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Drug-related Death low Registration in Iran: A Mixed Method Approach for Causes, Recommendations to Solve This Problem and Geographical Evaluation of an Intervention

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Original Article

Abstract

Background: The death registration is conducted by different systems in Iran. The drug-related death registration is exclusively conducted by Ministry of Health and Medical Education (MOHME) and Legal Medicine Organization (LMO). This study investigates the causes of undercounting drug-related deaths (DRDs) in Iran, provides recommendations for addressing this issue, and provides a geographical evaluation of the integrity and quality of drug-related mortality registration (2014–2017).

Methods: This is a mix-method study. In part1, individual targeted interviews were conducted with 12 experts in death registration in MOHME and LMO to collect data on the causes of low registration in Iran and provide recommendations for resolving the issue. Part2 of the study involved an intervention in the form of a memorandum of understanding on reduction of low-registrations. This memorandum was signed to transfer information about the corpses between the MOHME and LMO. First, the number of DRDs (2014-2017) was examined using capture-recapture method and, then, we calculated and compared the rate of pre-intervention (2014-2016) and post-intervention (2017) under-registration to assess whether this memorandum of understanding had been effective in reduction of under-registrations.

Findings: In part1, according to the participants, the causes of undercounting DRDs in LMO and MOHME were arranged and categorized into 4 categories: weak administration system, physician and personnel training problems, system constraints, and client-related problems. Also, some suggestions were presented to help resolving the problem of undercounting; these suggestions concern the administrative system, technology, and educational domains. In part 2, about half of the provinces in Iran had a positive performance in reducing the undercount.

Conclusion: At the macro level, the memorandum of understanding between the two organizations responsible for registering deaths was effective. However, increasing the quality of data registrations requires monitoring at the micro and organizational levels to lead to a positive performance in reducing death under-registration in all provinces.

Keywords: Death certificates; Iran, Drug-Related Side Effects and Adverse Reactions; Capture- recapture method

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Introduction

One of the most important needs of social health planning is the statistics on the causes of death in a community.[1,2] Obtaining valid information on the causes of death is one of the most basic foundations of management, evaluation, and planning of the health sector in all countries.[3,4] According to the reports presented by the World Health Organization, deaths are not completely registered in many countries and only 55% of the countries have access to these cases covering 90% of the area under their control.[5] All governments are responsible for assessing the completeness of death registration for statistical purposes and the related supervisions.[6,7] This helps authorities invest in promoting registration systems with serious data defects; 2) It allows researchers and healthcare professionals to use the available data and modify them for readjustment. [3]

When identifying the cause of death associated with substance use, the type of drug/matter/poison taken by the individual are important aspects of completing a death certificate.[8] Vital statistics obtained via death certificates, help World Health Organization (WHO) monitor the trend of drug use and implement general strategies in line with the necessary interventions.[9] When confirming a drug-induced death and issuing the death certificate, additional information such as medical history, drug abuse history, and autopsy findings can be very helpful in tracking deadly drugs by which an area is inflicted.[9] The death registration is conducted by different systems in Iran. Drug-related death (DRDs) registration is exclusively done by MOHME and LMO using death certificates, autopsy reports, and toxicology reports. The recognition and improvement of the standards to prevent undercounting are important for providing better scientific services. Due to the variety of the sources of data in Iran, completeness of the registrations and the existing under-registrations have not been evaluated. The present study seeks to investigate the rate of under-registration of drug-related deaths[10] and assess the effectiveness of the interventions in reducing the existing under-registrations by reevaluating the system of registration of drug-induced deaths.

Methods

This study is a follow-up to the author's previous investigation in our investigation, we found that the drug-related death data is undercounted in these two sources (Figure 1).

Figure 1- Issuing Drug - related Deaths certificate the first part of this mix-method study used the qualitative content analysis method to answer these two questions: "What is the reason for underestimating the death data by MOHME and LMO?" and “What are the recommendations for solving these issues?". For this purpose, 12 participants (clinical toxicologist, internal medicine specialist, poisoning department head nurse in hospitals, death registry officers in MOHME and LMO) who were involved in the process of registering drug-related deaths were selected from several selected provinces (Khorasan Razavi, Tehran, Mazandaran, Semnan) in Iran in 2019. The data was collected by conducting semi-structured interviews with open-ended questions. The interviews were recorded and immediately transcribed. These interviewees determined the reasons for undercounting and provided some recommendations to solve this problem.

According to interviewers’ comments, the most important cause of underestimation in DRDs registration in Iran was the lack of connection between the death registration systems including the LMO and MOHME, so in part2, we evaluated the effect of a “memorandum” signed between these two organizations in March, 2016, for mutual cooperation in exchanging the data on death in order to promote the system of registering and classifying the causes of death. In line with developing medical services and improving people’s quality of life, the two sides made the following commitments:

1. LMO delivers the scanned images of burial certificates from April, 2017 to the representatives of the Department of MOHME;
2. LMO provides the data related the corpses including the cause of death, quality of death, and external causes of death to the representatives of the MOHME.
3. MOHME provides the LMO with a link to access the information related to the deceased maintaining the confidentiality of the information, on the Causes of Death Registration and Classification System.

After collecting the data related to registration of drug-induced deaths from two sources including the LMO and the Department of Health of the MOHME, the data was run on Excel and the SPSS software version 23. The rate of under-registration before 2014-2016 and after 2017 intervention was

calculated and compared. To do this, the number of deaths over the last three years was calculated separately for each province. We then calculated the number of commonly registered deaths (by the two sources) during the three years prior to the intervention. Finally, using the Stata software, the rate of commonly registered names during the three years was compared with those in 2017. The significance of the p-value was evaluated as a good performance in implementing the provisions of the memorandum of understanding.

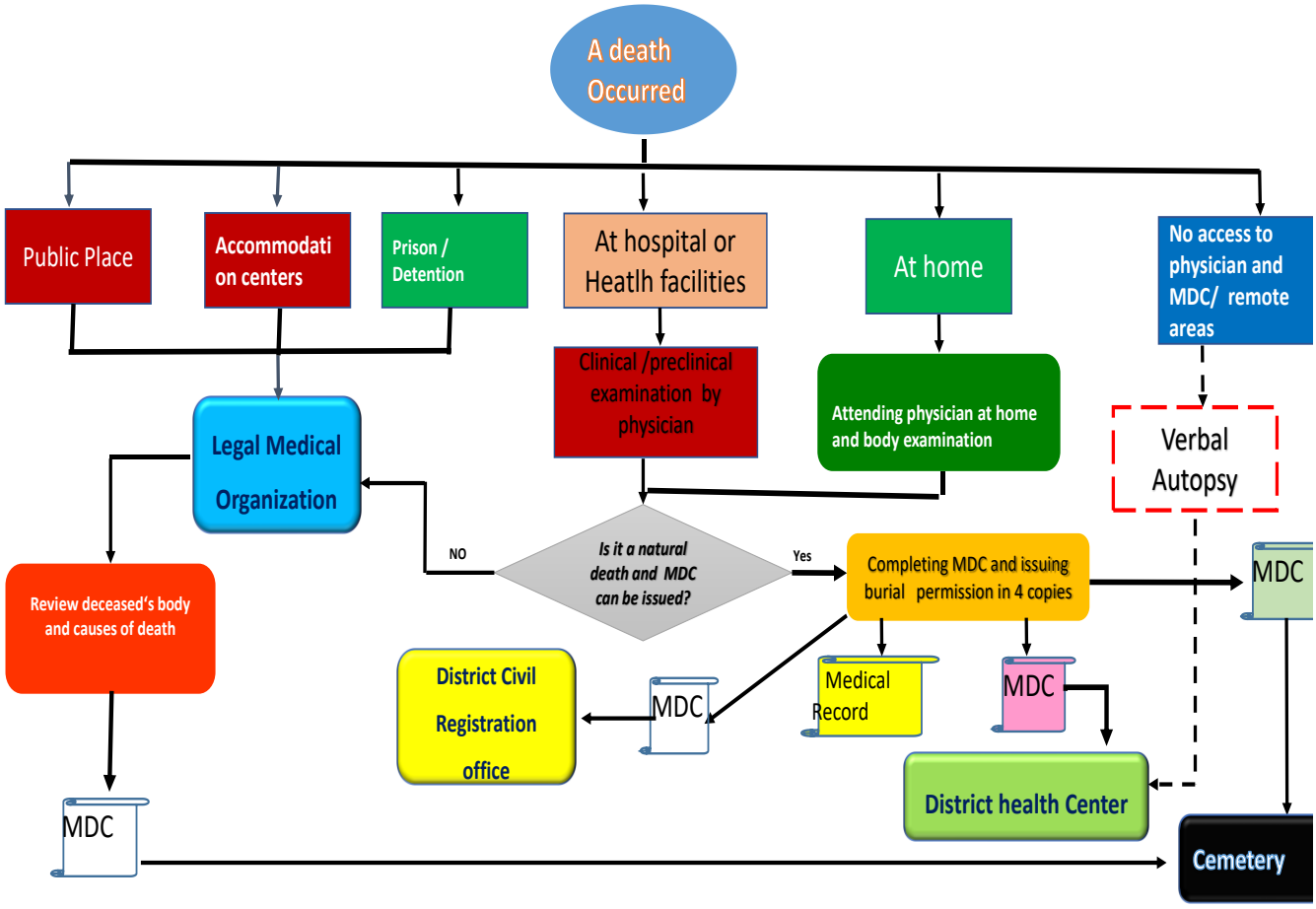

Figure 1. Process of Issuing Drug-related Deaths Certificate[8]

Results

Part 1: The interviews were conducted with 12 experts in drug-related deaths registration in MOHME and LMO. According to the participants, the causes of undercounting drug-related deaths by the MOHME and LMO were categorized into four classes including weak administration system, physician and personnel training problems, system constraints, and the problems associated with the clients (Table 1). Also, some recommendations were provided in line with reducing the undercounting in three areas: the administrative system, technology, and educational domains (Table 2).

Causes of undercounting: According to the experts, the causes of undercounting under-registration of drug-related deaths in the MOHME and LMO are as follows: (Interviewer quotes are listed in Figure 1).

Weak administrative system: From the perspective of the experts in death registration, the shortcomings of the administrative system are one of the reasons for undercounting. The experts believed that in the process of registering data in the current administrative system, the lack of transferring data from the MOHME and LMO plays a significant role in undercounting.

Physician and Personnel training Problems: From the perspective of the experts, inadequate training is one of the most important factors leading to undercounting (Table 1).

System constraints: A number of death cases are closed in hospitals and are referred to LMO to investigate and determine the exact cause of death; this is one of the reasons for undercounting in MOHME (Table 1).

Problems of Clients: In some death cases, it is necessary to determine the cause of death, but the families disagree with conducting an autopsy on the dead body (Table 1).

Table 1. Reasons for undercounting drug-related deaths in Iran

Main categories	Sub-categories	Open codes
The systemic weaknesses in the Ministry of Health	Weak administrative system	- Insufficient supervision over the staff work process
		- Lack of updated photos on birth certificates and health insurance cards
		- Admitting the person illegally using others' health insurance card
		- Lack of timely update of statistics
		- Lack of organizational agreement between LMO and MOHME for the transfer of death causes statistics.
	Educational problems of the physicians and personnel	- Incomplete patient records
		- Coder error
		- Illegible handwriting of physicians
		- Ambiguity in reporting the causes of death (mismatch with ICD-10)
		- Impatience of physician
		- Physicians' lack of adequate education
		- Physician's weakness in detecting the cause of death
		- Registering death cause as cardiopulmonary arrest
		- Error in registering a causal but inadequate sequence
		- Physician's unfamiliarity with the process of issuing death certificates in the case of suspicious deaths
	System constraints	- Issuing the certificate for suspicious deaths and deaths in the past 24 hours exclusively by LMO
		- The short duration of the patient's admission until death and lack of completed patient history
		- Inability to monitor the performance of clinicians and physicians in hospitals
		- Not providing real data due to the implementation of destructive reduction programs
		- Not providing suspicious deaths data to hospitals
		- Lack of connection between death registration systems
		- Lack of toxicological laboratories in hospitals
	Problems of clients	- Hospitalization of patients with the name of other people
		- Hospitalizing unknown people and not identifying them during a stay in hospital
		- The patient or family not telling the truth
		- Refusal of the families of the deceased people to send the dead body to LMO
		- Social stigma for drug-related deaths
Systemic weakness of Legal Medicine Organization	Weak administrative system	- Lack of adequate supervision over the personnel's working process
		- Lack of timely update of statistics
	System constraints	- The long process of detecting the cause of death
		- Simple registration of suspicious deaths and deaths in the past 24 hours
		- Not transmitting the statistics related to all deceased people due to security issues
		- Not autopsying all dead bodies
		- Ambiguity in registering the causes of death (inconsistency with ICD-10)
		- Limitations of scientific and diagnostic tools in detecting the cause of death
		- Not delivering the dead bodies to LMO
		- No registering identities in the death registration system using national code or lack of connection between the death registration systems
	Problems of clients	- Not consenting to transfer corpse from hospital to LMO
		- Not consenting to autopsy
		- Families of the deceased people refusing to tell the truth
		- Social stigma associated with drug-related deaths for the families of the deceased
		- Social pressure to protect the dignity of families
		- Pressure on organization's employees to not register the actual cause of death after the autopsy

Recommendations for decreasing undercounting: The following recommendations were provided by the experts to improve the quality of death registration in MOHME and LMO. (Interviewer quotes are listed in Appendix 2).

Administrative-system domain: Since the system of classification and death registry system is one of the most important health information systems in Iran, it is necessary to create an appropriate system and hire professional staff (Table 2).

Technology domain: Currently, the death certificate information is directly entered into death registration system in some hospitals in Iran (8). In this regard rapid updates of statistics, electronic registration of death certificates, not scanning the physicians' handwritten forms, connection to registration system, and registration of individual identity information using national codes helps reduce undercounts (Table 2).

Education domain: A proper education plan is required for the approval process, death registration, and legal proceedings. Due to the high diversity of ICD10 codes, everyone involved in the death registration process should be familiar with medical terminology. (Table 2).

Table 2. Recommendations to reduce undercounting in drug-related death registration system in Iran

Main categories	Sub-categories	Initial codes
Organizations of Ministry of Health	System-administrative domain	- Monitoring the work process of the staff
		- Requiring clients to update the photo of their identification card and health insurance card to identify the exact identity of clients
		- Preventing the use of the health insurance card of other people in hospitals
		- Preserving confidentiality in the statistics obtained from LMO
		- Unbiased consideration of the number of statistics
		- Inter-organizational agreement for transmitting death statistics
	Technology domain	- Increasing the number of physicians and confirming the process of issuing death certificates by two physicians
		- Employing more staff members at hospitals for issuing death certificates
		- Equipping hospital laboratories with toxicological diagnostic centers
		- Issuing electronic death certificates and not scanning physicians' handwritten form
		- Linking death registry systems in related organizations
		- Registering the individual's identity information using their national code
		- Quick updating of statistics in the death registration system
	Education domain	- Reducing errors in coding by physician in determining the causes of death in accordance with ICD-10
		- Retraining physicians about drug poisoning
		- Retraining physicians to refer suspicious deaths to LMO
		- Updating physicians' knowledge on detection of death causes
		- Providing detailed planning by WHO on the process of registering deaths
		- Holding training courses for physicians on how to issue a death certificate
	System-administrative domain	- Monitoring the performance of the personnel
		- Providing feedback to hospitals on the cause of death
		- Changing attitudes of the families of the deceased towards autopsy
		- Speeding up the process of checking causes of death
		- Timely delivery of corpses to LMO
Legal Medicine Organization	Technology domain	- Issuing electronic death certificates and not scanning physicians' handwritten forms
		- Registering the individuals' identity information using their national code
		- Linking death registry systems in related organizations
		- Quick updating of statistics in the death registration system
	Educational domain	- Providing detailed planning by WHO on the process of registering deaths
		- Coding the causes of deaths according to ICD-10

Part2: According to interviewers' comments, the most important cause of undercount in DRDs registration was the lack of connection between death registration systems including the LMO and MOHME, so in part2, we evaluate the effect of the "memorandum understaning" signed between these two organizations. For evaluating the effectiveness of the inter- organizational memorandum of understanding, a comparison was made between the three years before the intervention (2014-2016) with the year after the intervention (i.e., 2017). As presented in Table 3, this memorandum of understanding proved effective across the country and in more than half of the provinces.

The criterion for coloring various areas was the significance level of the effect of the interventions (Figure 2). If the effect of the interventions was significant at 0.05 with an increasing trend, the interventions were believed to be highly effective, as demonstrated by dark green in the provinces of Ardabil, Qom, Kordestan, Kermanshah, Isfahan, Tehran, Alborz, Khorasan Razavi, Kerman, Lorestan, Kohgulien va Boyer Ahmad, and Gilan. When the effect of the interventions was not significant at 0.05 and had an increasing trend, the interventions were believed to be relatively effective; the provinces with relative effectiveness (Bushehr, Chahar Mahalo Bakhtiari, Khorasan Shomali, Khuzestan, Zanjan, Markazi, Hormozgan, and Yazd) have been shown with light green. Non-significant effect of the interventions at 0.05 with a decreasing trend was indicative of the relatively deteriorating effect of the interventions; the provinces with such a trend (i.e., Azarbayjan Qarbi, Ilam, Khorasan Jonubi, Sistan va Baluchestan, Golestan and Mazandaran) were marked with light red. Finally, the provinces in which the impact of the interventions were found to be significant at 0.05 and had a decreasing trend (i.e., Semnan, Qazvin, Hamedan, Fars, and Azarbayjan Sharghi) were demonstrated with dark red, which is indicative of the highly deteriorating effect of the interventions (Table 3).

Table 3. The status of death records before and after official intervention for provinces with high effect of the intervention and relatively effective intervention

	Province of death	Year	LMO	MOHME		Total	BOTH/LMO+MOHME	P-value
			Only LMO	Both	Only MOHME			
3	**Ardabil**	2017	13	17	17	47	0.566	0.0001
		2014-2016	50	21	60	131	0.190	
		2016	18	18	22	58	0.45	
		2015	8	0	30	38	0	
		2014	24	3	8	35	0.093	
4	**Isfahan**	2017	111	88	50	249	0.546	P<0.05
		2014-2016	439	39	100	632	0.065	
		2016	161	25	56	242	0.115	
		2015	170	10	25	205	0.051	
		2014	162	4	19	185	0.022	
5	**Alborz**	2017	65	9	33	107	0.91	P<0.05
		2014-2016	411	2	5	411	0.004	
		2016	155	1	2	158	0.006	
		2015	137	0	2	139	0	
		2014	119	1	1	121	0.008	
7	**Bushehr**	2017	23	3	7	33	0.1	0.8
		2014-2016	51	2	8	25	0.086	
		2016	6	2	1	9	0.285	
		2015	7	0	5	12	0	
		2014	2	0	2	4	0	
8	**Tehran**	2017	367	292	123	782	0.594	P<0.05
		2014-2016	1655	29	89	1773	0.016	
		2016	668	6	46	720	0.008	
		2015	460	6	30	496	0.122	
		2014	527	17	13	557	0.314	
9	**Chahar-Mahal Bakhtiari**	2017	22	1	2	25	0.041	0.25
		2014-2016	98	1	8	107	0.009	
		2016	52	1	2	55	0.185	
		2015	19	0	4	23	0	
		2014	27	0	2	29	0	
11		2017	170	72	58	300	0.315	P<0.05
		2014-2016	640	57	128	825	0.074	
		2016	190	27	45	262	0.114	
		2015	254	19	52	325	0.062	
		2014	196	11	31	238	0.048	

Table 3. The status of death records before and after official intervention for provinces with high effect of the intervention and relatively effective intervention

	Province of death	Year	LMO	MOHME		Total	BOTH/LMO+MOHME	P-value
			Only LMO	Both	Only MOHME			
12	**North Khorasan**	2017	13	1	4	18	0.58	0.67
		2014-2016	46	5	14	65	0.083	
		2016	21	3	6	30	0.111	
		2015	8	0	3	11	0	
		2014	17	2	5	24	0.090	
13	**Khuzestan**	2017	13	8	58	79	0.112	0.06
		2014-2016	163	25	100	288	0.095	
		2016	48	16	46	110	0.170	
		2015	48	6	34	88	0.073	
		2014	67	3	20	90	0.034	
14	**Zanjan**	2017	37	5	8	50	0.111	0.37
		2014-2016	149	13	31	193	0.072	
		2016	41	4	11	56	0.076	
		2015	44	6	11	61	0.109	
		2014	64	3	9	76	0.41	
19	**Qom**	2017	58	9	4	71	0.145	P<0.05
		2014-2016	125	0	3	128	0	
		2016	47	0	2	49	0	
		2015	33	0	0	33	0	
		2014	45	0	1	46	0	
20	**Kurdistan**	2017	41	4	2	47	0.093	0.05
		2014-2016	۸۷	3	14	104	0.029	
		2016	41	1	5	47	0.021	
		2015	22	2	6	30	0.071	
		2014	24	0	3	27	0	
21	**Kerman**	2017	92	7	7	106	0.070	0.003
		2014-2016	159	4	54	217	0.018	
		2016	78	1	11	90	0.011	
		2015	29	2	16	47	0.044	
		2014	52	1	27	80	0.012	
22	**Kermanshah**	2017	108	39	53	200	0.242	0.001
		2014-2016	333	52	59	444	0.132	
		2016	137	14	24	175	0.086	
		2015	83	32	23	138	0.301	
		2014	113	6	12	131	0.048	
24		2017	11	9	7	27	0.5	P<0.05
		2014-2016	39	0	12	51	0	
		2016	17	0	4	21	0	
		2015	10	0	3	13	0	
		2014	12	0	5	17	0	
25	**Gilan**	2017	78	6	4	88	0.073	0.002
		2014-2016	215	7	35	257	0.028	
		2016	96	1	13	110	0.009	
		2015	66	2	7	75	0.027	
		2014	53	4	15	72	0.058	
26	**Lorestan**	2017	108	8	13	129	0.066	P<0.05
		2014-2016	262	14	31	307	0.047	
		2016	68	7	17	92	0.082	
		2015	103	3	4	110	0.028	
		2014	91	4	10	105	0.039	
	Markazi	2017	48	2	5	55	0.037	0.69
		2014-2016	95	3	10	108	0.028	
		2016	16	0	4	20	0	
		2015	34	2	4	40	0.052	
		2014	45	1	2	48	0.021	

Table 3. The status of death records before and after official intervention for provinces with high effect of the intervention and relatively effective intervention

	Province of death	Year	LMO	MOHME		Total	BOTH/LMO+MOHME	P-value
			Only LMO	Both	Only MOHME			
29	**Hormozgan**	2017	23	2	3	28	0.076	
		2014-2016	81	7	59	147	0.05	
		2016	18	3	22	43	0.075	0.67
		2015	19	2	22	43	0.048	
		2014	44	2	15	61	0.033	
31	**Yazd**	2017	21	5	9	35	0.166	
		2014-2016	24	10	45	79	0.144	
		2016	8	7	14	29	0.318	0.79
		2015	2	3	20	25	0.136	
		2014	14	0	11	25	0	
	Total	2017	2042	637	614	3293	0.238	
		2014-2016	6455	636	1469	8560	0.080	
		2016	2343	281	536	3160	0.097	P<0.05
		2015	1985	197	534	2716	0.078	
		2014	2127	158	399	2684	0.062	

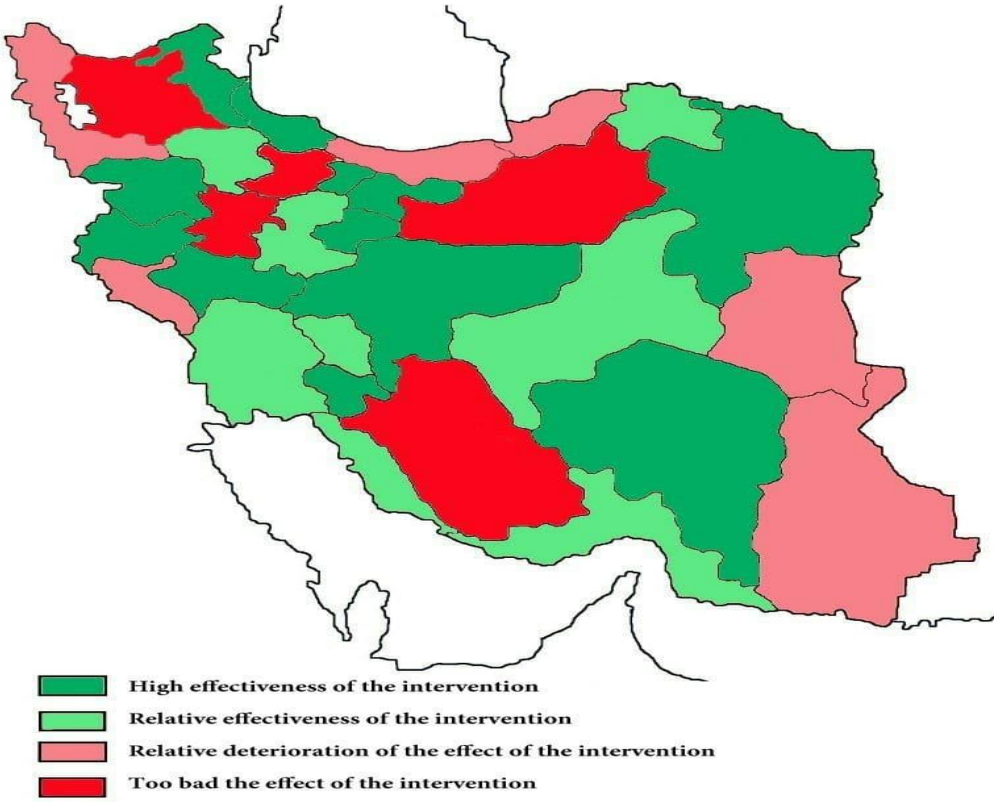

Figure 2. Geographical evaluation after inter-organizational memorandum of understanding (2017)

Discussion

The official death data registration to issue death certificates is conducted in accordance with WHO International Guidelines.[13] However, there are major challenges in registering drug-related deaths data in all countries, including Iran; this makes it difficult to make international comparisons. The findings of this study showed that the system constraints are the first major reason for underestimation in MOHME and LMO in Iran. Due to lack of connection among death registration systems in Iran, the MOHME does not have accurate statistics on the cause of death of the bodies sent to LMO. In a study to assess the availability of the information registered in various death registration systems in South Africa after Apaprtied, it has been proposed to increase the legality and reliability of data by linking the data to more advanced death registration and cause of death registration systems.[14]

The program for controlling and preventing drug- related deaths requires accurate data. Designing and implementing drug-related deaths registration system is one of the first steps in controlling and may provide the necessary infrastructure for implementing control programs and preventing death. In Kentucky, a comprehensive multifunctional model called Drug Overdose Fatality Surveillance System (DOFSS) which improved drug-related deaths data registration was created using death certificates, autopsy reports, toxicology result report, coroner reports, and prescription drug monitoring program.[15] This model may be taken into consideration by other countries, including Iran, in order to detect the consumption of new and emerging substances, identify the vulnerable population, and achieve the best practices to reduce substance overdose. [16]

Another systemic constraint in Iran is that hospitals usually use a series of rapid methods for early detection of drug-related poisoning and the exact type of poisoning substance is not reported in the death certificate. This type of underestimation is also found in other countries. The findings of a similar study in the United States showed that the specific drugs leading to death are often not listed in death certificates.[17] Another system constraint is the delayed transmission of dead bodies to LMO making it difficult to pinpoint the cause of death. Studies also confirm that if the toxicology tests are conducted late in the dead body or the quality of analysis is poor, the cause of death may be reported to be "morphine-poisoning" and LMO data will also be error-prone.[17, 18] Although legal toxicology may provide useful information on the types of drugs in the blood, it is important to note that some substances, such as heroin and cocaine, have a short half-life and are rapidly decomposed in the body.[19, 20] The analysis of interviews showed that the training weaknesses in the MOHME and LMO staff were another main reason for undercounting. According to WHO, death is not an immediate event; it is a cycle generated by a series of events.[19] Qualitative improvements in statistics can be achieved by taking into account the main causes, background causes, and the direct cause of death by physicians. There is insufficient observation of these sequences in registering ICD codes in Iran and other countries. In 2013, the National Association of Medical Examiner and American College of Medical Toxicology Expert Panel recommended that the person who issues the death certificate should carefully complete all parts required to issue drug-related death certificates.[21] Since the United States sought to add more details on substance overdose to prepare a counter-substance program, it was observed that the number of drug-related death reports increased in the last five years.[22] Other public health authorities also proposed standards for determining drug-related deaths. They recommended that the interpretation of deaths data needs to be done with caution until these standards are fully accepted.[21]

Iran's educational systems pose many problems with the registration and access to death data. The findings of studies on the quality of death registration at death certificates in Iran showed that the incomplete forms, lack of many necessary questions in certificates, lack of easy access to information, inaccuracy in registering the information related to death causes, and illiteracy of registered data were the major issues in the process of registering deaths.[23] Other problems occur during death registration in Iran and other countries. This includes unfamiliarity with the process of death registration, inexperienced registration death certificate registration, and misdiagnosis of the cause of death or mechanism of death, improper completion of death registration forms, inappropriate use of diagnostic codes, lack of adequate training in registration of death, fatigue, time constraints, and failure to

recognize the importance of registering death.[24-26] In a study in the United States, which examined the causes of undercounting drug-related deaths, it was suggested that more education needs to be provided to physicians and the medical exams need to be standardized[17]. In the United States, the overdose drug-related deaths codes are used by the National Center for Health Statistics (NCHS) to code such deaths and they use a software program that automatically standardizes this process and reduces human errors[21].

According to the findings, the weak administrative system may also affect the level of undercounting. If the person's skills and professional needs are not coordinated, his/her productivity will be threatened; the personnel of the medical system and LMO are not an exception. Restrictions on proper training, and equipment, lack of staff, high working hours per week, and heavy work to clarify the ambiguity of records may reduce the job satisfaction of individuals and affect the quality of registrations. By increasing social support and defining the obligations and roles, the impact of weak management systems can be reduced.[27]

The findings also showed that another major reason for undercounting was related to the problems faced by the clients who refer to the hospital and LMO. The physicians in hospitals and LMO investigate the effects of death and poisoning. In some cases, however, the deceased individuals' families simply refuse to state the cause of death before the intervention of the physician.[24] The findings of similar studies in other countries have also confirmed this issue.[28] Khan et al conducted verbal autopsies to specify the cause of death by interviewing the man/woman who had cared for the deceased person. The collected data was then evaluated by three experts separately to identify the cause of death.[29]

Another major problem is the pressure put on the organization's employees not to register the actual cause of death after autopsy. Similar problems are found in other countries with military, political, or racial motivations. Although the personnel of LMO and their families are under physical threats and violence from the clients and their attorneys, the laboratory findings should never be falsified or partly removed. The personnel should disclose any aggression and oppression in accordance with LMO's Code of Ethics in the Medical Field.[30] After signing the memorandum, about half of the provinces in the country displayed a positive performance in implementing it. The results of the MOU efficacy analysis showed that the rate of under-registration death in populated areas was high. The reason might be that in the larger cities by population people have more access to medical services and legal medicine centers. In other countries, geographical inequalities have been observed in the quality of death registration. A study in Ecuador attributed death under-registration in different geographical locations of an area to the unreliable population estimates in the ages below 5 and poor performance in adjusting the methods when the quality of the data was low[4]. The results of this study further showed that in the countries with low and medium income that have a larger number of alcohol-related and violent deaths, the quality of death registration was lower.[4] Furthermore, a similar study also acknowledged the low quality of data registration in the areas with high ethnic ratios, deprived of economic and social facilities, and with a high rate of immigration and low population rates.[31] Therefore, there is a need to more comprehensively examine the characteristics of these areas to explain the reasons.

Examining the quality of data registration at the national level was indicative of the effectiveness of this intervention in improving the quality of data registration related to drug-related deaths in Iran. In the United States, in recent years, several organizations including Public Health Associations, federal agencies such as the Centers for Disease Control and Prevention, and the Department of Justice, have collaborated with physicians and legal medicine centers at the national state and local levels to help in improving the complete registration of drug-related deaths and reducing the mortality rate caused by substance use.[9] However, the measures taken have shown a considerable improvement in the quality of electronic registration of the data and keeping the vital statistics up-to-date.[9]

Based on the findings of the present study, although the memorandum of understanding signed between the two deaths registration organizations was effective, increasing the quality of the data requires supervision at the organizational level to lead to positive performance and reduced under-registration in all provinces. When detecting and recording suspicious deaths such as drug-related deaths, using empty codes (unclear and unregistered

codes), makes the cause of death devoid of the required accuracy and sensitivity. Therefore, health centers in the counties should feel obliged to return the images of the death certificates to the physician or source issuing and ask them to avoid registration of empty and misleading causes in the death certificates. In addition, the required instructions should to be provided to the physicians who use empty codes. The legal means such as providing the departments of health in medical universities and the Medical Council with the authority to resolve the cases of empty codes registration could also be used.

There are other restrictions in the data of the current registration system including lack of accuracy in stating the cause of death, under-registration, bad registration, informal cemeteries, lack of cooperation by the Legal Medicine Organization, no exchange of information in some organizations including the National Organization for Civil Registration, and incorrect completion of the death certificates.[3, 32] On this basis, there is a need to increase the intra- and intersectoral cooperation to homogenize the statistics and improve the quality of the plans. More adequate instructions are also required to be provided to the students of medicine to help them to more efficiently recognize and register the causes of death.

Allocating budget to Patient-Centered Outcomes Research for better recognition of the deaths caused by drug overuse and equipping the comprehensive toxicology testing laboratories are among the strategies that can help to identify the cases of overdose in time and improve the quality of data registration.

Limitations and Strengths of Study: Part1: This study, like all studies, was constrained by some limitations; lack of participation of some participants due to being busy was one of the common problems. Hence, it was tried to eliminate this limitation by appropriate timing. One of the strengths of this study in comparison to similar studies in the world is that it investigated the causes of undercounting in drug-related deaths registration with a broad and deep perspective, using a qualitative approach, and with sufficient depth and richness. It provided useful and effective recommendations.

Part2: Governments should assess the completeness of death registration for supervision and statistical purposes. The existing methods such as the capture-recapture method suffer from certain limitations such as inaccuracy and lack of complexity that prevent wide application.[6]

Conclusion

After developing strategies and interventions to improve the national drug death certificate, we still found substantial inequalities in the completeness and quality of Iran's death certificate in some areas the high-quality registration of death data is a good source for research and policy-making. Registration of data can be improved by eliminating deficiencies in administration, education, and technology systems. At the macro level, signing the memorandum of understanding between the two organizations responsible for registering deaths was effective, but increasing the quality of data registrations requires supervision at the macro or organizational level so that a better performance can be achieved in all provinces. Ethical approval this paper was obtained from a doctoral dissertation approved and supported by the Psychiatry and Behavioral Sciences Research Center of Mazandaran University of Medical Sciences with grant number 10295 and code of ethics in research IR.MAZUMS.REC.1398.445 in 2019.

Conflict of Interests

The authors declared no conflict of interests.

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Authors' Contribution

MB: Conceptualization, Design, and Methodology Validation, Analysis, data/evidence collection, Resources, Data Curation, Writing Original Draft, Supervision; MZ: Conceptualization, Design and Methodology Validation, Writing - Original Draft; AA: Conceptualization, Design, and Methodology, Analysis, Resources, Writing - Review & Editing; AK: Writing - Original Draft; AK and MS: data collection, Writing - Review & Editing, Supervision. All authors approved the final manuscript.

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مرگ و میر ناشی از مصرف مواد در ایران: یک مطالعه ترکیبی برای بررسی علل کم ثبتی‌ها، توصیه‌هایی جهت رفع این مشکل و ارزیابی جغرافیایی کیفیت ثبت مرگ‌ها در سراسر ایران به وسیله انجام یک مداخله

مهران ضرغامی[۱،۲]، مسعوده باباخانیان[۲]، سید عبداله خاوری[۳]، عباس علیپور[۴]، اردشیر خسروی[۵]، مهدی صابری[۶]

مقاله پژوهشی

چکیده

مقدمه: ثبت آمار متوفیان توسط سیستم‌های مختلفی در ایران انجام می‌شود. ثبت مرگ مرتبط با مسمومیت با مواد منحصراً توسط وزارت بهداشت و سازمان پزشکی قانونی انجام می‌شود. با این حال، این مطالعه با هدف بررسی علل کم ثبتی مرگ‌های ناشی از مواد مخدر در ایران و ارائه توصیه‌هایی برای حل این مشکل و ارائه یک ارزیابی جغرافیایی از کیفیت ثبت مرگ و میر ناشی از مواد مخدر در ایران در طی سال‌های ۱۳۹۳ لغایت ۱۳۹۷ می‌باشد.

مواد و روش‌ها: این مطالعه از نوع ترکیبی است. در بخش اول، مصاحبه‌هایی در سال ۱۳۹۸ به صورت هدفمند و جداگانه با ۱۲ نفر از کارشناسان ثبت فوت در وزارت بهداشت و پزشکی قانونی انجام شد تا اطلاعاتی در مورد علل کم ثبتی این گونه مرگ‌ها در ایران و توصیه‌هایی برای حل این مشکل جمع‌آوری شود. بخش دوم مطالعه شامل بررسی انجام یک مداخله در قالب یک اجرای یک تفاهم در مورد کاهش تعداد کم ثبتی‌ها فی مابین سازمان پزشکی قانونی و وزارت بهداشت بود. این تفاهم‌نامه برای انتقال اطلاعات در مورد اجساد بین وزارت بهداشت و پزشکی قانونی در سال۱۳۹۸ منعقد شده بود. ابتدا تعداد مرگ‌های ناشی از مصرف مواد در طی سال‌های ۱۳۹۳ لغایت ۱۳۹۵ با استفاده از روش صید باز صید مورد بررسی قرار گرفت و سپس، میزان کم ثبتی‌ها قبل از مداخله در سال‌های ۱۳۹۳ لغایت ۱۳۹۵ و پس از مداخله (۱۳۹۶) محاسبه و مقایسه گردید و تا ارزیابی شد که آیا این تفاهم نامه در کاهش تعداد کم ثبت نام مؤثر بوده است؟

یافته‌ها: در بخش اول مطالعه، بنا به نظر مصاحبه‌شوندگان، علل کم‌شماری مرگ‌های ناشی از مصرف مواد در وزارت بهداشت و پزشکی قانونی عبارت‌اند از: سیستم مدیریت ضعیف، مشکلات آموزشی پزشکان و پرسنل، محدودیت‌های سیستمی و مشکلات مرتبط با ارباب رجوعان. همچنین پیشنهاداتی برای کمک به حل مشکل کم شماری ارائه شد. این پیشنهادات مربوط به سیستم اداری، فناوری اطلاعات و حوزه های آموزشی است. در قسمت ۲ حدود نیمی از استان های ایران در کاهش کم شماری عملکرد مثبتی داشتند.

نتیجه‌گیری: در سطح کلان، تفاهم‌نامه بین دو سازمان مسئول ثبت متوفیان ناشی از مصرف مواد مؤثر بود. با این حال، افزایش کیفیت ثبت داده‌ها مستلزم نظارت در سطوح خرد و سازمانی است تا منجر به عملکرد مثبت در کاهش کم‌ثبت فوت در تمامی استان‌ها شود.

واژگان کلیدی: گواهی فوت، ایران، عوارض دارویی، روش صید باز صید

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