Original Article

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# Knowledge and attitudes of doctors in Basra governorate regarding the International Classification of Diseases (ICD-10)

Nada Hasan Abdulraheem Al-Kawaz [1], Huda Hassan Muhaibes Al-Abbodi [2], Ziyad Tarik Shwaish [3]

[1] Family Physician, Planning Department, Basrah Health Directorate, Basrah, Iraq. [2] Master's in Community Medicine, Planning Department, Basrah Health Directorate, Basrah, Iraq. [3] Consultant in Family Medicine, Technical Department, Basrah Health Directorate, Basrah, Iraq.

**ABSTRACT**

**Background**: The International Classification of Diseases, Tenth Revision (ICD-10), is a critical tool for standardizing health information globally. Despite its widespread adoption, gaps in understanding and application among healthcare providers persist, potentially affecting patient care and health system efficiency. **Aim**: To examine the knowledge, attitudes, and practices of physicians regarding the implementation of the ICD-10 system. **Methods**: This descriptive, cross-sectional study assessed the knowledge and attitudes of 67 healthcare professionals (27 specialists, 25 senior residents, eight general practitioners, and seven junior residents) from various medical settings in Basra, southern Iraq, including hospitals and clinics. Participants completed a questionnaire evaluating their familiarity with and application of ICD-10, particularly in tasks such as death certification. Data were analyzed using SPSS version 26, with the Chi-Square Test employed to explore relationships between knowledge levels and demographic as well as professional variables. **Results**: While 61% of respondents reported familiarity with ICD-10, only 8% demonstrated "Good" proficiency in its application. A notable 60% exhibited "Poor" proficiency, particularly in death certification procedures. Statistical analysis found no significant correlation between professional role or years of practice and ICD-10 knowledge levels (Chi-Square values = 14 and 5.5, P-values = 0.1 and 0.9, respectively). The primary source of ICD-10 knowledge was self-education (54%), with formal training programs contributing minimally (15%). Despite recognizing the importance of ICD-10, only 14.9% of doctors regularly applied these standards in their practice, and 68.7% had never participated in any formal ICD-10 training. **Conclusion**: This study highlights a significant gap in the effective application of ICD-10 among medical professionals in Basra, pointing to systemic deficiencies in training and education. There is a critical need for comprehensive training programs and policy interventions to enhance ICD-10 understanding and usage. Strengthening these efforts could improve clinical documentation, patient care, and overall health system management, bridging the gap between the perceived importance of ICD-10 and its practical implementation.

**Keywords**: ICD-10, healthcare education, clinical documentation, professional training.

**Corresponding author**: Ziyad Tarik Shwaish. E-mail: ziyadshwaish@gmail.com
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## INTRODUCTION

As medical knowledge advances and healthcare landscapes evolve, the need for a universal language to classify health information remains paramount. The goal of enhancing patient care on a global scale has further emphasized the necessity of a comprehensive and consistent system for standardizing diseases, medical conditions, and related health information.

This need led to the introduction of the International Classification of Diseases (ICD), which initially began as a statistical tool,[1] but has since evolved into an indispensable resource used by healthcare professionals, researchers, and regulatory organizations. The ICD provides a common language for reporting and monitoring diseases and health conditions, facilitating the organization, analysis, and interpretation of health data for clinical, epidemiological, and statistical purposes.[2]

The history of the International Statistical Classification of Diseases and Related Health Problems (ICD) can be traced back to the French physician Jacques Bertillon, who introduced the Bertillon Classification of Causes of Death, initially containing only 179 causes of death.[3, 4] However, the foundation of a more comprehensive global disease classification system dates back to 1898, when French physician Francois Bossier de Lacroix developed a system categorizing 10 major disease classes and 2,400 individual diseases to assist doctors in diagnosis.[5] Many countries subsequently developed their own morbidity classifications until 1948, when the World Health Organization (WHO) assumed responsibility for disease reporting and rebranded the system as the International Statistical Classification of Diseases.[2] Since then, the ICD has undergone revisions approximately every 10 years.[3] As advancements in healthcare expanded, the number of codes increased with each revision, broadening the system's applicability beyond mortality statistics to various clinical and research purposes.

The continuous refinement of the ICD led to the development of a more detailed and professional edition, ICD-9, in the late 1970s, which was globally adopted in the 1980s.[4] However, leaders at WHO recognized the need for a more comprehensive revision to address the rapidly evolving medical field. Consequently, work on the tenth revision (ICD-10) began even before the completion of ICD-9.[2, 6] ICD-10, the most recent revision, was published in 1999[7] and introduced over 155,000 codes,[4] significantly expanding the classification system to accommodate a vast range of new diagnoses. This advancement made ICD-10 an essential tool for international healthcare practitioners and a vital component of modern healthcare operations.

The International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM) was subsequently developed by the National Center for Health Statistics (NCHS), incorporating additional codes and introducing significant improvements. These enhancements include greater code specificity, the creation of diagnosis/symptom combinations to reduce the number of codes needed for a specific medical condition, and the addition of supplementary information to better represent managed care and ambulatory encounters.[4] The NCHS regularly updates the ICD-10-CM. However, several other countries have expanded the ICD-10 by introducing more detailed codes, leading to the development of country-specific versions such as ICD-10-Canada.[8]

One of the notable improvements in ICD-10-CM is its enhanced level of detail, including new codes that differentiate between types of diabetes. This encourages healthcare providers to document critical information, such as underlying conditions or medications that may contribute to the development of diabetes.[6] Additionally, ICD-10 employs a distinct coding system that differs from previous versions, using alphanumeric codes instead of purely numeric ones. Each ICD-10 code begins with a letter (A–Z), followed by two numeric digits, a decimal point, and an additional digit (e.g., J21.0 denotes acute bronchiolitis due to respiratory syncytial virus). In contrast, ICD-9-CM codes start with a three-digit number (001–999), followed by a decimal point and, if necessary, up to two additional digits (e.g., 466.11 represents acute bronchiolitis due to respiratory syncytial virus).[8]

ICD plays a pivotal role in modern healthcare, serving as a standardized framework that influences various aspects of the medical field. For example, it is used to generate hospital report cards that assess multiple performance metrics, including patient outcomes, quality of care, and resource utilization.[9] Additionally,

ICD data is widely utilized by health researchers to study healthcare services, mortality, and other outcomes. For instance, a retrospective cohort study examining the relationship between estimated glomerular filtration rate and the risk of hospitalization or mortality due to pneumonia identified comorbid conditions using validated ICD-9-CM and ICD-10 coding algorithms.[10]

Given the importance of routinely collecting hospital morbidity data, which further strengthens the role of ICD-10 and its applications in healthcare. Global administrative databases, including those in Iraq, are increasingly adopting the ICD-10 system, highlighting the need to validate coding accuracy. This cross-sectional statistical study was conducted to examine the trends, knowledge, attitudes, and practices of physicians regarding the implementation of the ICD-10 system. It serves as an evaluative study aimed at improving its functionality, increasing awareness of its significance, and promoting its use in medical and statistical contexts.

## MATERIALS AND METHODS

### Study Design and Setting

This study employs a descriptive, cross-sectional design to investigate doctors' knowledge and attitudes regarding the ICD-10. Conducted across various hospitals, clinics, and health centers affiliated with the Basra Health Directorate, which were randomly selected, this research spans a 10-month period from November 2022 to August 2023. The target population consists of 67 doctors with varying affiliations, including specialists, general practitioners, senior residents, and junior residents.

### Population and Sample Size Selection

The inclusion criteria for participants require them to be registered medical practitioners currently employed in a healthcare institution under the Basra Health Department. The sample size of 67 doctors was determined based on the feasibility of conducting thorough data collection within the study's timeframe while ensuring a representative mix of medical practitioners across different specializations and experience levels. The sample was selected using a simple random sampling technique, ensuring that every eligible doctor had an equal chance of being included, thereby reducing selection bias and enhancing the representativeness of the sample. This sample size is considered adequate for a preliminary assessment of knowledge and attitudes toward ICD-10 within the specified setting. Additionally, the study acknowledges potential biases and limitations regarding generalizability, enhancing transparency.

### Outcomes Measurement

The outcomes of this study are measured based on participants' responses to an electronic questionnaire designed to assess their knowledge and attitudes toward the ICD-10 coding system. The questionnaire consists exclusively of closed-ended questions to ensure comprehensive data collection. Knowledge levels are categorized into four groups based on the percentage of correct answers: poor (< 50%), acceptable (50%–59%), average (60%–69%), and good (≥ 70%).

### Data Collection

Data were collected using a specialized questionnaire form, which was distributed to participants to ensure convenience and maximize response rates. The electronic distribution method also helped maintain the confidentiality of responses.

### Ethical Considerations

Ethical approval was obtained from the Basra Health Directorate before the commencement of the study.

### Statistical Analysis

Data analysis was conducted using SPSS version 26. The Chi-Square Test was employed to assess the significance (P-value) of associations between categorical variables, specifically examining correlations between demographic factors and knowledge levels or attitudes toward ICD-10. This statistical approach enables the identification of significant trends and discrepancies in knowledge and attitudes among different groups of doctors within the study population.

## RESULTS

A total of 67 healthcare professionals were included in this study. The largest groups were specialists (40.3%) and senior residents (37.3%). Most participants worked in general hospitals (50.7%), followed by primary healthcare centers (29.9%), indicating a focus on generalist medical settings. Regarding tenure, there was a significant spread across experience levels, with 23.9% having practiced for over 14 years and 31.3% for between two and four years (Table 1).

Table 2 presents data on participants' knowledge of ICD-10, and their proficiency in using it for death certification. A majority (61%) are familiar with ICD-10; however, a substantial portion (60%) demonstrates

poor proficiency in applying it to death certificates, with only 8% rated as "Good." The primary source of ICD-10 knowledge is self-education (54%), followed by training courses (15%), friends (12%), and other sources (19%).

Table 3 presents the distribution of knowledge levels across different doctor affiliations. A notable finding is the high proportion of specialists (55.56%) and general practitioners (87.5%) rated as having "Bad" knowledge. In contrast, "Good" knowledge is relatively rare across all categories. The analysis, with a Chi-Square value of 14 and a P-value of 0.1, indicates no statistically significant association between doctors' affiliations and knowledge levels.

Table 4 evaluates the relationship between years of practice and knowledge levels. The data reveal a trend in which the majority of doctors across all experience levels fall into the "Bad" knowledge category, with particularly high percentages among those practicing for 2–5 years (66.66%) and 10–15 years (66.67%). Notably, no doctors with 5–10 years of experience were rated as having "Good" or "Moderate" knowledge. The statistical analysis, with a Chi-Square value of 5.5 and a P-value of 0.9, suggests no statistically significant association between years of practice and knowledge levels among doctors.

Table 5 provides an insightful analysis of various aspects of death certificate management among 67 doctors. A significant portion of participants (53.7%) have written fewer than 50 death certificates, indicating a moderate level of experience with this responsibility for the majority. Notably, a substantial majority (68.6%) express dissatisfaction with writing death certificates, which closely correlates with the low participation rate in training programs on the ICD, as 68.7% have not attended such programs.

The perception of the importance of accurately writing a death certificate is predominantly medicolegal (91%), though a small fraction acknowledges its broader implications, including health promotion and planning. Despite 61.2% of doctors being aware of ICD-10, only 14.9% actively apply it in practice. However, 31.3% express a notable interest in learning more about ICD-10.

Regarding convenience and attitudes toward ICD-10's importance, 65.7% consider it important, while 23.9% deem it very important. The primary reason cited for dissatisfaction with writing death certificates is the belief that it is "Not My Job" (50.7%).

**Table 1:** Job description, job institute, and practicing tenure among the studied participants

| Variables | | Frequency (No. 67) | Percent |
|---|---|---|---|
| Job description | Junior Resident | 7 | 10.4% |
| | Senior Resident | 25 | 37.3% |
| | General Practitioner | 8 | 11.9% |
| | Specialist | 27 | 40.3% |
| Job institute | Primary Health Care Center | 20 | 29.9% |
| | Specialized Health Care Center | 3 | 4.5% |
| | General Hospital | 34 | 50.7% |
| | Health Directorate | 5 | 7.5% |
| | Others | 5 | 7.5% |
| Practicing tenure | < 2 years | 4 | 6.0% |
| | 2–4 years | 21 | 31.3% |
| | 5–9 years | 15 | 22.4% |
| | 10–14 year | 11 | 16.4% |
| | > 14 year | 16 | 23.9% |

| **Table 2:** Knowledge-related data analysis among the studied participants. | | | |
|---|---|---|---|
| Variables | | Frequency (No. 67) | Percent |
| Are you familiar with ICD-10? | Yes | 41 | 61.0% |
| | No | 26 | 39.0% |
| Knowledge about Writing the death certificate according to ICD-10 among doctors. | Bad | 40 | 60.0% |
| | Acceptable | 13 | 19.0% |
| | Fair | 9 | 13.0% |
| | Good | 5 | 8.0% |
| Source of Information about ICD-10 | Self-education | 36 | 54.0% |
| | Friends | 8 | 12.0% |
| | Training courses | 10 | 15.0% |
| | Others | 13 | 19.0% |

| **Table 3**: Association between doctors' affiliations and degree of knowledge. | | | | |
|---|---|---|---|---|
| Variables | Specialist | General practitioner | Senior resident | Junior resident |
| Good | 3 (11.12%) | 0 (0.0%) | 2 (8.0%) | 0 (0.0%) |
| Moderate | 6 (22.23%) | 0 (0.0%) | 1 (4.0%) | 2 (28.57%) |
| Acceptable | 3 (11.12%) | 1 (12.5%) | 9 (36.0%) | 0 (0.0%) |
| Bad | 15 (55.56%) | 7 (87.5%) | 13 (52.0%) | 5 (71.43%) |
| Total | 27 (40.3%) | 8 (11.94%) | 25 (37.3%) | 7 (10.45%) |
| * Chi-Square: 14 * P-value: 0.1 | | | | |

| **Table 4:** Association between doctors' practicing years and degree of knowledge. | | | | | |
|---|---|---|---|---|---|
| Variables | < 2 years | 2–5 years | 6–10 years | 11–15 years | > 15 years |
| Good | 2 (12.5%) | 1 (6.66%) | 0 (0.0%) | 1 (4.76%) | 1 (9.09%) |
| Moderate | 4 (25.0%) | 2 (13.34%) | 0 (0.0%) | 2 (9.53%) | 1 (9.09%) |
| Acceptable | 3 (18.75%) | 2 (13.34%) | 1 (25.0%) | 4 (19.04%) | 3 (27.27%) |
| Bad | 7 (43.75%) | 10 (66.7%) | 3 (75.0%) | 14 (66.7%) | 6 (54.55%) |
| Total (67) | 16 (23.9%) | 15 (22.4%) | 4 (5.97%) | 21 (31.4%) | 11 (16.4%) |
| * Chi-Square: 5.5 * P-value: 0.9 | | | | | |

**Table 5:** Attitudes regarding death certificate writing.

| Variables | | Frequency (No. 67) | Percent |
|---|---|---|---|
| Number of written death certificates | None | 8 | 11.9% |
| | < 50 | 36 | 53.7% |
| | 50–100 | 12 | 17.9% |
| | > 100 | 11 | 16.4% |
| Contentment regarding writing the Death Certificate | Yes | 21 | 31.3% |
| | No | 46 | 68.6% |
| Participation ratio in training program regarding the ICD | Yes | 21 | 31.3% |
| | No | 46 | 68.7% |
| Importance of writing a Death Certificate accurately | Medicolegal | 61 | 91% |
| | Medicolegal, Health promotion | 2 | 3% |
| | Planning | 3 | 4.5% |
| | Planning, Medicolegal, and Health Promotion | 1 | 1.5% |
| ICD-10 Program Application in Practice | Yes | 10 | 14.9% |
| | Partially | 16 | 23.9% |
| | No | 41 | 61.2% |
| Are you interested in ICD-10 | Yes | 21 | 31.3% |
| | Partially | 20 | 29.9% |
| | No | 26 | 38.8% |
| convenience with ICD-10 importance | Important | 44 | 65.7% |
| | Not important | 7 | 10.4% |
| | Very important | 16 | 23.9% |
| Reasons of Lack of Contentment Regarding Writing the Death Certificate | Difficulty of the Certificate | 2 | 3.0% |
| | Not My Job | 34 | 50.7% |
| | Others | 13 | 19.4% |
| | Useless Instructions | 8 | 11.9% |

## DISCUSSION

This study aimed to assess the knowledge and attitudes of medical professionals in Basra regarding ICD and its applications. Our findings present a nuanced view of the challenges and perceptions healthcare providers face concerning the ICD. The study did not find a statistically significant correlation between specialization, years of service, and knowledge levels of ICD-10. This lack of correlation suggests that gaps in knowledge and training are systemic, affecting medical professionals across different career stages and specialties. This finding is significant, as it indicates that efforts to improve ICD-10 knowledge should be broad-based rather than limited to early-career doctors or specific fields.

**Knowledge and Training:** The majority of participants demonstrated a poor level of knowledge about ICD-10, with 60% classified as having a "Bad" understanding. This finding aligns with concerns in the literature regarding insufficient training and awareness of ICD among healthcare providers worldwide.[11,12] Despite the critical role of ICD in healthcare documentation, billing, and epidemiological research, our data suggest that current training mechanisms, such as training courses—attended by only 15% of participants—are inadequate. This is further supported by the fact that 54% of doctors identified self-education as their primary source of ICD-10 knowledge. However, relying on self-learning may not provide the comprehensive understanding necessary for effectively using ICD-10 in clinical practice. Additionally, the study found no significant association between job descriptions (Junior Resident, Senior Resident, General Practitioner, Specialist) or years of experience (< 2 years, 2–5 years, 5–10 years, 10–15

years, > 15 years) and ICD-10 knowledge levels among healthcare professionals, as indicated by P-values of 0.1 and 0.9, respectively. These findings suggest that gaps in ICD-10 knowledge are present across all professional roles and experience levels, pointing to a systemic issue in education and training rather than isolated deficiencies.

Consistent with our results, previous research has highlighted doctors' concerns and perceived benefits regarding ICD-10 usage. Key challenges identified in earlier studies include the software's readiness and completeness, the significant time and accuracy required for documentation, the difficulty of acquiring new skills related to software use, and a widespread deficiency in training.[13]

**Death Certificate Knowledge Among Doctors**

Regarding doctors' knowledge of writing death certificates according to ICD-10, only 8% of respondents demonstrated a "Good" understanding of the process, while a significant majority (60%) had a "Bad" level of knowledge. This discrepancy is not merely a reflection of individual competency but suggests systemic shortcomings in medical education and ongoing professional development.

In terms of satisfaction with writing death certificates, responses varied. While 58% of doctors expressed contentment with the process, 31% were dissatisfied, and 11% were neutral. These figures highlight that a substantial proportion of medical professionals feel either dissatisfied or ambivalent about this critical documentation task.

The reasons for dissatisfaction were diverse, with the most commonly cited issue being the perceived complexity of the certificate (51%). Other reasons included the belief that it is not part of their job (19%), unclear or unhelpful instructions (15%), and other unspecified factors (15%). These findings reflect the various challenges practitioners face, ranging from concerns about clarity and relevance to differing perceptions of the task's importance within their professional responsibilities.

The death certificate is a crucial document with far-reaching implications across legal, societal, and public health domains. It serves as pivotal evidence in both civil and criminal legal proceedings.[14] Accurate completion of death certificates according to ICD-10 is essential for several reasons. First, it ensures the proper statistical recording of mortality rates and causes, which is critical for public health surveillance, resource allocation, and epidemiological research. Second, it directly impacts families, influencing matters such as inheritance, insurance claims, and, in some cases, criminal investigations.[15–17] Given these significant roles, the observed lack of proficiency among doctors in Basra has serious implications for healthcare quality and public health management.

**Insights on ICD-10 Training, Application, Interest, and Perceived Importance Among Medical Professionals**

The nuanced findings from the study on ICD-10 reveal critical insights into the complex dynamics between medical professionals and the adoption of ICD-10. The notably low participation rate in ICD-10 training programs highlights significant gaps in education and professional development. Only 18% of respondents reported having attended such training, underscoring a widespread lack of formal education on the coding system. This deficit likely contributes to the reported challenges in applying ICD-10 in clinical settings, where only 15% of practitioners fully incorporate the system into their practice.

Furthermore, consistent with our observations, previous studies have documented healthcare providers' and coding professionals' negative perceptions of ICD-10 adoption. This reluctance stems from a shortage of skilled coding professionals and the complexities of navigating an advanced coding system, leading to frustration among some healthcare providers.[18] As a result, it is crucial to provide ongoing training for healthcare professionals in ICD-10 implementation, particularly when introducing new health technology systems.

To facilitate a smoother transition, stakeholders and hospital managers must prioritize the recruitment and continuous training of coding professionals to ensure the system is integrated swiftly and effectively. For physicians, nurses, and midwives, adopting ICD-10 requires modifications in documenting patients' medical histories and diagnoses. [19,20]

Moreover, the divided interest in the ICD-10 program—31% interested, 39% not interested, and 30% partially interested—reflects broader challenges in engagement and perception among healthcare providers. This variation in interest levels may stem from several factors, including the perceived complexity of the coding system, its relevance to individual clinical practices, and a prevailing healthcare culture that may

not prioritize administrative accuracy as a component of clinical excellence.

Despite these challenges, the fact that a majority (66%) of respondents recognize the importance of ICD-10 is a positive sign. It indicates a foundational understanding of the value that accurate and standardized coding brings to the healthcare ecosystem, from improving patient care to facilitating global health surveillance.

## CONCLUSIONS

In conclusion, while medical professionals in Basra widely recognize the importance of ICD-10, there remains a significant gap in knowledge and practical application. This study underscores the need for comprehensive strategies to improve understanding and utilization of ICD-10, ensuring its full potential in enhancing patient care, healthcare management, and epidemiological research. Additionally, examining the influence of organizational and systemic factors on ICD-10 adoption could help inform strategies for more effective implementation across healthcare settings.

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