



ORIGINAL RESEARCH

Relationship between personal characteristics of specialist physicians and choice of practice location in Iran

E Taati Keley¹, H Ravaghi², M Salehi², AA Nasiripour³, Z Abdi⁴, A Meshkini¹

¹Ministry of Health and Medical Education, Tehran, Iran

²Iran University of Medical Sciences, Tehran, Iran

³Science and Research Branch, Islamic Azad University, Tehran, Iran

⁴National Institute of Health Research, Tehran University of Medical Science, Tehran, Iran

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Taati Keley E, Ravaghi H, Salehi M, Nasiripour AA, Abdi Z, Meshkini A

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ABSTRACT

Introduction: Uneven geographic distribution of physicians is a major healthcare issue in Iran. This study aimed to explore the relationship between personal characteristics of the recently graduated specialist physicians in Iran and their choice of practice location.

Methods: A cross-sectional study was conducted to extract information with regard to 3825 recently graduated specialist physicians from all medical schools across Iran between 2009 and 2012. The relationship between physicians' personal attributes and their desire to practise in underdeveloped areas was analyzed using χ^2 test and logistic regression analysis.

Results: Birthplace, sex, exposure to rural practice before residency program, place of residence, and year of graduation were associated with physicians' desire to practise in an underdeveloped area. The logistic regression showed that female physicians were less likely to choose underdeveloped areas to practise as compared with their male counterparts (OR=0.659, 95%CI, 0.557–0.781, $p \leq 0.001$). Physicians who lived in underdeveloped areas were nine times more likely to choose underdeveloped areas to practise as compared with those living in other areas (OR=8.966, 95%CI, 4.717–17.041, $p \leq 0.001$). Physicians who did not have previous exposure to rural practice were 28% less likely to choose to serve in the underdeveloped areas as compared to those who had such exposure (OR=0.780, 95%CI, 0.661–0.922, $p=0.004$). Neither physicians' marital status nor their success in the board certification exam was associated with their choice of practice location.



Conclusions: It seems that increasing the enrollment of physicians with a rural background in residency programs may solve the problem of uneven distribution of specialist physicians in Iran. Because female physicians are less willing to work in the underdeveloped areas than male physicians, increasing the number of male student admissions to residency programs, particularly in certain specialties that are more in demand in the underdeveloped areas, could alleviate the problem of uneven distribution of physicians in the short run. Further, programs that support raising the admissions of female students with a rural background into local medical universities along with providing incentives to encourage them to live and work in rural areas should be put on the policy agenda.

Key words: Iran, medical workforce, physician, underserved area.

Introduction

Achieving equity in access to health care is a top priority of healthcare systems worldwide. Equity in access to healthcare means all people should have equal opportunity to use health care regardless of their socioeconomic status, geographical location, and ethnicity^{1,2}. To ensure equity, adequate allocation of healthcare resources, including human resources, is imperative³. Empirical evidence indicates that ensuring adequate distribution of skilled healthcare workforce could lead to the improvement of patient health outcomes⁴. Unbalanced distribution of health workforce, particularly physicians, between and within countries is a global longstanding problem contributing to great disparities in health outcomes between rural and urban populations^{5,6}. The uneven distribution of physicians results in the 'law of inverse care': people who most need healthcare services consume the least care⁷.

The shortage of physicians in rural and remote areas is a commonplace problem in both developed and developing countries⁵. In countries such as Canada, Australia, and USA, which vary dramatically in size and population density, maldistribution of health workforce in rural and remote areas still remains a challenge⁸⁻¹⁰. Uneven geographic distribution of physicians is also a major healthcare issue in Iran, a middle-income country with a vast territory and uneven regional economic development. This has led to the aggregation of physicians in urban areas and their shortage in rural and underdeveloped areas^{11,12}.

Numerous factors affect practice location decisions among physicians, such as physicians' personal attributes, community characteristics, socioeconomic factors, and professional issues^{7,13}. There is general agreement that particular personal characteristics of physicians are associated with the recruitment and retention of physicians in rural areas^{14,15}. Male physicians are more likely to practise in rural areas than their female counterparts^{16,17}. Rural background has been shown in many different countries to be a significant factor associated with medical graduates' intentions to practise in rural settings^{14,18,19}. Evidence indicates that students from local medical schools are more likely to enter rural practice in future²⁰. Exposure to rural practice could influence physicians' decisions and attitudes to enter rural practice^{21,22}. Related studies suggest that physicians entering rural field residency or medical students who have pre-vocational experiences in rural communities are more likely to pursue rural practice in their future careers^{23,24}. It is widely perceived that selection of medical students based on pre-determined criteria may increase the likelihood of their retention in rural and remote areas once they are qualified⁷.

Overview of health system and distribution of physicians in Iran

Iran, a middle-income developing country with a population of 75 million, is one of the most populated countries in the Middle East. The Iranian healthcare system has experienced major reforms through the past three decades. In 1985, the integration of the two systems of healthcare delivery and medical education led to the establishment of the Ministry of



Health and Medical Education (MOHME). The main purpose of the integration was to establish a more coordinated approach to healthcare provision and medical education²⁵. MOHME has delegated some of its responsibilities to the medical universities, which all operate under the supervision of MOHME. Medical universities are responsible for training the required workforce for the health system, as well as providing public health services through a three-tiered healthcare system.

For more than a decade, MOHME has invested great efforts aimed at redressing the maldistribution of physicians through a wide array of policies and programs, including increasing the supply of physicians, obligatory community service, and providing financial and non-financial incentives. To increase the supply and improve the distribution of health workforce, particularly physicians, the number of medical universities had increased to 50 in 2014, of which 10 were established in the underdeveloped areas of the country. Training local workforce for underdeveloped areas is one of the main goals of these local medical universities²⁶.

The community service program requires specialist physicians to serve in public facilities for a specified time period following their graduation. They will be allowed to practise in the public and/or private sectors following the completion of the community service. Specialist physicians are assigned across the country based on a number of factors, including the need for specialized care in different areas, physicians' choices, and their personal and educational characteristics (i.e. marital status and the score obtained in specialty certification examination)²⁶.

Although the number of physicians has grown considerably in the past few years, the uneven rural–urban distribution of physicians remains a significant problem that may have implications for health. It means that equitable access to health care in underdeveloped areas and rural communities, where residents experience poorer health outcomes, still poses a serious challenge for the Iranian health system^{11,12}.

To the authors' knowledge, there is no previous study that explores factors affecting physicians' choice of practice location using a large sample in Iran. Therefore, the aim of the present study was to investigate the relationship between personal characteristics of the recently graduated specialist physicians, who must perform community service, and their choice of practice location. This study aimed to investigate what personal characteristics of the newly graduates were associated with an increased likelihood to practise in an underdeveloped area for a community service program.

Methods

The study was a cross-sectional study conducted in 2013. The study population consisted of 6673 physicians who graduated from all public medical schools across the country between 2009 and 2012. It should be noted that 2848 of them were not mandated to perform compulsory community service for different reasons, hence they were excluded from the study. Most of the excluded cases were military physicians, for whom working for military organizations was the only choice. Others were physicians who were obliged to perform military service once they graduated. Iran has a mandatory military service for men, which starts at the age of 18. The rest, who accounted for a small number of participants, were overseas specialists with no Iranian citizenship who were to leave the country after their graduation. As a whole, the study participants were those physicians who were free to choose their practice location ($n=3825$).

In Iran, only public medical schools train specialist physicians; no private medical school has a residency program. The study participants graduated in a range of specialties: orthopedics, urology, pathology, anesthesiology, dermatology, obstetrics and gynecology, neurosurgery, internal medicine, ophthalmology, radiology, neurology, otolaryngology, cardiology, and general surgery.

Physicians' personal data were collected from the MOHME directorate general for personnel. Physicians' personal information included age, sex, specialty, birthplace, the rank



of the university attended, place of residence, previous exposure to rural practice, board examination certification, and year of graduation. Further, to categorize the graduates' birthplace and place of residence into two zones (developed and underdeveloped areas), the socioeconomic development index of provinces and regions established by the government was used. The universities where the study participants graduated were categorized as I, II or III – according to the system used by MOHME. Classification of the medical universities has been made on the basis of different criteria (ie number of beds of affiliated hospitals, financial and scientific capacity, number of faculty members, research activities, and efficiency of use of research capacities). Medical schools categorized as type III are not allowed to hold residency and fellowship programs.

The graduates' selected locations were classified as developed, semi-developed, or underdeveloped areas. MOHME has classified the areas according to the level of socioeconomic development of the provinces, geographical location, and infrastructure and health facilities. Due to Iran's geographical vastness, the areas in need of specialists are not necessarily deprived areas. Specialist physicians are allowed to select from among 40 areas to perform their compulsory service. Each area is the catchment area of one of the medical universities. They are not allowed to perform their compulsory service in a number of province capitals and large cities. During the assignment process, physicians did not know if there was any open vacancy in their selected areas. If there was not any open vacancy in their first selected location, the next choice would be considered in the assignment process. Because the current study aimed to assess the relation between physician choice and their personal characteristics, only their first choice was considered as their preferred choice, regardless of the result of the assignment.

To explore the relationship between physicians' attributes and their choice of practice location, data were analyzed using χ^2 test and multivariate logistic regression analysis with the assistance of Statistical Package for the Social Sciences software v18 (SPSS; <http://www.spss.com>). A p -value ≤ 0.05 was considered statistically significant.

Ethics approval

This study received ethics approval from the Ethics Committee of Iran University of Medical Sciences; ethics approval number 92-04-136-24339.

Results

Normality of the distribution was checked using the Kolmogorov–Smirnov (K–S) test ($p \geq 0.05$, normal distribution). All 3825 graduated physicians who were mandated to perform compulsory community service were included in the study. As Table 1 shows, 60.4% of the physicians were male. The majority of the physicians were married (79.6%) and 80.7% of them graduated from type I medical schools. Most physicians were born and lived in developed areas (92.5% and 91.3%, respectively). Sixty-four percent of physicians had passed the specialty certification examination successfully. The mean age of the study population was 34 years (range, 27–50 years).

Table 2 shows the number of graduates within different specialties. The physicians graduated in 2011 comprised 34% of the study sample. Within the sample, obstetricians and gynecologists made the highest number (14%) and neurosurgeons the lowest (2%).

Table 3 summarizes the results of the χ^2 test. The results of the test indicated that the choice of practice location was associated with birthplace, sex, year of graduation, rank of the university attended, place of residence, exposure to rural practice before residency program, and age ($p < 0.05$). Graduates' marital status and holding of board certification were not found to be significantly related to the dependent variable.

The results of regression analysis are shown in Table 4. The independent variables included birthplace, marital status, sex, year of graduation, rank of the university attended, place of residence, and exposure to rural practice before residency training program. To compare the two groups of graduates



(those who chose to practise in the underdeveloped areas and those who chose to practise in the developed areas) logistic regression analysis was used. The results of the analysis revealed that the independent variables (sex, year of graduation, the rank of the university attended, place of residence, and exposure to rural practice before residency training program) were significantly associated with the decision to practise in an underdeveloped area ($p \leq 0.05$). The analysis suggested that female physicians were less likely to choose underdeveloped areas to practise as compared with their male counterparts (OR=0.659, 95%CI, 0.557–0.781, $p \leq 0.001$). The likelihood of choosing an underdeveloped area to practise increased for those who studied in type I medical schools as compared with those who attended type II medical schools (OR=1.679, 95%CI, 1.389–2.029, $p \leq 0.001$). Physicians who lived in the underdeveloped areas were nine times more likely to choose to practise in the underdeveloped areas than those lived in the developed areas (OR=8.966, 95%CI, 4.717–17.041, $p \leq 0.001$). Physicians who had no previous exposure to rural practice were less likely to practise in the underdeveloped areas as compared to those who were exposed to rural practice before entering a residency training program (OR=0.780, 95%CI, 0.661–0.922, $p=0.004$).

According to the regression logistic analysis, variables such as sex, year of graduation, rank of the university attended, and place of residence were significantly different in graduates whose first choice was a developed area as compared to those who selected to practise in a semi-developed area. Female physicians were more likely to select a developed area to practise as compared with male physicians (OR=0.528, 95%CI, 0.349–0.800, $p=0.003$). Physicians who lived in the underdeveloped areas were 17 times more likely to choose to practise in the underdeveloped areas as compared with those who lived in other parts of country (OR=17.301, 95%CI, 6.841–43.754, $p \leq 0.001$).

Discussion

The shortage and uneven distribution of the health workforce represents a longstanding problem in rural and remote areas

of Iran, with serious implications for access to healthcare services in such areas. As noted earlier, a number of government national policies have sought to increase the number of rural physicians. There is increasing evidence that the recruitment and retention of physicians in particular areas is affected by multiple factors, including physicians' personal attributes, community characteristics, economic, and professional education factors¹⁸. There is a general agreement that personal characteristics of physicians such as growing up in a rural community, exposure to a rural practice during training, marriage to a person from a rural area, and training in family medicine rather than other specialties are associated with the recruitment and retention of physicians in rural areas¹³. According to the findings of the study, key personal attributes determining initial practice location after graduation among the young Iranian physicians included sex, birthplace, place of residence, and exposure to rural practice before residency program.

This study supports previous findings that female physicians are less likely than their male counterparts to choose rural areas to practise^{17,18}. This may be explained by the fact that the location choice of female physicians is often modified by a number of factors including family responsibilities and commitments, access to good schools for children, spouse's career concerns, and inadequate accommodation facilities in underdeveloped areas⁷. The literature from other countries has also reported that increase in the number of female physicians would not result in more physicians working in rural areas¹⁶⁻¹⁸. A study conducted in the USA concluded that growth in the number of female physicians would not resolve the shortage of physicians in rural and remote areas¹⁶. Being a female physician was reported as a negative predictor for rural practice in Japan²⁷. In Australia, both female GPs and female specialists are much less likely to practise in rural locations compared with male physicians¹⁸. In Turkey, 86.5% of male physicians and only 13.5% of female physicians tend to work in rural areas¹⁷. A study conducted in Iran found that male physicians are more willing to practise in rural areas as compared with female physicians²⁸. According to a previous study, the most common reasons for the unwillingness of Iranian female physicians to practise in rural areas are family issues and lifestyle considerations²⁶.



Table 1: Demographic characteristics of study population

Variable	Number	Percentage
Birthplace		
Underdeveloped area	287	7.5
Developed area	3538	92.5
Marital status		
Single	781	20.4
Married	3044	79.6
Sex		
Female	1515	39.6
Male	2310	60.4
Age range (years)		
25–30	1349	35.3
31–35	1828	47.8
36–40	457	11.9
41–45	174	4.6
Year of graduation		
2009	778	20.3
2010	773	20.2
2011	1318	34.5
2012	956	25.0
Rank of university attended		
I	3085	80.7
II	740	19.3
Place of residence		
Underdeveloped area	333	8.7
Developed area	3492	91.3
Board examination certificate?		
Yes	2463	64.4
No	1362	35.6
Exposure to rural practice?		
Yes	2153	43.7
No	1672	56.3

Table 2: Number of graduated physicians by specialty and year of graduation

Specialty	2009	2010	2011	2012
Anesthesia	85	65	97	96
Cardiology	43	34	95	69
Dermatology	28	36	35	38
Ear, nose and throat	31	24	41	26
General surgery	53	56	114	76
Internal medicine	57	50	217	85
Neurology	40	41	50	46
Neurosurgery	14	19	29	28
Obstetrics and gynecology	122	115	170	134
Ophthalmology	34	28	49	39
Orthopedics	46	57	55	47
Pathology	56	56	72	57
Pediatrics	82	104	161	117
Radiology	63	53	89	69
Urology	24	35	44	29



Table 3: Choice of practice location among participants based on personal characteristics: results of χ^2 test

Variable	Practice location			p value
	Developed	Semi-developed	Underdeveloped	
Birthplace	24 (2.8)	2 (1.5)	261 (9.2)	<0.001*
Underdeveloped area	24 (2.8)	2 (1.5)	261 (9.2)	<0.001*
Developed area	839 (97.2)	131 (98.5)	256 (90.8)	
Marital status	24 (2.8)	2 (1.5)	261 (9.2)	<0.001*
Single	194 (22.5)	19 (14.3)	568 (20.1)	0.063
Married	669 (77.5)	114 (85.7)	2261 (79.9)	
Sex				
Female	411 (47.6)	42 (31.6)	1062 (37.5)	<0.001*
Male	452 (52.4)	91 (68.4)	1767 (62.5)	
Age range (years)				
25–30	341 (39.5)	49 (36.8)	959 (33.9)	
30–35	390 (45.2)	71 (53.4)	1367 (48.3)	0.033*
35–40	92 (10.7)	12 (9.0)	353 (12.5)	
40–45	36 (4.2)	1 (10.8)	137 (4.8)	
45–50	4 (0.5)	0 (0)	13 (0.5)	
Year of graduation				
2009	160 (18,5)	26 (19,5)	592 (20,9)	
2010	129 (14,9)	42 (31,6)	602 (21,3)	
2011	347 (40,2)	39 (29,3)	932 (32,9)	<0.001*
2012	227 (26,3)	26 (19,5)	703 (24,8)	
Rank of university attended				
I	649 (75.2)	119 (89.5)	2317 (81.9)	
II	214 (24.8)	14 (10.5)	512 (18.1)	<0.001*
Place of residence				
Underdeveloped area	12 (1.4)	11 (8.3)	310 (11)	<0.001*
Developed area	851 (98.6)	122 (91.7)	2519 (89)	
Board examination certification?				
Yes	567 (65.7)	94 (70.7)	802 (63.7)	
No	296 (34.3)	39 (29.3)	1027 (36.3)	0.171
Exposure to rural practice?				
Yes	359 (79.4)	77 (84.6)	1531 (86.6)	
No	93 (20.67)	14 (15.4)	236 (13.4)	0.01*

*Statistically significant at $p < 0.05$

It should be noted that to address gender imbalance and provide female patients with female physicians, MOHME has increased the number of female physicians in residency programs within most specialties up to 40% since 2000. While the number of women entering medicine has increased in recent years in Iran, there is concern that this could exacerbate the rural physician shortage²⁶. It seems that this policy itself is unlikely to resolve the shortage of female physicians in remote and rural areas of Iran. Thus, it is time to revise the policy. It should be added that, due to the policy

implementation, shortage of female physicians has been mostly resolved in large cities and urban areas. Consequently, it could be suggested that increasing the number of male physician admissions to residency programs, particularly in certain specialties that are more in demand in underdeveloped areas, could alleviate the problem of uneven distribution of physicians in underserved areas in the short term. Evidence suggests that rural medical school programs can substantially increase the likelihood of women serving in rural areas^{19,29}. Therefore, to redress the shortage of female



physicians in rural and remote areas in the long run, raising the enrollment of female students with rural backgrounds in local medical universities along with providing incentives to encourage them to work in rural settings after graduation may be some other possible strategies.

Unmarried physicians are more prepared to move or migrate because they have less family responsibilities⁵. However, the findings of the current study suggest that there is not a significant relationship between marital status of physicians and their choice to work in underdeveloped areas. Expectations such as higher income and working in better facilities, as well as the disparity between physicians' income in rural areas and urban areas, could be considered as some reasons for their desire to practice in urban areas.

Numerous studies have elucidated the association between rural background and rural practice^{18,19}. In Turkey, for example, physicians who have particular socioeconomic backgrounds such as rural origin or come from low-income families are more likely to be motivated to work in underdeveloped areas¹⁷. The present study also identified rural background as a predictor of choosing underdeveloped areas to practise. However, according to the results, only 7% of the recently graduated physicians were born in underdeveloped areas. Students living in rural communities and underdeveloped regions have less opportunity to enter medical schools due to their socioeconomic background, and lack of access to good schools in such areas. To accelerate progress in achieving social justice, the Iranian parliament passed a law in 2014 that mandated MOHME to increase the number of students with rural background entering public medical schools by 30% across all specialty programs.

Previous exposure to rural practice during undergraduate or postgraduate medical training could influence the subsequent decision to practise in a rural community among physicians^{21,22,30}. Consistent with the findings of prior studies^{21,23}, the present study revealed that physicians who do not have experiences working in rural and remote areas before entering residency training programs are less willing to practise in the underdeveloped areas of the country after their graduation as compared to those who had such exposure. Previous studies also confirmed that working in

rural and underdeveloped areas could prepare young physicians to cope with living in rural and remote areas and change their attitudes toward rural practice^{19,21}. It should be noted that the current medical curriculum of the Iranian medical schools, which is primarily a tertiary hospital-based model of medical education, exposes medical students to curative and specialized care. This mainly could reduce the likelihood of entering a rural practice. Providing community-based education, where most of the clinical teaching is centered in the community (eg primary health clinics, small health centers, and rural hospitals), could be an appropriate way to prepare young Iranian physicians for rural practice and to equip them with adequate knowledge and skills to practise in rural settings.

More recently graduated students may have different career expectations than their older counterparts³¹, which was also observed in the present study. These findings indicate that recently graduated physicians are less likely to practise in underdeveloped areas as compared with those who graduated earlier. There could be several reasons for this. Due to the current economic issues in Iran, it seems that financial factors play a key role in physicians' early career decisions, which motivate them to work in urban areas and large cities to maximize their income. In addition to financial factors, newly graduated physicians may also take into account family and lifestyle factors such as leisure activities, access to good schools for their children, and spouse's employment opportunities in choosing their practice location.

Limitations

Certain limitations need to be acknowledged in the present study. First, as this study is a cross-sectional survey, the results are just a static picture which could not include changes or trends in physicians' job preferences or factors influencing workplace selection among them. Second, this study included a limited number of physicians' personal characteristics; other important factors such as spouse's background and preferences, family background, and salary expectations were not included. Third, due to the nature of the data, birth in a rural community was regarded as having a rural origin. However, in similar studies rural origin was defined as having completed primary or secondary school education in rural communities.



Table 4: Factors predicting practice in underdeveloped areas: results of regression analysis

Choice of place of practice	Variable		Estimation point	p value	Odds ratio (95%CI)	Lower bound	Upper bound
Developed vs underdeveloped areas	Birthplace	Underdeveloped	0.258	0.301	1.295	0.794	2.112
		Developed					
	Marital status	Single	-0.090	0.353	0.914	0.756	1.105
		Married					
	Sex	Female	-0.416	0.001*	0.659	0.557	0.781
		Male					
	Year of graduation	2009	0.136	0.281	1.145	0.895	1.466
		2010	0.426	0.001*	1.531	1.194	1.962
		2011	-0.200	0.049	0.819	0.671	0.999
		2012					
	Rank of university attended	I	0.518	0.001*	1.679	1.389	2.029
		II					
	Place of residence	Underdeveloped	2.193	0.001*	8.966	4.717	17.041
Developed							
Exposure to rural practice?	No	-0.240	0.004*	0.780	0.661	0.922	
	Yes						
Semi-developed vs underdeveloped areas	Birthplace	Underdeveloped	-2.012	0.112	0.134	0.028	0.636
		Developed					
	Marital status	Single	-0.496	0.060	0.609	0.363	1.021
		Married					
	Sex	Female	-0.638	0.003*	0.528	0.349	0.800
		Male					
	Year of graduation	2009	0.276	0.380	1.318	0.712	2.441
		2010	1.054	0.001*	2.869	1.662	4.954
		2011	-0.051	0.850	0.950	0.559	1.614
		2012					
	Rank of university attended	Type I	1.133	0.001*	3.104	1.729	5.571
		Type II					
	Place of residence	Underdeveloped	2.851	0.001*	17.301	6.841	43.754
Developed							
Exposure to rural Practice?	No	-0.396	0.600	0.620	0.211	1.342	
	Yes						

* Statistically significant at $p < 0.05$
CI, confidence interval

Conclusions

In this study, a number of factors have been found to be significantly associated with the recruitment and retention of physicians in underdeveloped areas of Iran. These findings have several implications that may assist policy-makers in making physician distribution more equitable. More than 90% of specialist physicians in Iran were born and lived in developed areas. Considering the relationship between being born in an underdeveloped area and selecting such areas to perform community service, it seems that the increase in the

enrollment of physicians with a rural background in residency programs may solve the problem of uneven distribution of specialist physicians in Iran. Further, experiences in non-urban areas could influence their decisions as to where to practise. Also, because female physicians have less desire to live in the underdeveloped areas as compared to their male counterparts, increasing the number of male physicians entering residency programs, particularly within certain specialties that are more in demand in the underdeveloped areas, could alleviate the problem of uneven distribution of physicians in such areas. To increase the number of female



physicians in rural and remote areas, programs that support raising the admissions of female students with a rural background into local medical universities along with providing incentives to encourage them to live and work in rural areas should be put on the policy agenda.

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