, nurses, and midwives, are responsible for protecting personal health data.		0,641					
It is legal for healthcare personnel to record information about a patient who is addicted to drugs and to transfer it to the administration department in accordance with the procedure.		0,63					
Personal health data include information covering treatment and care practices, such as the patient's examination findings, diagnosis, test results, X-ray images, medications used, consultations, surgeries, and discharge summaries.			0,76			4,24	1,2
The disclosure of information that the patient does not wish to be disclosed to anyone other than themselves without legal obligation is unlawful.			0,739				
Recording information about the patient's political views or membership in associations or unions is unlawful when taking the patient's medical history.			0,732				
Personal health data fall within the scope of the individual's center to privacy, which is protected by the Constitution and the law.			0,728				
It is legal for healthcare personnel to report information about a patient diagnosed with a disease, such as AIDS, to the Provincial Health Directorate in accordance with the proper procedures.			0,606				
It is lawful for a healthcare worker who has been assaulted by a patient at a polyclinic to disclose patient information related to the crime to defend themselves in court.				0,683		3,94	1,15
A healthcare professional facing a malpractice lawsuit may disclose patient data to their lawyer or insurance company to defend themselves.				0,653			
It is legal for healthcare personnel to disclose information to the relevant authorities to prevent an individual with a mental disorder from harming others.				0,6			
Healthcare personnel record patient health data to ensure that the patient receives appropriate care and provide evidence when necessary.				0,524			

	Component						
	Knowledge of the Personal Health Data	Legal Knowledge	Legal data sharing	Sharing Personal Health Data	Recording of Personal Health Data	X	Std
Sharing patient information among relevant healthcare professionals during consultations is legal.					0,759	3,95	1,17
If possible, medical records should be kept concurrently with medical procedures or immediately after the procedure.					0,628		
There is no legal distinction between recording patient information in a service protocol logbook and recording it in a computerized system.					0,505		

The exploratory factor analysis yielded a robust and theoretically coherent five-factor structure, reflecting distinct yet interrelated dimensions of healthcare professionals' legal and ethical cognition surrounding the protection, sharing, and documentation of personal health data. Each factor demonstrated both statistical adequacy (with loadings ranging from 0.505 to 0.803) and conceptual clarity, thereby reinforcing the instrument's structural validity. The results elucidate nuanced patterns in the understanding and operationalization of health data protection norms across clinical settings among healthcare professionals. Knowledge of personal health data (loading range: 0.803–0.513) comprises a foundational understanding of what constitutes personal health data and under what circumstances its disclosure is considered unlawful. Items loading highly on this factor—such as the illegality of presenting insufficiently anonymized patient images in public forums or the inadmissibility of sharing patient information with third parties without explicit consent—underscore respondents' grasp of fundamental data privacy principles. The mean score (M = 4.09, SD = 1.15) suggests a moderately high level of awareness, although the relatively broad SD may signal variability in either contextual application or institutional reinforcement of these norms. This factor reflects a core dimension of health data literacy—legal and ethical comprehension of confidentiality obligations, irrespective of intent or outcome. Notably, the inclusion of items involving both overt disclosures (e.g., social sharing, conference presentation) and passive infractions (e.g., failure to anonymize) suggests that professionals possess a conceptual—but not uniformly operational—understanding of privacy safeguards. Legal Knowledge (loading range: 0.764–0.630) reflects respondents' legal literacy regarding data sharing boundaries and exceptions, particularly in non-clinical contexts such as research, public discourse, and social media. High-loading items include legal constraints against using identifiable data in scientific research or posting patient-related content without consent. The component is marked by legal precision and situational specificity, suggesting that when the contexts are clearly delineated, respondents can recognize legally sanctioned versus illicit actions. The mean score (M = 4.11, SD = 1.16) further confirms a relatively strong grasp of regulatory frameworks. However, the standard deviation again indicates knowledge inconsistencies—likely attributable to discrepancies in institutional training, evolving data protection laws, or differences in occupational exposure to such scenarios. Legal data sharing (loading range: 0.760–0.600) captures the understanding of healthcare professionals regarding the lawful sharing of personal

health data under statutory or judicial mandates. The included items illustrate complex legal scenarios—disclosing information to defend against malpractice claims, reporting public health risks, or responding to prosecutorial inquiries—requiring nuanced legal discernment. Interestingly, this factor yielded the lowest overall mean score (M = 3.94, SD = 1.15), suggesting a relative deficit in respondents' ability to accurately interpret exceptions to confidentiality based on overriding legal imperatives. This finding may reflect a broader tension between healthcare ethics (e.g., non-maleficence, confidentiality) and legal obligations (e.g., reporting mandates), which may hinder compliance or generate legal risk if center unresolved through institutional policy or training. Personal health data sharing (loading range: 0.759–0.524) is related to the intra-institutional exchange of patient information within multidisciplinary teams and routine clinical workflows. High-loading items include lawful consultations between healthcare personnel, timely record-keeping, and the procedural transfer of sensitive data under formal guidelines. The mean score (M = 3.95, SD = 1.17) denotes an intermediate level of comprehension, while the relatively high standard deviation indicates variable interpretations, perhaps reflecting inconsistency in local policies or professional norms. This factor bridges the ethical-legal continuum by combining lawful practice with implicit ethical responsibilities (e.g., discretion and necessity). Because these scenarios are embedded in daily clinical routines, such conceptual fuzziness represents a latent vulnerability that merits systematic educational intervention. Personal Health Data Recording (loading range: 0.628–0.505) emphasizes procedural knowledge and attitudes toward secure, accurate, and timely personal health data documentation. This includes maintaining parallel records across analog and digital platforms and recognizing the evidentiary value of health data in both clinical and legal settings. The highest mean score across all components (M = 4.24, SD = 1.20) strongly endorses data recording as a clinical and professional obligation. Nonetheless, the elevated variance implies inconsistent adherence or infrastructural constraints that impede standardization. Crucially, while documentation is widely accepted as necessary, its execution is not uniformly regulated or facilitated across healthcare institutions.

The multidimensional structure revealed by factor analysis provides compelling evidence that healthcare professionals differentiate between types of knowledge and contexts in which data protection principles apply. While foundational understanding and legal literacy appear relatively strong, significant variability in context-specific scenarios—especially those involving legal exceptions or interprofessional data exchange—raises critical concerns about operational clarity and risk mitigation. The factor structure exhibits face validity, content alignment, and internal consistency from a methodological standpoint. However, the consistently high SDs across all factors expose fissures in institutional training and policy uniformity. This is of particular concern in a regulatory environment where compliance lapses have tangible legal and ethical repercussions.

In sum, the findings underscore the need for targeted, scenario-based training modules, clearer institutional protocols, and harmonized legal-ethical guidance to bridge the gap between theoretical knowledge and practical application. The instrument's factorial integrity, combined with its diagnostic capacity, positions it as a valuable framework for future research, workforce training, and policy refinement in healthcare data governance.

Table 3

Independent Samples t-Test Results for the Subdimensions of Gender and Institution Type

Subdimension		N	X	t	p
Knowledge of the Personal Health Data	Male	129	4,22	-1,575	0,116
	Female	217	4,02		
	Public Hospital	223	4,01	-1,971	0,05
	Private Hospital	123	4,25		
Legal Knowledge	Male	129	4,22	-1,294	0,197
	Female	217	4,05		
	Public Hospital	223	4,03	-1,944	0,053
	Private Hospital	123	4,27		
Legal data sharing	Male	129	4,35	-1,231	0,219
	Female	217	4,18		
	Public Hospital	223	4,15	-2,101	0,037
	Private Hospital	123	4,42		
Sharing Personal Health Data	Male	129	4,11	-2,051	0,041
	Female	217	3,85		
	Public Hospital	223	3,93	-0,347	0,729
	Private Hospital	123	3,97		
Recording of Personal Health Data	Male	129	4,06	-1,362	.174
	Female	217	3,88		
	Public Hospital	223	3,88	-1,415	0,158
	Private Hospital	123	4,07		

In the study, the knowledge and attitudes of the participants regarding the protection and sharing of personal health data and legal regulations were examined using one-way analysis of variance (ANOVA) according to educational level, and significant differences were found in all sub-dimensions. Scheffé multiple comparison tests were performed for the variables found to be significant, detailing the groups between which the differences occurred.

In the Knowledge of Personal Health Data dimension, participants with postgraduate education levels scored significantly higher than those with associate and bachelor's degrees. In the Legal Knowledge subdimension, the postgraduate group showed a significant difference compared to the associate's degree group and scored higher than the bachelor's degree group, although the difference was at the threshold of significance. In the Legal Data Sharing dimension, the postgraduate group scored significantly higher than the associate degree group and at the threshold of significance compared to the bachelor's degree group. Similarly, in the Personal Health Data Sharing sub-dimension, the postgraduate group scored significantly higher than the associate degree group and at the threshold of significance compared to the bachelor's degree group. In the Personal Health Data Recording dimension, the postgraduate group had significantly higher scores than both the undergraduate and bachelor's degree groups, and the bachelor's degree group had significantly higher scores than the undergraduate group.

These findings show that the level of knowledge and attitudes regarding the protection and sharing of personal health data is significantly related to education level. The fact that individuals with postgraduate

education exhibit higher awareness and positive attitudes highlights the decisive role of education in the effective fulfillment of ethical and legal responsibilities. In this regard, more emphasis should be placed on ethical, legal, and practical content related to personal health data in pre-service and in-service education programs in the health field.

Table 4

Relationships between education and factors

		Sum of the Squares	d	Mean Square	F	Sig.
Knowledge of the Personal Health Data	Between Groups	24,924	2	12,462	9,749	0,000
	Within Groups	438,469	343	1,278		
	Total	463,393	345			
Legal Knowledge	Between Groups	24,684	2	12,342	9,562	0,000
	Within Groups	442,749	343	1,291		
	Total	467,434	345			
Legal data sharing	Between Groups	25,395	2	12,697	9,080	0,000
	Within Groups	479,670	343	1,398		
	Total	505,065	345			
Sharing Personal Health Data	Between Groups	21,665	2	10,833	8,549	0,000
	Within Groups	434,612	343	1,267		
	Total	456,277	345			
Recording of Personal Health Data	Between Groups	38,899	2	19,450	15,240	0,000
	Within Groups	437,755	343	1,276		
	Total	476,654	345			

The findings of the analysis show that there are significant differences in the level of knowledge and attitudes regarding the protection of personal health data among participants according to their occupational groups. In the one-way analysis of variance conducted in the dimensions of knowledge of personal health data, legal knowledge, legal data sharing, personal health data sharing, and personal health data recording, all differences are statistically significant ($p < .001$). The Scheffé test results reveal that these differences are particularly pronounced between doctors and other healthcare personnel (midwives, nurses, and healthcare technicians). Doctors scored significantly higher in all dimensions than other occupational groups. This effect is particularly pronounced in the Knowledge of Personal Health Data, Legal Knowledge, and Personal Health Data Recording dimensions.

Among midwives, nurses, and health technicians, no significant differences were observed in most dimensions; this indicates that the knowledge and attitude levels of support staff regarding data security are similar, but they differ statistically from doctors. Doctors' higher levels of awareness may stem from their professional responsibilities requiring direct and continuous access to patient data. In contrast, the lower scores among support staff may indicate that data security is not sufficiently emphasized in their job descriptions or that institutional training is lacking.

In conclusion, developing profession-based and needs-oriented training programs for all professional groups is essential to ensure that health data are managed ethically, securely, and within a legal framework.

Strategic and targeted interventions to increase the digital data awareness of support staff are critical in terms of patient safety and service quality.

Table 5

Relationships between occupational groups and factors

		Sum of the Squares	d	Mean Square	F	Sig.
Knowledge of the Personal Health Data	Between Groups	32,594	3	10,865	8,625	,000
	Within Groups	430,800	342	1,260		
	Total	463,393	345			
Legal Knowledge	Between Groups	30,131	3	10,044	7,855	,000
	Within Groups	437,302	342	1,279		
	Total	467,434	345			
Legal data sharing	Between Groups	32,734	3	10,911	7,901	,000
	Within Groups	472,331	342	1,381		
	Total	505,065	345			
Sharing Personal Health Data	Between Groups	23,772	3	7,924	6,266	,000
	Within Groups	432,505	342	1,265		
	Total	456,277	345			
Recording of Personal Health Data	Between Groups	39,356	3	13,119	10,260	,000
	Within Groups	437,298	342	1,279		
	Total	476,654	345			

The study found significant differences in the levels of knowledge, attitudes, and behaviors regarding the protection of personal health data among healthcare workers, depending on the units in which they work. A one-way analysis of variance indicated statistically significant differences in all subdimensions.

In the Knowledge of Personal Health Data dimension, the unit where the task is performed makes a difference ($F(5, 340) = 3.851$; $p = .002$), and the Scheffé test shows that this difference is particularly significant between the ED and the OR and OC. The fact that emergency department staff have a significantly lower level of awareness than other groups suggests that data security awareness may take a back seat due to the need for quick decision-making and high patient traffic.

Significant differences were also observed in terms of legal knowledge ($F(5, 340) = 4.856$; $p < .001$); operating room staff have a higher level of legal knowledge than emergency department, laboratory, and outpatient clinic staff. This indicates that legal responsibility awareness may be higher in units directly related to high-sensitivity procedures.

Significant differences were also found in the Legal Data Sharing dimension ($F(5, 340) = 3.288$; $p = .006$); particularly, operating room staff demonstrated a higher level of awareness compared to emergency department staff. The time pressure associated with emergency intervention processes may lead to insufficient attention being given to data sharing processes.

A similar pattern was observed in the Personal Health Data Sharing sub-dimension ($F(5, 340) = 4.253$; $p = .001$); the operating room staff scored higher than the emergency department, laboratory, and outpatient clinic staff. This difference can be explained by more conscious and legally compliant data sharing practices.

Significant differences were also observed in the Personal Health Data Recording dimension according to the unit of assignment (F(5, 340) = 5.256; p < .001). Operating room staff were found to have higher attitudes toward data recording, especially compared with the emergency department and laboratory staff. This situation can be attributed to the operating room environment's structural discipline in data management processes.

In general, the unit in which the task is performed is a decisive variable in terms of awareness, knowledge, and attitudes regarding the protection of personal health data. The higher level of awareness among operating room staff is related to the disciplinary structure and protocol-based operation in these units. In contrast, the low level of awareness observed in the ED may be due to the workload and dynamic nature of this environment.

These differences necessitate the re-evaluation of personal data security policies in healthcare institutions according to their areas of responsibility and the unit-based structuring of educational content. This would support healthcare workers in different service units in achieving equal knowledge and awareness levels.

Table 6

Relationships between Units and Task-Performing Factors

		Sum of the Squares	d	Mean Square	F	Sig.
Knowledge of the Personal Health Data	Between Groups	24,837	5	4,967	3,851	,002
	Within Groups	438,556	340	1,290		
	Total	463,393	345			
Legal Knowledge	Between Groups	31,158	5	6,232	4,856	,000
	Within Groups	436,275	340	1,283		
	Total	467,434	345			
Legal data sharing	Between Groups	23,298	5	4,660	3,288	,006
	Within Groups	481,767	340	1,417		
	Total	505,065	345			
Sharing Personal Health Data	Between Groups	26,858	5	5,372	4,253	,001
	Within Groups	429,419	340	1,263		
	Total	456,277	345			
Recording of Personal Health Data	Between Groups	34,201	5	6,840	5,256	,000
	Within Groups	442,452	340	1,301		
	Total	476,654	345			

The results of the one-way analysis of variance (ANOVA) revealed that the frequency of use of digital patient documents by healthcare professionals led to significant differences in their knowledge, attitudes, and awareness levels regarding the protection of personal health data. Specifically, knowledge of personal health data (F(2,343) = 3.360; p = .036), legal knowledge (F(2,343) = 3.750; p = .024), legal data sharing (F(2,343) = 4.476; p = .012), and personal health data recording (F(2,343) = 3.811; p = .023) were the most important variables. A difference approaching significance was observed in the Personal Health Data Sharing variable (F(2,343) = 2.732; p = .067). Scheffé test results show that these differences are particularly concentrated between those who use digital documents "every day" and those who use them "a few times a month."

Significant differences were found between these two groups in the Legal Data Sharing (p = .019) and Personal Health Data Recording (p =.025) dimensions. Daily users demonstrate higher awareness and attitudes regarding the legal sharing and recording of personal health data.

These findings indicate that regular access to digital patient information systems increases awareness of PDP. Healthcare professionals who interact with digital systems are found to have higher levels of knowledge regarding legal obligations and data security protocols.

In conclusion, the regular and widespread use of digital health documents positively influences the attitudes of healthcare workers toward data protection, legal responsibility, and patient privacy. Therefore, healthcare institutions must promote the use of digital documents, offer continuous training programs on this topic, and develop awareness-raising strategies for groups with low usage rates to institutionalize a data security culture and provide effective healthcare services.

Table 7

Frequency of Use of Documents Containing Patient Data and Factor Interrelationships

		Sum of the Squares	d	Mean Square	F	Sig.
Knowledge of the Personal Health Data	Between Groups	8,905	2	4,452	3,360	,036
	Within Groups	454,488	343	1,325		
	Total	463,393	345			
Legal Knowledge	Between Groups	10,003	2	5,002	3,750	,024
	Within Groups	457,430	343	1,334		
	Total	467,434	345			
Legal data sharing	Between Groups	12,847	2	6,424	4,476	,012
	Within Groups	492,218	343	1,435		
	Total	505,065	345			
Sharing Personal Health Data	Between Groups	7,155	2	3,577	2,732	,067
	Within Groups	449,122	343	1,309		
	Total	456,277	345			
Recording of Personal Health Data	Between Groups	10,361	2	5,181	3,811	,023
	Within Groups	466,293	343	1,359		
	Total	476,654	345			

The results of the correlation analysis show that there are highly significant (p < .01) positive relationships ranging from.85 to.97 between the five basic structural variables addressed in the study. This indicates that the relationship between these variables exhibits remarkable structural integrity in terms of strength and consistency.

In particular, the extremely high correlation between knowledge of personal health data and legal knowledge (r = .972) reveals that in practice, these two variables conceptually overlap and complement each other. Similar levels of correlation with other sub-dimensions (Legal Data Sharing, Personal Health Data Sharing, Personal Health Data Recording) also suggest that data security and legal awareness can be addressed within an integrated, holistic framework.

These high correlations provide strong support for the structural validity and internal consistency of the scales and confirm the conceptual model of the study. In this context, the relational integrity between

the variables enhances the applicability of advanced multivariate analyses, such as structural equation modeling, enabling more in-depth inferences in the areas of data security and legal awareness.

Table 8

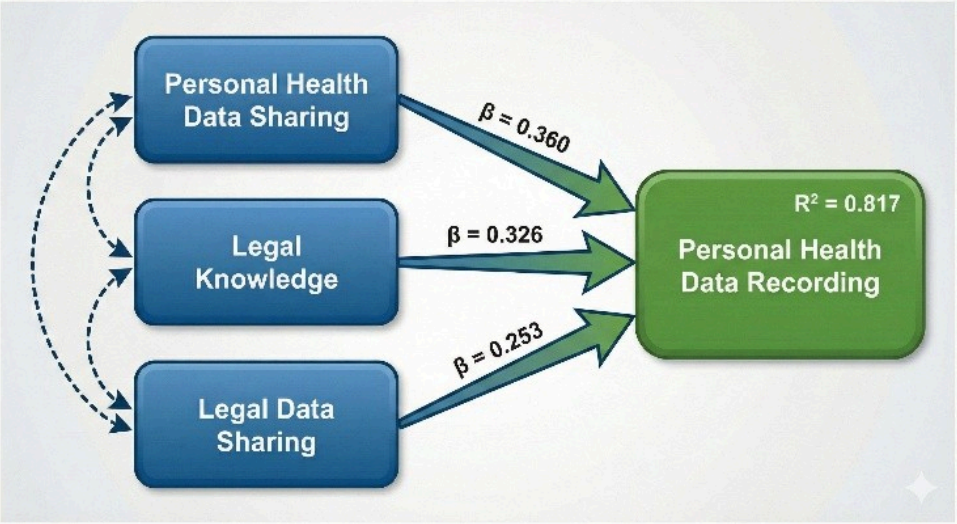
Relationships between the Factors

		Knowledge of the Personal Health Data	Legal Knowledge	Legal data sharing	Sharing Personal Health Data	Recording of Personal Health Data
Knowledge of the Personal Health Data	Pearson Correlation	1	,972**	,947**	,906**	,875**
	Sig. (2-tailed)		,000	,000	,000	,000
	N	346	346	346	346	346
Legal Knowledge	Pearson Correlation	,972**	1	,940**	,881**	,881**
	Sig. (2-tailed)	,000		,000	,000	,000
	N	346	346	346	346	346
Legal data sharing	Pearson Correlation	,947**	,940**	1	,850**	,866**
	Sig. (2-tailed)	,000	,000		,000	,000
	N	346	346	346	346	346
Sharing Personal Health Data	Pearson Correlation	,906**	,881**	,850**	1	,863**
	Sig. (2-tailed)	,000	,000	,000		,000
	N	346	346	346	346	346
Recording of Personal Health Data	Pearson Correlation	,875**	,881**	,866**	,863**	1
	Sig. (2-tailed)	,000	,000	,000	,000	
	N	346	346	346	346	346

**. Correlation is significant at the 0.01 level (2-tailed).

Figure 3

Personel Health Data Recording using the SEM Model



Initially, the measurement model comprised five subdimensions: knowledge of personal health data, legal knowledge, legal data sharing, personal health data sharing, and personal health data recording.

However, as part of the preliminary analyses, multiple regression and multicollinearity diagnostics were conducted to ensure the model's robustness. These analyses revealed that the Knowledge of Personal Health Data dimension exhibited substantial overlap with the legal-related constructs and produced VIF values exceeding acceptable thresholds, indicating excessive shared variance among predictors. Therefore, to enhance the interpretability and statistical stability of the model, this dimension was excluded from the final regression analysis.

The refined model, presented in Figure 3, demonstrates that Personal Health Data Recording awareness is strongly explained by three core predictors, accounting for a substantial proportion of variance (R^2 = 0.817). As illustrated in the structural model, PHD emerged as the most influential determinant of awareness (β = 0.360), followed by Legal Knowledge (β = 0.326) and Legal Data Sharing (β = 0.253). The relationships depicted in the model indicate that legal knowledge and data-sharing practices operate in an integrated and complementary manner in shaping awareness.

Table 9

Results of the Structural Model for Personal Health Data Recording

Predictor Variable	Standardized β	t-value	p-value	Interpretation
Sharing Personal Health Data	0.360	7.313	< .001	Strongest predictor
Legal Knowledge	0.326	4.278	< .001	Strong and significant effect
Legal data sharing	0.253	3.700	< .001	Moderate supportive effect
Model Fit	R^2 = 0.817			Very high explanatory power

The results of the regression analysis revealed that the strongest positive predictor of awareness regarding Personal Health Data Recording is Personal Health Data Sharing (β = 0.360, p < .001). Legal Knowledge (β = 0.326, p < .001) and Legal Data Sharing (β = 0.253, p < .001), both of which exhibit statistically significant and positive effects on awareness, are followed. Taken together, these predictors explain a substantial proportion of variance in personal health data recording awareness (R^2 = 0.817), indicating a highly robust explanatory model.

In conclusion, awareness regarding the recording of personal health data is primarily shaped by legally grounded data-sharing practices and the internalization of legal knowledge, rather than by isolated or fragmented forms of information. This finding underscores that effective awareness formation depends not only on knowledge but also on the integration of legal frameworks, policy implementation, and routine professional practices. Accordingly, policy-oriented and legally structured interventions appear to be critical mechanisms for strengthening the awareness of healthcare data protection processes.

DISCUSSION AND CONCLUSION

This study demonstrates that the knowledge, attitudes, and awareness of healthcare professionals regarding the recording and protection of personal health data constitute a multidimensional construct, shaped not primarily by individual characteristics but by institutional context, professional responsibilities, and the degree of interaction with digital systems.

Systematic Differences among Professional Groups: A Structural Perspective

One of the most salient findings of the study is that physicians scored significantly higher than nurses, midwives, and healthcare technicians across all five dimensions—Knowledge of Personal Health Data, Legal Knowledge, Legal Data Sharing, Personal Health Data Sharing, and Personal Health Data Recording (all com-

parisons $p < .001$). These findings address a notable gap in the existing literature, which has predominantly focused on nursing students (Maraş & Ceyhan, 2021; Eskimez & Köse Tosunöz, 2023; Pakiş Çetin & Çevik, 2021; Kırca et al., 2025), while comprehensive examinations of actively practicing healthcare professionals across different occupational groups remain limited. Nevertheless, the interpretation of these differences must be approached with careful consideration of key methodological constraints.

Methodological Consideration: Measurement Invariance

A primary limitation of the present study lies in the application of the scale across professional groups without formally testing measurement invariance through MGCFA. The instrument was originally developed for nursing students (Bezirgan Gözmener et al., 2019), and its adaptation to heterogeneous professional groups requires renewed psychometric validation. In the absence of measurement invariance testing, observed score differences may reflect not only genuine variations in awareness but also DIF. For example, items referencing expert witness roles or malpractice litigation may resonate more strongly with physicians due to their greater medico-legal exposure; items describing routine clinical procedures may be interpreted differently by nurses and technicians based on their distinct responsibilities; and legal terminology may be processed with varying levels of precision across educational and professional backgrounds. All professional group comparisons should be interpreted as preliminary and hypothesis-generating findings (Vandenberg & Lance, 2000; Putnick & Bornstein, 2016).

Multilevel Explanations of Physician Superiority

Despite this caution, several structural mechanisms may account for the observed differences in physician–support staff. First, within the Turkish healthcare system, the professional role and legal responsibility place physicians in a position of ultimate accountability for patient care decisions, exposing them to heightened medico-legal risk, greater autonomy in data-sharing decisions, and stronger legal–ethical emphasis during training. Second, educational attainment functions as a confounding factor: while all physicians in the sample held at least a bachelor's degree, 68% possessed postgraduate qualifications (compared to 32% of the overall sample). Given that education level independently predicted awareness scores (Table 4), physician–nurse differences may partially reflect educational rather than purely occupational effects—an issue that the causal-comparative design cannot disentangle. Third, measurement bias cannot be ruled out because higher physician scores may partly reflect differential item salience rather than substantive superiority.

Homogeneity Among Support Staff: Evidence of Structural Marginalization

The absence of significant differences among nurses, midwives, and healthcare technicians across most dimensions (Scheffé tests, all $p > .05$) is theoretically informative. This homogeneity suggests that specific technical roles drive awareness variation less than hierarchical positioning within the healthcare system. These groups share subordinate roles in clinical decision-making, limited autonomy over data-sharing decisions, task-oriented training emphasizing procedural compliance, and reduced medico-legal exposure. If professionals with distinct scopes of practice nonetheless exhibit comparable—and relatively lower—levels of awareness, this pattern points to systemic educational deficiencies affecting all non-physician staff. More broadly, it reflects hierarchical knowledge distribution within healthcare organizations, where legal and ethical training is disproportionately directed toward physicians.

Role of Clinical Units: Organizational Context and Culture

Consistently higher scores among operating room staff compared with emergency, laboratory, and outpatient units (Table 6) underscore the decisive influence of organizational context. Operating rooms are characterized by high procedural standardization, structured planning, comprehensive team briefings, clearly delineated roles, and frequent regulatory oversight—features that foster a disciplined culture extending to data security practices. In contrast, emergency departments, which exhibited the lowest awareness scores across all dimensions, operate under constant pressure, high cognitive load, open physical layouts, frequent interruptions, and cultural normalization of privacy compromises. Practices such as discussing patient information in corridors or reviewing medical histories in crowded spaces may become routine over time. These findings are consistent with previous evidence documenting unit-based variability (Dündar et al., 2024).

Digital Documentation and Awareness: Technology as an Educational Medium

Participants who accessed digital patient records daily demonstrated significantly higher scores in Legal Data Sharing ($p = .012$) and Personal Health Data Recording ($p = .023$) than those who accessed records only a few times per month (Table 7). This pattern highlights the role of digital health systems as continuous learning environments, not merely as information repositories. EHR systems render data security visible through login protocols, access logs, audit trails, embedded training modules, and immediate feedback on unauthorized attempts. Such ongoing exposure appears to facilitate the internalization of the principles of data protection.

The Knowledge–Awareness Paradox: Theoretical and Practical Implications

The initially observed negative association between Knowledge of Personal Health Data and awareness —although excluded from the final model due to severe multicollinearity (VIF = 18.43)—challenges the assumption that knowledge acquisition automatically enhances professional awareness. Several mechanisms proposed in the theoretical framework may account for this paradox: overconfidence leading to complacency (Kruger & Dunning, 1999), the declarative–procedural gap (Anderson, 1982), lack of implementation intentions (Gollwitzer, 1999), automation effects among experts (Kalyuga et al., 2003), and organizational barriers preventing knowledge translation into practice (Cabana et al., 1999). Together, these mechanisms suggest that information-heavy training alone is insufficient and that interventions should emphasize simulation-based procedural learning, metacognitive strategies, and organizational redesign.

Structural Equation Modeling: An Integrated Awareness View

Structural equation modeling (Figure 3, Table 9) demonstrates that Personal Health Data Recording awareness is strongly explained by three predictors ($R^2 = 0.817$): Personal Health Data Sharing ($\beta = 0.360$, $p < .001$), Legal Knowledge ($\beta = 0.326$, $p < .001$), and Legal Data Sharing ($\beta = 0.253$, $p < .001$). The dominance of PHD indicates that awareness is embedded in daily clinical interactions rather than abstract principles. Meanwhile, the strong effect of Legal Knowledge confirms that regulatory frameworks such as KVKK and GDPR function as behavioral guidance systems—yet their impact is maximized when they are integrated with hands-on data-sharing practices.

Methodological Considerations: Multicollinearity and Discriminant Validity

Extremely high inter-factor correlations (r = .85–.97; Table 8) and elevated VIF values (9.34–18.43) indicate serious multicollinearity and weak discriminant validity (Hair et al., 2010; Farrell, 2010). The correlation of r = .972 between knowledge of personal health data and legal knowledge implies that these constructs share 94.5% of their variance, raising questions about their empirical distinctiveness. Although the model demonstrates strong predictive power, individual path coefficients should therefore be interpreted with caution and regarded as indicative rather than definitive evidence.

The findings should be interpreted considering several limitations: absence of measurement invariance testing, weak discriminant validity, constraints on causal inference inherent in the cross-sectional design, reliance on self-reported data, and inability to capture temporal changes in awareness. Future research should conduct MGCFA across professional groups, explore more parsimonious factor structures, employ longitudinal and intervention designs, triangulate self-report with behavioral indicators, and develop profession-specific or mixed-method measurement tools.

Despite these limitations, the study reveals robust patterns: systematic professional differences, unit-based effects, benefits of digital exposure, and the central role of integrating legal knowledge with practice. Data security in healthcare is a multilayered phenomenon that requires institutional policies, differentiated training strategies, and supportive organizational cultures. The findings provide a foundation for evidence-based interventions while underscoring the need for future research to refine methodologies.

Peer Review Externally peer-reviewed.
Conflict of Interest The author have no conflict of interest to declare.
Grant Support The author declared that this study has received no financial support.

Author Details Faruk Dursun
[1] Sakarya University, Faculty of Business Administration, Management Information Systems, Sakarya, Türkiye
0000-0003-1571-1107 : farukdursun@sakarya.edu.tr

References

Ajzen, I. (1991). Theory of planned behavior *Organizational Behavior and Human Decision Processes*, 50(2), 179-211. https://doi.org/10.1016/0749-5978(91)90020-T

Alçin, A. A. (2022). Personal health data in Turkish law and the obligation of the administration to protect personal health data. *Türkiye adalat Akademisi Dergisi*, 10(51), 365–410. https://doi.org/10.54049/taad.1140182

Anderson, J. R. (1982). Acquisition of cognitive skills. *Psychological Review*, 89(4), 369-406. https://doi.org/10.1037/0033-295X.89.4.369

Ataklıoğlu Başkan, S., Karakurt, P. & Kasımoğlu, N. (2021). Nursing students' attitudes toward recording and protecting patients' personal health data: A descriptive study *Galician Medical Journal*, 28(3), 1-7. https://doi.org/10.21802/gmj.2021.3.3

Atalay, H. (2021). Mahremiyet kapsamında kişisel sağlık verilerinin korunması ve depolanması. *Journal of Academic Perspective on Social Studies*, (1), 01-20. https://doi.org/10.35344/japss.786353

Atalay, H. N. & Yücel, Ş. (2023). Kişisel sağlık verileri paylaşımı ile ilgili değişkenlerin sosyo-demografik özellikler bakımından farklılıkları. Bilgi *Yönetimi Dergisi*, 6(2), 231 – 245. https://doi.org/10.33721/by.1242514

Basit, G. (2021). Hemşirelik öğrencilerinin hastaların kişisel sağlık verileri ile ilgili görüşleri. *Ege Üniversitesi Hemşirelik Fakültesi Dergisi*, 37(3), 189-195. https://doi.org/10.53490/egehemsire.792537

Bezirgan Gözmener, S., Şenol, S. & Seren İntepeler, Ş. (2019). Hemşirelik öğrencileri için kişisel sağlık verilerinin kayıt ve korunması tutum ölçeği geçerlik ve güvenirlik çalışması*. *Dokuz Eylül Üniversitesi Hemşirelik Fakültesi Elektronik Dergisi*, 12(1), 21-30.

Bilgiç, İ., Paslı Gürdoğan, E. & Uslu, B. (2025). Nursing students' attitudes toward the security of personal health data. *Balkan Journal of Health Sciences*, 3(3), 135-143. https://doi.org/10.61830/balkansbd.1614742https://doi.org/10.61830/balkansbd.1614742

Büyüköztürk, Ş., Çakmak, E., Akgün, Ö., Karadeniz, Ş. ve Demirel, F. (2008). *Bilimsel araştırma yöntemleri* (1. Baskı). Ankara: Pegem Akademi,

Cabana, M. D., Rand, C. S., Powe, N. R., Wu, A. W., Wilson, M. H., Abboud, P. A., and Rubin, H. R. (1999). Why do physicians not follow clinical practice guidelines? A framework for improvement. *JAMA*, 282(15), 1458-1465. https://doi.org/10.1001/jama.282.15.1458

Çavdar Lokumcu, P. (2024). Hekimlerin hastalarına ilişkin sosyal medya paylaşımlarından doğan sorumluluğu. *Sakarya Üniversitesi Hukuk Fakültesi Dergisi*, 12(1), 429-453. https://doi.org/10.56701/shd.1462767

Demir Karabayır, E., Karaca Dedeoğlu & Kurşun, A. (2023). Sağlık Bilimleri Fakültesi öğrencilerinin kişisel sağlık verilerinin kayıt ve korunmasına ilişkin tutumlarının incelenmesi. *R&S- Research Studies Anatolia Journal*, 6(2), 145-168. https://doi.org/10.33723/rs.1257657

Dündar, A., Hacivelioğlu, D., Erdoğdu, S., & Gündüz, N. (2024). Attitudes toward the recording and protection of personal health data: An example of a public hospital in Istanbul *The Turkish Journal of Bioethics*, 11(1), 17-27.

Durmuş İskender, M. & Durmuş, A. (2022). Determining the correlation between the privacy consciousness of midwifery and nursing students and their attitudes toward the recording and protection of personal health data. Euroasia *Journal of Mathematics, Engineering, Natural & Medical Sciences*, 9(21), 67-78. https://doi.org/10.38065/euroasiaorg.960

Durmuş, V. (2021). Kişisel sağlık verilerinin korunmasında idarenin hukuki sorumluluğu. *Dokuz Eylül Üniversitesi Hemşirelik Fakültesi Elektronik Dergisi*, 2014, 14(1), 67-76.

Dutta, J. Barman, S. (2025). Smart contract and blockchain-based secured approach for storing and sharing electronic health records. *Multimed Tools Applied*, 84, 16883–16907. https://doi.org/10.1007/s11042-024-19714-7

Ericsson, K. A., Prietula, M. J. and Cokely, E. T. (2007). Making an expert. *Harvard Business Review*, 85(7-8), 114-121.

Eskimez, Z. & Köse Tosunöz, İ. (2023). Nursing students' attitudes toward the registration and preservation of personal health data *Etkileşimli Hemşirelik Dergisi*, 16(4), 513-523. https://doi.org/10.46483/jnef.1375543

Evci Eralp, Ö. (2023). İşyerlerinde kişisel sağlık verilerinin işlenmesinde sır saklama yükümlülüğünün kapsamı. *Kişisel Verileri Koruma Dergisi*, 5(2), 28-38. https://doi.org/10.1016/j.kişiselverilerikorumadergisi

Farrell, A. M. (2010). Insufficient discriminant validity: A comment on Bove et al. (2009). *Journal of Business Research*, 63(3), 324-327. https://doi.org/10.1016/j.jbusres.2009.05.003

Fraenkel, J. R., & Wallen, N. E. & Hyun, H. H. (2003). How to design and evaluate research in education. McGraw-Hill Higher Education, 366-386.

Gollwitzer, P. M. (1999). Implementation intentions: The strong effects of simple plans. *American Psychologist*, 54(7), 493-503. https://doi.org/10.1037/0003-066X.54.7.493

Graber, M. L., Franklin, N., & Gordon, R. (2005). Diagnostic errors in internal medicine *Archives of Internal Medicine*, 165(13), 1493-1499. https://doi.org/10.1001/archinte.165.13.1493

Grol, R., & Grimshaw, J. (2003). From best evidence to best practice: Effective implementation of change in patient care *The Lancet*, 362(9391), 1225-1230. https://doi.org/10.1016/S0140-6736(03)14546-1https://doi.org/10.1016/S0140-6736(03)14546-1

Gupta, N., Vashist, S., & Verma, R. & Terang, P. P. (2025). Cybersecurity and Privacy Concerns in Digital Health *Navigating Innovations and Challenges in Travel Medicine and Digital Health*. https://doi.org/10.4018/979-8-3693-8774-0.ch019

Hair, J. F.; Black, W. C.; Babin, B. J.; Anderson, R. E. (2010). *Multivariate data analysis* (7th ed.). Pearson, Prentice Hall.

İster, E. D. (2022). Nursing students' attitudes toward registration and protection of personal health data and related factors *Turkish Journal of Bioethics*, 9(3), 95-104

Kahneman, D. (2011). *Thinking, Fast and Slow*. Farrar, Straus, and Giroux.

Kaiser, H. F. (1974). An index of factorial simplicity. *Psychometrika*, 39(1), p.

Kalyuga, S., Ayres, P., Chandler, P., & Sweller, J. (2003). The expertise reversal effect. *Educational Psychologist*, 38(1), 23-31. https://doi.org/10.1207/S15326985EP3801_4

Keshta, I. Odeh, A. (2021). Security and Privacy of Electronic Health Records: Concerns and Challenges *Journal of Egyptian Informatics,* 22(2), 177–183.

Kırca, N., Bademli, K., Ozgonul, M. L. Karacar, Y. (2025). Relationship between the awareness of privacy, registration, and preservation of personal health data of nursing students: A cross-sectional study *International Journal of Caring Sciences*, 18(1), 152-164.

Kruger, J., & Dunning, D. (1999). Unskilled and unaware of it: How difficulties in recognizing one's own incompetence lead to inflated self-assessments *Journal of Personality and Social Psychology*, 77(6), 1121-1134. https://doi.org/10.1037/0022-3514.77.6.1121

Kurt Konca, & Badur, E. (2023). Avukatın müvekkilinin kişisel sağlık verilerine erişimine ilişkin değerlendirmeler. *Selçuk Ünviersitesi Hukuk Fakültesi Dergisi*, 31(1), 193-228. https://doi.org/10.15337/suhfd.1238540

MacCallum, R., and C. Widaman, K. F. (1999). Sample size in the factor analysis *Psychological Methods*, 4 (1), 84-99. https://doi.org/10.1037/1082-989X.4.1.84.

Mahammad, S. & Rani, K. U. (2025). Secure sharing of health records stored in a cloud using cryptographic secret sharing schemes through computational intelligence: A review *Computational Intelligence in Sustainable Computing and Optimization,* 281-301. https://doi.org/10.1016/B978-0-443-23724-9.00015-3

Maraş, G. & Ceyhan, Ö. (2021). Nursing students' attitudes toward the registration and protection of personal health data. *Journal of Inonu University Health Services Vocational School*, 9(2), 498-509. https://doi.org/10.33715/inonusaglik.851192

Mehmedović, E., & Mehmedović, A. (2023). Personal health data and the significance of its administrative protection. *Uprava*, *14*(2), 11–37. https://doi.org/10.53028/1986-6127.2023.14.2.11

Olğun, S. & Adıbelli, D. (2022). Hemşirelik öğrencilerinin hastaların kişisel sağlık verilerinin kayıt ve korunmasına yönelik tutumlarının belirlenmesi. *Sürekli Tıp Eğitimi Dergisi*, 31(6), 441-450. https://doi.org/10.17942/sted.1063958

Pakiş Çetin S. & Çevik K. (2021). Hemşirelik öğrencilerinin hastaların kişisel sağlık verilerinin kayıt ve korunmasına ilişkin tutumları. *Dokuz Eylül Üniversitesi Hemşirelik Fakültesi Elektronik Dergisi,* 14(3), 199- 206. https://doi.org/10.46483/deuhfed.779557

Putnick, D. L. and Bornstein, M. H. (2016). Measurement invariance conventions and reporting: State of the art and future directions for psychological research. *Developmental Review*, 41, 71-90. https://doi.org/10.1016/j.dr.2016.06.004

Shabir, G. Kenzie, F. (2025). Enhancing Patient-Doctor Communication with Digital Tools: A Path to Better Health Literacy and Outcomes https://doi.org/10.13140/RG.2.2.15931.94248

Shah, S. M., & Khan, R. A. (2020). Secondary use of electronic health record: Opportunities and challenges. *IEEE Access*, 8, 136947–136965.

Silva, R. R. T. (2025). A Privacy Aware Architecture for Electronic Health Records. Thesis. Faculdade de Ciências e Tecnologia da Universidade de Coimbra.

Taber, K. S. (2018). Cronbach's alpha is used when developing and reporting research instruments in science education. *Research in Science Education*, 48, 1273-1296. https://doi.org/10.1007/s11165-016-9602-2.

Tao, X., Shi, S. & Liu, J. (2025). Established but unused? Empirical study on the impact of health records on the use of basic public health services in China *Evaluation and Program Planning*, 112. DOI: 10.1016/j.evalprogplan.2025.102654

Tural Büyük, E. & Ünaldı Baydın, N. (2020). Relationship between EI and ethical sensitivity in Turkish nursing students *Turkish Journal of Bioethics*, 19(2), 341-351. https://doi.org/10.5505/tjob.2020.93685

Türk, F., & Topuz, İ., (2024). Yeni kuşak hemşirelik öğrencilerinde hasta mahremiyetinin incelenmesi. Sivas Cumhuriyet Üniversitesi Sağlık Öğrencileri Kongresi. Sivas, Turkey

Ülker, T. & Korkut, S. (2023). Does the consciousness of nursing students regarding privacy affect their attitudes toward the registration and preservation of personal health data? A descriptive study *Ordu University Journal of Nursing Studies*, 6(3), 640-648. https://doi.org/10.38108/ouhcd.1099347

Vandenberg, R. J., & Lance, C. E. (2000). A review and synthesis of the literature on measurement invariance: suggestions, practices, and recommendations for organizational research. *Organizational Research Methods*, 3(1), 4-70. https://doi.org/10.1177/109442810031002

Ware, S., Sukte, C., Patil, S., Patil, T., Keripale, S. & Nikam, Y. (2025). HealthX: Smart Health Record Management System with Speech Input, 2025 International Conference on Advanced Computing Technologies (ICoACT), Sivalasi, India, 1-7, doi: 10.1109/ICoACT63339.2025.11004679.

Xu, G. & Zhao, L. (2024). Classification and retrieval of personal health data based on differential privacy *International Journal of Data Mining and Bioinformatics*, 29(1-2).

Yılmaz, D. Uysal, O. (2024). Nursing students' attitudes toward the recording and protection of patient health data: A cross-sectional study *Makara Journal of Health Research*, 28(2), 148-154. https://doi.org/10.7454/msk.v28i2.1604