More than 70% of all mental disorders begin before the age of 25 years old. Unfortunately, the Eastern Mediterranean Region has a gross deficit of mental health resources for young people across all sectors. If left unaddressed, mental health problems can have serious social and economic costs that are likely to persist into adulthood, and lead to inter-generational disadvantage.

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Mental health services for youth in the Eastern Mediterranean Region: challenges and opportunities

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The Global Burden of Disease study (1) shows that the burden from mental and substance use disorders, measured in Disability Adjusted Life Years (DALYs), has steadily risen in the Eastern Mediterranean Region (EMR) over the last three decades and is higher than the global average for almost all EMR countries (2). Even more alarming is the finding that depression, self-harm, anxiety and conduct disorders constitute four of the top 10 causes of DALYs among girls and boys aged 15–19 years and suicide is a leading cause of adolescent mortality.

More than 70% of all mental disorders begin before the age of 25 years old. Risk factors for mental disorders include genetic pre-disposition, deficiencies in psychosocial or educational environments, alcohol and drug misuse, and family, peer or school problems (3). The Region has additional population level risks of high fertility rates, complex emergencies, instabilities, and rapid urbanization. But mental 'health' goes beyond mental disorders and encompasses an individual's ability to cope with stress and to realise his or her own potential, despite adversity. This calls for integration of mental health into development work across sectors, and not just health services (4). Unfortunately, the EMR has a gross deficit of mental health resources for young people across all sectors, including specialised personnel, facilities and training schemes, and many EMR countries lack adequate mental health policies and laws (5). Unaddressed mental health problems will have serious social and economic costs, which are likely to persist into adulthood, and lead to inter-generational disadvantage.

Therefore, in order to reverse the trend it is imperative that drastic action is taken. There is a consensus among experts that early-life interventions are likely to be the most promising investment in population mental health for the following reasons (4): First, early recognition of mental health problems or risk factors, such as parental mental illness, allows for remedial action. Second, early interventions contribute to tackling the damaging stigma associated with mental disorders as these become more symptomatic due to lack of treatment. Third, special attention to early interventions in high-risk groups, such as children affected by conflict and violence, abuse, maltreatment or poverty, can reduce disparities that are the inevitable consequence of poor mental health. Fourth, investing in child and youth mental health is not only a social and economic necessity, but also a moral obligation upon society.

Early life interventions when mapped on to developmental stages cover two critical periods: the first 1000 days; and school age. Given the brain's plasticity, the first 1000 days, including the perinatal period (in utero to two years postnatal) and early childhood (two to eight years), are critical for healthy development and later mental health (5). The early home environment provides a key opportunity to implement interventions that can promote mental health and prevent mental illness. Several evidence-based interventions have demonstrable benefits for both infants and mothers, even in low-income settings (6). These include interventions focusing on parental skills training, maternal mental health, mother-infant bonding and interaction, play, responsiveness and stimulation. Integrated approaches incorporating psychosocial, nutritional and educational 'common elements' delivered seamlessly by health, education and social welfare services are necessary to maximise benefits from these interventions for mothers and babies (7). Population-level interventions, such as genetic counselling, screening of new-born babies (8) and reduction of maternal alcohol and substance use can prevent cognitive impairment and disability.

While this early period is critical, later childhood and adolescence – especially school age – present further opportunities for ameliorating the effects of early disadvantage, and thus building resilience and reducing the harmful consequences of conditions that have an onset during this period (9). Good schools provide a natural, non-stigmatizing, culturally acceptable, accessible and potentially sustainable platform to build social and emotional competencies. In relation to the prevention of mental illness and substance abuse, systematic reviews show that universal socio-emotional learning (SEL) interventions in primary and post-primary schools promote children's social and emotional functioning and academic performance in the long term (10). The

most effective interventions employ a whole-school approach where mental health activities are supported by a school culture involving staff, students, parents, school environment and local community. The School health Implementation Research Network in the Eastern Mediterranean Region (SHINE) project promotes mental health through a manualized school-based intervention in EMR countries of the region (11). For mental disorders in youth, treatment strategies including 'talking therapies' like cognitive behavioural therapy and medication for selected conditions, are included in the WHO Mental Health Gap Action Programme Intervention Guide (12), aimed at non-specialist health care providers, especially in low- and middle-income countries.

The Regional Framework to Scale Up Action on Mental Health in the Eastern Mediterranean Region (13) was adopted by Member States at the 62nd Session of the WHO Regional Committee for the Eastern Mediterranean held in Kuwait, 5–8 October 2015, and identified high impact, cost-effective, affordable and feasible strategic actions supported by a set of indicators to monitor the implementation of the plan (14). Countries in the Region need to focus on implementation of this framework to help achieve targets set out in the sustainable development agenda and WHO's ambitious vision as expressed by the aspirational "triple billion" targets (15). The overwhelming evidence suggests that the best place to start is with early life interventions.

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Knowledge, practices and attitudes of physicians towards evidence-based medicine in Egypt

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Abstract

Background: Evidence-based medicine help clinicians deal with information overload, to distribute healthcare resources more equitably, help reduce healthcare costs, and justify treatment choices to the public.

Aims: This study aimed to assess evidence-based medicine (EBM) knowledge, practices and attitudes among physicians in Tanta University hospital, Tanta, Egypt.

Methods: A cross-sectional study was used. Collection of data was by a self-administrated questionnaire distributed to 398 physicians in different specialties during 2017.

Results: Response rate was 93.6%. More than half (61.3%) of participants reported Pub Med as used in decision-making. Physicians with good knowledge of EBM represented 10.5%, those with fair knowledge represented 54%, and those with poor knowledge represented 35.5%. Regarding attitudes towards EBM, 76.4% of study participants welcomed the current promotion of EBM; 81.4% thought that it useful to use research findings in daily management of patients; and 89.9% thought that practicing EBM improved patient outcomes. More than half of participants (55.8%) had attended courses related to EBM, but only 6.8% had attended courses related to critical appraisal. The majority of participants (97%) had access to the World Wide Web. Barriers reported by participants that interfere with EBM practice were patient overload (68.1%), lack of time (60.1%), colleagues' attitudes (47%), lack of skills (46.7%), and fear of criticism (44.5%).

Conclusions: Most participants in this study have a positive attitude towards EBM, have a fair knowledge of it, but poor practices. EBM should be integrated in the curriculum of both undergraduate and postgraduate studies, and EBM training courses provided to residents to ensure correct application of EBM in daily practice.

Keywords: evidence-based medicine, medical students, KAP, Egypt

Introduction

Evidence-based medicine (EBM) as a new paradigm for medical practice involves integrating the best available external clinical evidence with individual clinical expertise and use of individual patient's rights and preferences in clinical decision-making. Thus, the ability to critically appraise literature and assess its applicability is identified as integral to the practice of EBM (1). Evidence-based practice is the process of care for the patient, which takes into account his or her preferences and actions, the clinical resources available, and current and applicable scientific evidence, under the clinical expertise and training of the health-care provider (2).

Competent physicians use both individual clinical expertise as well as the best available external evidence (3). The benefits of EBM help clinicians deal with information overload, to distribute health care resources more equitably, help reduce healthcare costs, and justify treatment choices to the public. The goal is to improve quality of care by promoting effective practices and encourage clinicians have to try new scientific methods and discard ineffective practices (4).

In Egypt, relatively few studies (5–7) have been carried out to assess awareness demonstrated by health care physicians towards evidence-based medicine, the ability to access and interpret evidence, the barriers to moving from opinion-based to evidence-based practice, and the additional support necessary to incorporate evidence. This study was conducted to assess knowledge, attitudes and practices regarding EBM among physicians in Tanta University Hospitals in Tanta, Egypt, and identify barriers to EBM.

Methods

A cross-sectional study was performed in Tanta University Hospitals, which has 1962 beds providing secondary and tertiary healthcare services to 559 532 patients per year. The total number of working physicians is 2138 (8). The study subjects were physicians working at Tanta University Hospitals based on the following inclusion criteria: residents, demonstrators, and assistant lecturers working at different departments of Tanta University Hospitals. Exclusion criteria included: physicians who spent < 3 months in the job, and those who were on vacation during the whole period of study.

The sample size was calculated using Epi info 7, software developed by Center for Disease Control &

Prevention (CDC) and the World Health Organization (WHO). The Calculated number was 384 physicians (CI 95%), and expected outcome (total score of knowledge) was estimated at 50% with a 5% margin of error. The sample was obtained by one stage stratified sampling method. The departments were divided into two different strata; medical stratum and surgical stratum. The total sample size was divided by weight of total population of each stratum. In the medical stratum the total sample was 225 physicians while in the surgical stratum the total sample was 173 physicians. Departments were randomly selected from each stratum.

Data were collected from physicians using a self-administered questionnaire. The valid and reliable questionnaire used by McColl et al. 1998 (*9*) and modified by Boulus et al. 2013 (*6*) was adopted. The questionnaire consists of the following sections:

1. Socio-demographic data

2. Knowledge of physicians

3. Attitude of physicians towards evidence-based medicine.

4. Questions to describe practicing of EBM

5. Perceived major barriers to practicing EBM in medical practice.

The questionnaire was sent to five experts for testing for validity. A pilot study was done on 20 physicians not included in the study and Cronbach's alpha was found to be 0.853. The questionnaire was distributed to all residents, demonstrators and assistant lectures of the included medical and surgical departments. Out of 425 questionnaires distributed to physicians, 398 questionnaires were completed. Only 12 questionnaires were returned unanswered and were counted as 'no response'. Fifteen questionnaires were not returned (93.6% response rate). The scoring system of the questionnaire (*10*) was as follows:

A. Knowledge scoring:

Knowledge assessment consisted of 14 items (seven items to determine awareness of physicians with journal sites and seven items to reveal awareness with statistical terms used in scientific papers). Each item had a four response format. Subscale scores ranging from 0 to 3 were obtained by summing the items in each subscale and calculating the mean of score percentage. Total knowledge score ranged from 0 to 42. Knowledge score was divided into three tertiles; the first tertile represented poor, the second tertile represented fair, and the third tertile represented good knowledge.

B. Attitude scoring (10):

Attitude assessment consisted of three items with 5-Likert-scale format as zero "strongly unwelcoming" to 4 "strongly welcoming". Subscale score was obtained by summing the items and mean score percentage was calculated. Total attitude score ranged from zero to 12. The attitude score was divided into two halves; the first half represented negative, and the second half represented positive attitude.

C. Practice scoring:

Practice assessment consisted of five questions. First two questions addressed any previous training and was scored as (0) for no attendance and (1) for attending. The third question asked about accessibility to World Wide Web and was scored as (0) for "No" and (1) for "Yes". The fourth question asked about using the World Wide Web in clinical decision-making and was scored (0) for "No" and (1) for "Yes". The fifth question asked about reading of medical journals and was scored as the following (0) for "do not read any journals", (1) for "read occasionally", (2) for "read on demand", and (3) for "read regularly". Total practice score ranged from 0 to 7. The mean score percentage was calculated and the score was divided into three tertiles; the first tertile represented poor, the second tertile represented fair, and the third tertile represented good practice.

Statistical Analysis

Analysis of data was performed using Statistical Package for Social Sciences (SPSS®) version 21 (IBM, Armonk, NY; United States of America). Qualitative data were described using number and percent. Quantitative data were presented as mean and standard deviation. Chi square test was used for comparison of subcategories. $P < 0.05$ was adopted as the level of significance.

Ethical considerations

Approval for the research was obtained from the ethical committee of Tanta Faculty of Medicine before starting the study. Subjects were informed about the purpose of study and benefits of participating in it. Verbal consent was obtained from subjects to participate in the study. Confidentiality and privacy were guaranteed during the whole period of study.

Results

Table 1 shows socio-demographic characteristics of study participants. Table 2 shows that the highest reported resources as "used in decision-making" among participants were Pubmed (61.3%), Cochrane database for systematic review (10.1%), and EBM from BMJ Publishing Group (5.5%). Table 3 shows that more than one third (35.3%) of study participants had poor knowledge and more than half of them (53.7%) had fair knowledge, and only 10.5% of them had good knowledge. The table also reveals that job grade, specialty, and previous training concerning EBM had a statistically significant effect on knowledge score distribution among study participant.

Table 4 shows that 93.2% of participants had a positive attitude towards EBM, while only 6.8% of them had a negative attitude. Gender, job grade, specialty, previous qualifications, and previous training concerning EBM had a statistically significant effect on attitude scoring among study participants.

Table 5 shows that more than one-half of the

participants attended EBM courses, while 6.8% attended critical appraisal courses. Only 3.0% of participants did not have access to World Wide Web. Among those who had accessibility, 87.7% used it in clinical decision-making. The percentage of study participants reading medical journals was 73.1%. More than one half of the participants (54.5%) reported their EBM practice as less than 50%, and only 8.8% reported their EBM practice more than 75%. The best educational method to move towards EBM according to participants' opinion was the case review and discussion (87.7%), followed by workshops for training physicians (84.2%), and lastly the integration of EBM into undergraduate courses (75.4%). The major barriers perceived were patient overload (68.1%), followed by lack of time (60.1%), colleagues' attitude (47%), lack of skills (46.7%), and lastly fear of criticism (44.5%).

Table 6 shows that more than half (58.5%) of study participants had a poor practice score and one third (33.2%) of them had a fair practice score, and only 8.3% of them had a good practice score. The table also reveals that job grade, and specialty had a statistically significant effect on practice score distribution among the study participants.

Discussion

Regarding the knowledge of various EBM resources, the majority of study participants were aware of PubMed (Medline). Similar results were obtained by Risahmawati et al. (2011), which indicated that in Japan 90% of participants were aware of PubMed; moreover, it was the only resource among all EBM that was reported as used during clinical decision-making (10). However, the study conducted by Hassan et al. (2014) reported that only one half of the participants (50.9%) were aware of Pubmed (7).

This study showed that 60.5% of participants were aware of BMJ Publishing Group. Similar results were obtained by Al-Kubaisi et al. (2010) in which BMJ awareness represented 62.2% of the participants, followed by Qatar Medical Journal at 40% (11). The EBM from BMJ awareness in our study was higher than the study of Abd AL-Magied et al. (2013) and Hassan et al. (2014) in which only 28.6% and 27.3%, respectively reported awareness of that resource (5,7). In addition, 5.5% of participants had previously used EBM from BMJ in decision-making. This did not coincide with the study conducted in the Islamic Republic of Iran by Rashidbeygi and Sayehmiri (2013), which showed that 8.5% of participants used EBM from BMJ Publishing Group to support the process of decision-making (12).

Physicians' awareness percentage of clinical evidence in our results was 46.7%. This varied with results from Hassan et al. (2014), which showed that only 29.1% of participants were aware (7). In addition, the studies conducted by Abd Al-Magied et al. (2013) and Boulus et al. (2013) reported that participants' awareness of clinical evidence websites were 30% and 31.6%, respectively (5,6). This can be attributed to the observation that our study participants had received training during both undergraduate and postgraduate curricula about EBM

Table 1 Socio-demographic characteristics of studied physicians

Characteristics	n= 398	%
Age		
25-	161	40.5
28-	122	30.7
31-	115	28.8
Range	**25-34**	
Mean± S.D	**28.9 ± 2.7**	
Gender		
Male	213	53.0
Female	185	47.0
Job		
Resident	188	47.2
Demonstrator	61	15.3
Assistant lecturer	149	37.5
Specialty		
Medical	225	56.0
Surgical	173	44.0
Years since graduation		
<2	15	3.8
2–	125	31.4
4–	108	27.1
6–	60	15.1
8–	66	16.6
10	24	6.0
Range	**1-12**	
Mean± S.D	**5.1±2.7**	
Qualifications or fellowships		
None	374	94.0
USMLE	10	2.5
MRCP	10	2.5
MRCS	4	1.0

and its resources. Our study was also conducted three years later when awareness of EBM resources and its availability had increased.

Physicians' awareness of the Cochrane database in the present study was 71.8%. This was higher than Hassan et al. (2014) in which only 25.9% of participants were aware (7). This was also higher than the results of Abd Al-Magied et al. (2013) in which 39.4% of participants were aware of Cochrane collaboration as a source of information about EBM (5). However, the study conducted by Rashidbeygi and Sayehmiri (2013) revealed that only 5.3% of physicians used the Cochrane database of systematic reviews. This difference could be due to the fact that EBM is still a new term in the Islamic Republic of Iran (12). In the present study, physicians' awareness of the Eastern Mediterranean Health Journal was 16.8%, which differed studies by Hassan et al. (2014) in which 29.1% of participants were aware (7).

Table 2 Awareness and utilization of different EBM resources

Journal or database	Awareness							
	Unaware		Aware but not use		Read		Used in decision making	
	n.	%	n.	%	n.	%	n.	%
Pubmed	19	4.8	21	5.3	114	28.6	244	61.3
Cochrane	112	28.1	117	29.4	129	32.4	40	10.1
EBM from BMJ *	157	39.5	143	35.9	76	19.1	22	5.5
CDC**	175	44.1	127	31.9	76	19.2	19	4.8
Clinical-evidence	212	53.2	139	34.9	40	10.1	7	1.8
Eastern-Mediterranean health journal	328	82.2	42	10.5	19	4.8	6	1.5
Journal of family practice	337	84.7	54	13.5	4	1.0	3	0.8
Others reported resources								
Medscape				77 (19.3%)				
Up-To-Date				74 (18.5%)				
E-medicine				12 (3%)				
clinical key				8 (2%)				

British Medical Journal publishing group
**Center for Disease Control and Prevention*

This study indicated a generally positive attitude towards the current promotion of EBM. Boulus et al. (2013) found that 77.8% of participants had a positive attitude toward EBM (6). This was also similar to that reported by Abeysene et al. (2012) in which 75.8% of the study participants had a positive attitude towards the current promotion of EBM (13), while studies by Barghouti et al. (2009) indicated that 63.5% of participants were positive towards EBM (14).

In addition, 81.4% of participants agreed that research findings are useful in patient management. Similar results were obtained by Hassan et al. (2014), who reported that 82.3% of participants believed that research findings are useful in patient management (7). Mehrdad et al. (2012) found that 80% of participants believed that EBM is helpful in clinical decision-making (15). This result coincides with Jette et al. (2003) in which 85% of the respondents indicated they were interested in learning

Table 3 Distribution of studied subjects in relation to total knowledge score

Variables	Knowledge score						χ^2	P
	Poor		Fair		Good			
	n.	%	n.	%	n.	%		
Gender							2.290	0.318
Male (n = 213)	79	37.0	116	54.5	18	8.5		
Female (n = 185)	62	33.5	99	53.5	24	13.0		
Job							113.420	0.001
Resident (n = 189)	109	57.7	75	39.7	5	2.6		
Demonstrator (n = 61)	26	42.6	27	44.3	8	13.1		
Assistant lecturer (n = 148)	6	4.0	113	76.4	29	19.6		
Specialty	76	33.8	114	50.6	35	15.6	13.752	0.001
Medical (n = 225)								
Surgical (n = 173)	65	37.6	101	58.4	7	4.0		
Previous qualifications							57.632	0.001
Yes (n= 24)	2	8.3	3	12.5	19	79.1		
No (n = 374)	179	47.8	164	43.8	31	8.4		
Previous EBM training							13.748	0.001
Yes (n = 222)	60	27.0	137	61.7	25	11.3		
No (n = 176)	81	46.0	78	44.3	17	9.7		
Total (n = 398)	141	35.4	215	54.0	42	10.6		

Table 4 Factors affecting attitude score among the studied physicians

Variables	Attitude score				χ^2	P
	Negative (n = 27)		Positive (n = 371)			
	n.	%	n.	%		
Gender					6.786	0.009*
Male (n = 213)	21	9.9	192	90.1		
Female (n = 185)	6	3.2	179	96.8		
Job					18.149	0.001*
Resident (n = 189)	22	11.6	167	88.4		
Demonstrator (n = 61)	5	8.2	56	91.8		
Assistant lecturer (n = 148)	0	0.0	148	100.0		
Specialty					6.342	0.012*
Medical (n = 225)	9	4.0	216	96.0		
Surgical (n = 173)	18	10.4	155	89.6		
Previous qualifications and fellowships					1.785	0.182
Yes (n = 24)	0	0.0	24	100.0		
No (n = 374)	38	10.2	336	89.8		
Previous EBM training					18.402	0.001*
Yes (n = 222)	4	1.8	218	98.2		
No (n = 176)	22	11.0	154	89.0		
Total	27	6.8	371	93.2	–	–

and improving their skills of implementing evidence-based practices (*16*).

This study indicated that 89.9% of participants agreed that practicing EBM improve patient outcomes. Studies by Hassan et al., (2014) indicated that 90% of participants also believed that EBM would improve patient outcomes (*7*), but was higher than studies by Risahmawati (2011) in which 65% of participants said that EBM improve patient care (*10*).

Over one half of participants (55.8%) attended courses in EBM. This differed from Hassan et al. (2014) who reported only 18.2% of participants attending EBM courses (*7*), or Boulus et al. (2013) at 7.2% (*6*). This could be explained by the younger age of the target group included in those studies, namely graduated residents with high workloads and thus little chance of attending courses, especially those not integral in their postgraduate study. This differs from the results of Ismail et al. (2011) in which the percent was 10.9% attending EBM courses (*17*). This difference can be attributed to the fact that EBM was one of the postgraduate elective courses in Tanta Faculty of Medicine.

Regarding critical appraisal courses, only 6.8% of the current study participants reported attending them. Nearly similar results were obtained by Hassan et al. (2014) in which 10% of participants attended critical appraisal courses (*7*). Our results were higher than that reported by Boulus et al. (2013) in which only 4% attended critical appraisal courses (*6*). A relatively higher percentage was obtained by Ismail et al. (2011) at 19.1% attending such courses (*17*). This could be attributed to the fact that the

age of the participants ranged from 23 to 57 years old and included lectures and assistant professors.

Most physicians (97%) in our study had access to the World Wide Web, while studies by Hassan et al. (2014) indicated that 95.5% of participants had accessibility (*7*). Our results were higher than those of Boulus et al. (2013) and Ismail et al. (2011) in which only 60% and 46% respectively had accessibility (*6,17*). In addition, 87.6% of participants reported that World Wide Web searches influenced their practice. This was higher than Hassan et al. (2014) in which 60% of the participant had used World Wide Web searches in clinical decision-making (*7*).

In this study, 73.1% reported reading medical journals as follows: 28.3% read occasionally, 26.6% read on demand, and 18% read regularly. This differed from Hassan et al. (2014) in which 42.8% reported reading medical journals (*7*), while Al-Kubaisi et al. (2010) reported that one third of participants were reading journals regularly, another third were reading on demand, and 28% were reading occasionally (*11*). Our study indicated that 33.2% of participants reported more than 50% of their practice was evidence based. This differed from Hassan et al. (2014) in which 66.1% reported more than 50% of their practice was evidence based (*7*).

Barriers towards EBM application

Our study revealed that the major barriers reported by study participants were as follows: patient overload, lack of time, colleagues' attitudes, lack of skills, and the fear of criticism. According to Abd Al-Magied et al. (2013), the first barrier to practicing EBM for most family physi-

Table 5 **EBM Practice and barriers among studied physicians**

Variables	(n = 398)	%
Attendance of EBM courses	222	55.8
Critical appraisal training	27	6.8
Accessibility to World Wide Web		
No Accessibility	12	3.0
Home	358	89.9
Faculty Library	147	36.9
Mobile	171	43.0
Using World wide web in clinical decision	349	87.7
Reading medical journal	291	73.1
Frequency of reading journals		
Occasionally	113	28.4
On demand	106	26.6
Regularly	72	18.1
Practice percentage		
0-	43	10.8
25-	174	43.7
50-	97	24.4
75-100	35	8.8
Methods to move towards EBM		
EBM integration into undergraduate course	300	75.4
Training physicians to use EBM	335	84.2
Case review and discussion held in each department	349	87.7
Major barriers to practice EBM		
Patient overload	271	68.1
Lack of time	239	60.1
Colleagues' attitudes	187	47.0
Lack of skills	186	46.7
Fear of criticism by senior staff	177	44.5
No financial gain	151	37.9
Insufficient resources	87	21.9
Don't believe in EBM	34	8.5

Table 6 **Factors affecting practice score among the studied physicians**

Variables	Practice score						χ^2	P
	Poor		Fair		Good			
	n.	%	n.	%	n.	%		
Gender							1.977	0.372
Male (*n*=213)	125	58.7	74	34.7	14	6.6		
Female (*n*=185)	108	58.4	58	31.4	19	10.2		
Job							64.267	0.001*
Resident (*n*=189)	138	73.0	49	25.0	2	1.1		
Demonstrator (*n*=61)	42	68.9	16	26.2	3	4.9		
Assistant lecturer (*n*=148)	53	35.8	67	45.3	28	18.9		
Specialty							9.597	0.008*
Medical (*n*=225)	134	59.6	65	28.9	26	11.6		
Surgical (*n*=151)	99	57.2	67	38.7	7	4.0		
Previous qualifications							1.830	0.400
Yes (*n*=24)	17	70.8	5	20.8	2	8.4		
No (*n*=374)	216	57.8	127	34.0	31	8.3		
Total (n=398)	233	58.5	132	33.2	33	8.3	—	

*Significant

Connaissances, pratiques et attitudes des médecins à l'égard de la médecine factuelle en Égypte

Résumé

Contexte : La médecine factuelle aide les médecins à mieux gérer la surabondance d'informations, à répartir les ressources de santé de façon plus équitable, à réduire les dépenses de soins de santé et à justifier leurs choix thérapeutiques vis-à-vis du grand public.

Objectifs : La présente étude visait à évaluer les connaissances, les pratiques et les attitudes des médecins de l'hôpital universitaire de Tanta (Égypte) vis-à-vis de la médecine factuelle.

Méthodes : Une étude transversale a été conduite. Les données ont été recueillies par le biais d'un questionnaire auto-administré distribué à 398 médecins de différentes spécialités au cours de l'année 2017.

Résultats : Le taux de réponse était de 93,6 %. Plus de la moitié des participants (61,3 %) indiquaient utiliser PubMed lors de leurs prises de décisions. Les médecins ayant une solide connaissance de la médecine factuelle représentaient 10,5 % des participants, alors que 54 % déclaraient avoir d'assez bonnes connaissances dans ce domaine et 35,5 % des connaissances limitées. Concernant les attitudes à l'égard de la médecine factuelle, 76,4 % des participants à l'étude se félicitaient de la promotion qui en est fait actuellement, 81,4 % pensaient que l'utilisation des résultats d'études dans la prise en charge quotidienne des patients est utile et 89,9 % estimaient que la pratique de la médecine factuelle améliore les résultats obtenus chez les patients. Plus de la moitié des participants (55,8 %) avaient suivi des cours en lien avec la médecine factuelle mais seulement 6,8 % avaient été formés à l'évaluation critique. La majorité des répondants (97 %) avaient accès au Web. Les obstacles identifiés comme un frein à la pratique de la médecine factuelle étaient la surcharge de patients (68,1 %), le manque de temps (60,1 %), l'attitude des confrères (47 %), l'insuffisance des compétences (46,7 %) et la peur des critiques (44,5 %).

Conclusions : La plupart des participants à la présente étude ont une attitude positive à l'égard de la médecine factuelle, mais en ont une pratique insuffisante malgré des connaissances solides en la matière. La médecine factuelle devrait être intégrée dans les cursus d'études universitaires et postuniversitaires, et des formations devraient être proposées aux résidents afin qu'elle soit appliquée de façon adéquate dans la pratique quotidienne.

معلومات واتجاهات وممارسات الأطباء تجاه الطب الـمُسنَد بالبراهين في مصر

أميرة عبد الكريم، إبراهيم كباش، شيماء سعيد، عبد العزيز الديب

الخلاصة

الخلفية: يساعد الطب الـمُسنَد بالبراهين الأطباء السريريين على التعامل مع فيض المعلومات، من أجل توزيع موارد الرعاية الصحية على نحو أكثر إنصافًا، والمساعدة في خفض تكاليف الرعاية الصحية، وتفسير اختيارات العلاج للعامة.

الأهداف: هدفت هذه الدراسة إلى تقييم المعلومات والاتجاهات والممارسات تجاه الطب الـمُسنَد بالبراهين بين الأطباء في مستشفى جامعة طنطا، بمدينة طنطا، مصر.

طرق البحث: تم اتّباع أسلوب الدراسة المقطعية. وتم جمع البيانات من خلال استبيان ذاتي الإجابة وُزِّع على ٣٩٨ طبيبًا في مختلف التخصصات خلال عام ٢٠١٧.

النتائج: بلغ معدل الاستجابة ٩٣, ٦٪. أبلغ ما يزيد عن نصف المشاركين (٦١, ٣٪) أنه جرى استخدام محرك البحث Pub Med في عمليات اتخاذ القرار. ومثّلت نسبة الأطباء الذين لديهم معرفة جيدة بالطب الـمُسنَد بالبراهين ١٠, ٥٪، والذين لديهم معرفة كافية ٥٤٪، والذين لديهم معرفة ضئيلة ٣٥, ٥٪. أما بالنسبة للاتجاهات نحو الطب الـمُسنَد بالبراهين، رحب ٧٦, ٤٪ من المشاركين في الدراسة بالتعزيز الحالي للطب الـمُسنَد بالبراهين؛ واعتقد ٨١, ٤٪ أنه من المفيد استخدام نتائج البحوث في العلاج اليومي للمرضى؛ واعتقد ٨٩, ٩٪ أن ممارسة الطب الـمُسنَد بالبراهين تحسِّن المخرجات الصحية للمرضى. وحضر ما يزيد عن نصف المشاركين (٥٥, ٨٪) دورات تدريبية تتعلق بالطب الـمُسنَد بالبراهين، ولكن حضر ٦, ٨٪ فقط دورات تدريبية تتعلق بالتقييم النقدي. ويستطيع أغلب المشاركين (٩٧٪) الوصول إلى شبكة الإنترنت العالمية. وشملت العوائق التي ذكر المشاركون أنها تتداخل مع ممارسة الطب الـمُسنَد بالبراهين: زيادة أعداد المرضى (٦٨, ١٪)، وعدم توافر الوقت (٦٠, ١٪)، ومواقف الزملاء (٤٧٪) والافتقار إلى المهارات (٤٦, ٧٪)، والخوف من النقد (٤٤, ٥٪).

الاستنتاجات: يُعَدُّ موقف معظم المشاركين في هذه الدراسة إيجابيًا نحو الطب الـمُسنَد بالبراهين، كما يمتلكون معرفة كافية به، ولكن ممارساتهم فيما يتعلق بالطب الـمُسنَد بالبراهين ضعيفة. ويجب دمج الطب الـمُسنَد بالبراهين في المناهج الدراسية بالجامعة والدراسات العليا، كما يجب توفير دورات تدريبية حول الطب الـمُسنَد بالبراهين للأطباء المقيمين لضمان التطبيق الصحيح له في الممارسة اليومية.

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Assessment of device-associated infection rates in teaching hospitals in Islamic Republic of Iran

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Abstract

Background: Surveillance of health care-associated infections (HCAIs) is an integral part of infection control programmes, especially in intensive care units (ICUs). Device-associated infections (DAIs) are a major threat to patient safety.

Aim: To measure DAI rates in ICUs.

Methods: Central line-associated bloodstream infection (CLABSI), ventilator-associated pneumonia (VAP), and catheter-associated urinary tract infection (CAUTI) were assessed in the ICUs of 4 tertiary-care teaching hospitals in Tehran, Islamic Republic of Iran.

Results: The incidence rate of CLABSI, VAP and CAUTI was 10.20, 21.08 and 7.42 per 1000 device-days, respectively. The utilization ratio for central lines, ventilators and urinary catheters was 0.62, 0.47, and 0.84, respectively. The most common organisms were Acinetobacter (33.5%) and Klebsiella (19.0%). Sixty to eighty percent of Enterobacteriaceae were extended-spectrum beta-lactamase producing. About half of Pseudomonas aeruginosa isolates were resistant to piperacillin/tazobactam and carbapenem. Acinetobacter resistance rate to ampicillin/sulbactam and carbapenem was 70–80%. The prevalence of methicillin-resistant Staphylococcus aureus and vancomycin-resistant Enterococcus was 84.6% and 83.3%, respectively.

Conclusions: This study showed high incidence rates of DAIs and resistant organisms, and appropriate interventions are necessary to reduce these rates.

Keywords: catheter-related infections; pneumonia; urinary tract infections; drug resistance; intensive care units.

Introduction

Healthcare-associated infections (HAIs) affect patients with indwelling devices in hospitals and other healthcare facilities, and are the most common cause of increased morbidity, mortality and cost in hospitalized patients, especially in high-risk settings, such as intensive care units (ICUs) (1–4). Central line-associated bloodstream infection (CLABSI), ventilator-associated pneumonia (VAP) and catheter-associated urinary tract infection (CAUTI) are 3 major device-associated infections (DAIs). These infections pose the greatest threat to patient safety, and the standard definitions have been provided by the Centers for Disease Control and Prevention (CDC) (5).

The rate of HCAIs varies between countries, but in low- and middle-income countries, overall rates of DAIs per 1000 device–days in adult ICUs are strikingly higher than those reported in high-income countries (6–8). In the ICUs of low- and middle-income countries, the

CLABSI incidence per 1000 central line-days is 4.9–12.2 (0.9–3.5 in high-income countries), the VAP incidence per 1000 ventilator–days is 16.8–23.9 (1.1–7.9 in high-income countries), and the CAUTI incidence per 1000 urinary catheter-days is 5.5–8.8 (1.3–4.1 in high-income countries) (1–4,6,7). In addition to the risk factors associated with HCAI in high-income countries, other risk factors have been identified in acute-care settings in low- and middle-income countries that are more broadly associated with poverty, such as a lack of basic hygiene, and limited resources. These factors include malnutrition, age < 1 year, low birth weight, parenteral nutrition, and ≥ 2 underlying diseases (6). Although not demonstrated as independent risk factors, general barriers to optimal infection control practices in low- and middle-income countries are lack of financial support, inadequate numbers of trained personnel working in infection control, understaffed hospital units, and insufficient equipment and supplies. In resource-constrained settings, compliance with

standard recommendations for infection prevention and control is generally not optimal, and the capacity of existing systems to respond to the increased demand associated with HCAI, such as length of stay (LOS), cost, effective antimicrobial therapy and advanced technology is also limited (8).

Surveillance of DAIs is an important part of the infection control programme of any hospital. It defines the extent of the problem, which is the initial step toward planning strategies to ensure quality of health care and reducing threat of infection. In hospitals, information about the epidemiology of infections and antimicrobial resistance patterns of microorganisms is of utmost importance in ICUs (1,2,8), and different incidences of DAIs show the importance of gathering and evaluating own-hospital data for development of appropriate infection control programmes. Surveillance data on the epidemiology of DAIs and antimicrobial resistance patterns of related microorganisms are limited in the Islamic Republic of Iran. Therefore, this study was conducted to determine the burden and antimicrobial resistance patterns of CLABSI, VAP (ventilator-associated event; VAE) and CAUTI in 15 adult ICUs of 4 tertiary care teaching hospitals in Tehran, Islamic Republic of Iran.

Methods

Setting

This observational prospective study was conducted from February to March 2014 in 15 adult medical and surgical ICUs of 4 teaching hospitals in Tehran to assess the incidence per 1000 device-days of 3 common DAIs: CLABSI, VAP and CAUTI, as defined by the CDC criteria (3, 5, 9). This study was approved by the local Research and Ethics Committee, and the need for informed consent was waived in view of the observational nature of the study. The recorded data were coded for patient confidentiality, and only the infection control teams were informed. In all 4 hospitals there is an infection control team including an infection control nurse (with at ≥ 5 years' experience) and an infectious diseases specialist (infection control physician with > 10 years' experience). The hospitals also have microbiology laboratories to provide *in vitro* susceptibility testing of clinical isolates using standardized methods.

Surveillance

We measured DAI acquisition attributable to the ICU. Each patient admitted to 1 of the 15 ICUs who received a device (central line, mechanical ventilation or urinary catheter) was monitored prospectively for the development of DAIs on a daily basis. Infection control nurses collected data on CLABSI, VAP and CAUTI occurring in patients in each ICU using CDC data sheets for surveillance of DAIs, and infection control physicians supervised the process. Patients who did not receive a device were excluded from the study. Patients' demographic data were recorded: name, sex, date of birth, admission date, admission ward, and LOS. Device-days and patient-days were collected as denominator data, and microbiological investigations were also recorded.

Definitions of DAIs

DAIs were defined according to the CDC criteria published in January 2014 (5) (see Appendix).

Culture techniques

For CLABSI, the central line was removed aseptically, and the distal 5 cm of the catheter (i.e., catheter tip) was cultured using a standardized semiquantitative method. Concomitant samples for blood culture were drawn percutaneously. For VAP, in all cases, a deep tracheal aspirate from the endotracheal tube was cultured aerobically and Gram staining was performed. For CAUTI, urine samples were aseptically aspirated from the sampling port of the urinary catheter and cultured quantitatively. To identify microorganisms, standard laboratory methods were used, and susceptibility tests were performed in all cases (10).

DAI rate calculation

Device-associated incidence density was calculated by number of DAI episodes × 1000 / number of device-days. The incidence density rates of CLABSI (number of cases per 1000 central line-days), VAP (number of cases per 1000 mechanical ventilator-days) and CAUTI (number of cases per 1000 urinary catheter-days) were measured. The rates of CLABSI, VAP and CAUTI per 1000 device-days were calculated by dividing the total number of DAIs by the total number of specific device-days and multiplying the result by 1000.

Device utilization ratio was calculated by number of device-days divided by the number of patient-days. Device-days were calculated by the total number of days of exposure to the device (central line, ventilator, or urinary catheter) for all the patients in the ICUs during the study period, and patient-days were calculated by the total number of days that patients were in the ICUs during the study period.

Statistical analysis

Variables including standard demographic information (name and identifier, sex, date of birth, admission date, and admission ward), LOS, admission and discharge diagnoses, surgical/invasive procedures, device utility days (endotracheal tube, intravascular catheter, and urinary catheter), and laboratory and pharmacy data were collected. Continuous variables were presented as mean and standard deviation (SD) and categorical variables as numbers and percentages.

Results

The types of ICU and numbers of beds and patients are shown in Table 1. DAI rate and device utilization ratio are summarized in Table 1. There were 169 DAIs detected in 1545 patients: 48 episodes of CLABSI, 74 of VAP and 47 of CAUTI. The overall incidence rate per 1000 device–days of CLABSI, VAP and CAUTI was 10.20, 21.08 and 7.42, respectively.

Table 1 Rates of CLABSI, VAP and CAUTI in ICUs of 4 teaching hospitals, Islamic Republic of Iran, 2014

ICU type	ICUs/beds	No. of patients	Patient days	CL days	CL-UR	CLABSI	CLABSI density	V days	V-UR	VAP	VAP density	UC days	UC-UR	CAUTI	CAUTI density
Medical–surgical	6/62	688	3591	2415	0.67	27	11.18	2191	0.61	42	19.17	3227	0.90	25	7.75
Medical	2/11	67	658	475	0.72	5	10.53	429	0.65	8	18.65	591	0.90	5	8.46
Surgical	2/15	196	888	418	0.47	5	11.96	302	0.34	8	26.49	798	0.90	6	7.52
Neurosurgical	3/19	299	1137	607	0.53	7	11.53	390	0.34	11	28.20	1011	0.89	7	6.92
Cardiosurgical	2/18	295	1257	787	0.63	4	5.08	198	0.16	5	25.25	705	0.56	4	5.67
Total	15/125	1545	7531	4702	0.62	48	10.20	3510	0.47	74	21.08	6332	0.84	47	7.42

ICU = intensive care unit; CLABSI = central line-associated bloodstream infection; VAP = ventilator-associated pneumonia; CAUTI = catheter-associated urinary tract infection; CL = central line; CL-UR = central line utilization ratio; V days = ventilator days; V-UR = ventilator-utilization ratio; UC = urinary catheter; UC-UR = urinary catheter-utilization ratio.

The mean (SD) duration between device insertion and infection symptom onset was 18.8 (16.4) days for CLABSI, 17.8 (15.6) days for VAP and 22.2 (17.4) days for CAUTI. The mean age of patients with DAIs was 55.3 (21.9) years; sex distribution was 58% male to 42% female; and mean LOS was 44.0 (29.4) days (Table 2). Mortality rate for CLABSI, VAP and CAUTI was 45.5%, 50.7% and 27.5%, respectively, and 50% overall. Some patients who died experienced > 1 infection.

The causative agents of various types of DAI are shown in Table 3. Since > 1 organism may cause an infection, 179 isolates were responsible for 169 episodes of DAI, and Gram-negative bacteria were the predominant isolates (147; 82.1%). Twenty-nine (16.2%) Gram-positive bacteria and 3 (1.7%) fungi were also isolated. A total of 52 pathogens were isolated from blood cultures as CLABSI agents, and *Acinetobacter baumannii* (12; 23.1%) and *Klebsiella pneumoniae* (10; 19.2%) were the most common isolates. *A. baumannii* (38; 48.1%) and *K. pneumoniae* (14; 17.7%) were most frequently implicated in VAP. In CAUTI, *Escherichia coli* (15; 31.3%) was the most prevalent among the 48 isolates detected.

The antimicrobial resistance pattern of the isolates is shown in Table 4. With the exception of colistin, > 65% of *Acinetobacter* strains were resistant to various antimicrobial agents: > 90% were resistant to ceftazidime and fluoroquinolones, 70–80% to aminoglycosides and ampicillin/sulbactam, and 66.7% to carbapenem. Half of *Pseudomonas aeruginosa* isolates were resistant to ceftazidime, piperacillin/tazobactam and carbapenem, 47.4% to aminoglycosides, and 37.9% to fluoroquinolones. Among Enterobacteriaceae isolates, 80% of *E. coli* and 70% of *Klebsiella* isolates produced extended spectrum beta-lactamase producing; resistance to fluoroquinolone was 40–70% in this group. Among *Staphylococcus aureus* isolates, 84.6% were methicillin-resistant *Staphylococcus aureus* (MRSA) and 83.3% of *Enterococcus* isolates were vancomycin-resistant *Enterococcus* (VRE).

INIS software

This software is a national freeware for the surveillance of HAIs. As a part of the study, the data collected about patients with or without DAIs, as confirmed by physicians, were compared with the output of INIS software. The software identified all DAIs cases with no false-positive or false-negative results. The feedback of infection control practitioners showed that INIS software was user-friendly (http://inis.health.gov.ir).

Discussion

In the present study, we carried out prospective surveillance of 3 main DAIs (CLABSI, VAP and CAUTI) in ICUs of 4 tertiary teaching hospitals in the Islamic Republic of Iran. The incidence density for CLABSI, VAP and CAUTI per 1000 device-days was 10.20, 21.08 and 7.42, respectively. According to a World Health Organization (WHO) report, the incidence density for CLABSI, VAP and CAUTI per 1000 device-days in developed countries is 3.5, 7.9 and 4.1, respectively, compared with 12.2, 23.9 and 8.8 in developing countries (2). In the present study, the rate of DAIs in the ICUs was approximately 2–3 times higher than that in high-income countries, but less than the rate in low- and middle-income countries. According to the International Nosocomial Infection Control Consortium (INICC) report for DAIs in 503 ICUs in low- and middle-income countries, the incidence density for CLABSI, VAP and CAUTI per 1000 device-days was 4.78, 14.7 and 5.30, respectively (3); these infections were higher in the present study. According to the National Healthcare Safety Network (NHSN) annual report for 2012, even in high-risk ICUs in the United States of America, the rate for CLABSI, VAP and CAUTI per 1000 device-days was only 3.4, 4.4 and 5.0, respectively (4). Possible reasons for the higher rates in the Islamic Republic of Iran include: low compliance with hand hygiene; lack of proper training and deficiency in continuous supervision; no strict control of antibiotic therapy; some limitations for isolation (e.g., absence of private rooms in most ICUs); and insufficient numbers of nurses to implement proper cohorting of staff and patients.

Table 2 Age, sex and LOS of patients with DAIs in ICUs of 4 teaching hospitals, Islamic Republic of Iran, 2014

DAI	Mean age (SD) years	Sex, M/F (%)	Mean LOS (SD) days
CLABSI	56.9 (22.3)	26/22 (54/46)	43.2 (33.2)
VAP	57.1 (20.7)	47/27 (63/37)	42.4 (26.2)
CAUTI	50.9 (22.8)	25/22 (53/47)	47.1 (29.8)
Total	55.3 (21.9)	98/71 (58/42)	44.0 (29.4)

LOS = length of stay; DAI = device-associated infection; ICU = intensive care unit; CLABSI = central line-associated bloodstream infection; VAP = ventilator-associated pneumonia; CAUTI = catheter-associated urinary tract infection.

Table 3 Microorganisms in DAIs, in ICUs of 4 teaching hospitals, Islamic Republic of Iran, 2014

	Microorganism	CLABSI No. (%)	VAP No. (%)	CAUTI No. (%)	Total No. (%)
Gram positive	Staphylococcus aureus	4 (7.7)	9 (11.4)	–	13 (7.3)
	Staphylococcus epidermidis	2 (3.8)	–	–	2 (1.1)
	Enterococcus spp.	8 (15.4)	–	4 (8.3)	12 (6.7)
	Streptococcus spp.	1 (1.9)	1 (1.3)	–	2 (1.1)
Gram negative (Enterobacteriaceae)	Klebsiella pneumoniae	10 (19.2)	14 (17.7)	10 (20.8)	34 (19.0)
	Escherichia coli	1 (1.9)	5 (6.3)	15 (31.3)	21 (11.7)
	Proteus mirabilis	–	2 (3.5)	2 (4.2)	4 (2.2)
	Enterobacter spp.	3 (5.8)	–	3 (6.3)	6 (3.4)
	Citrobacter spp.	–	1 (1.3)	–	1 (0.6)
	Serratia marcescens	–	1 (1.3)	–	1 (0.6)
	Pseudomonas aeruginosa	8 (15.4)	8 (10.1)	3 (6.3)	19 (10.6)
	Acinetobacter baumannii	12 (23.1)	38 (48.1)	10 (20.8)	60 (33.5)
	Stenotrophomonas maltophilia	1 (1.9)	–	–	1 (0.6)
Fungi	Candida spp.	2 (3.8)	–	1 (2.1)	3 (1.7)
	Total	52 (100)	79 (100)	48 (100)	179 (100)

DAI = device-associated infection; ICU = intensive care unit; CLABSI = central line-associated bloodstream infection; VAP = ventilator-associated pneumonia; CAUTI = catheter-associated urinary tract infection.

Published surveillance data from other low- and middle-income countries have shown a wide range of results that makes any comparison and discussion difficult. Studies conducted in Argentina (CLABSI 30.3, VAP 46.3 and CAUTI 18.5 per 1000 device-days) (11) and India (VAP 30.67) (12) showed higher incidence density than in the present study. In contrast, other studies showed a lower incidence density; for example, in Brazil (CLABSI 6.4) (13) or Saudi Arabia (VAP 16.8) (14). In another study from India (15), incidence density for CLABSI, VAP and CAUTI was 13.50, 6.15 and 10.75, respectively, which, compared with the present study, showed higher incidence of CLABSI and CAUTI and lower incidence of VAP. However, yet another study from India (16) showed a higher VAP rate (21.92 per 1000 device-days) but lower CLABSI (0.48 per 1000 device-days) and CAUTI (0.6 per 1000 device-days) rate than in the present study.

In most surveillance studies conducted in the Islamic Republic of Iran, variables such as device utilization ratio, device days, patient days and incidence density have not been calculated. Instead, only the percentage of infected patients has been reported, which makes any comparison inapplicable. However, 2 studies conducted by Afhami et

al. on CLABSI and VAP showed incidence density rates of 1.98 per 1000 catheter-days for CLABSI and 9.96 per 1000 ventilator days for VAP (17,18), which were lower than in the present study. Different incidences of DAIs may depend on the definition, type of hospital or ICU, type of patients admitted, infection control programmes of the institution, and antibiotic prescription policy.

In the present study, the utilization ratio for central lines, ventilators and urinary catheters was 0.62, 0.47 and 0.84, respectively. According to an INICC report, the utilization ratio for central lines, ventilators and urinary catheters was 0.53, 0.38 and 0.62, respectively (3). In an NHSN report, the utilization ratio for central lines, ventilators and urinary catheters was 0.57, 0.37 and 0.70, respectively (4). In comparison with these data, the overall device utilization ratio was 10–20% higher in Iranian ICUs. One reason for the differences might be the type of patients admitted to the ICUs because the hospitals in our study were tertiary-level referral hospitals and most patients had serious comorbidity, and more device utilization was needed to care for such patients.

In the present study, the mean age of patients with DAIs was around 55 years; there were more men than

Table 4 **Antibiotic resistance pattern in ICUs of 4 teaching hospitals, Islamic Republic of Iran, 2014**

Organism	No. of isolates	Antibiotic	No. of antibiograms	No. of resistant bacteria (%)
Staphylococcus aureus	13	Oxacillin or cefoxitina	13	11 (84.6)
		Clindamycin	13	11 (84.6)
		Vancomycin	13	0 (0)
Enterococcus spp.	12	Ampicillin	9	6 (66.7)
		Vancomycinb	12	10 (83.3)
		Linezolid	6	0 (0)
Klebsiella pneumoniae	34	Cephalosporinc	34	24 (70.6)
		Fluoroquinolone	34	17 (50.0)
		Beta-lactamase inhibitor	16	11 (68.8)
		Carbapenemd	29	13 (44.8)
Escherichia coli	21	Cephalosporin	21	17 (81.0)
		Fluoroquinolone	21	14 (66.7)
		Beta-lactamase inhibitor	8	2 (25.0)
		Carbapenemd	17	1 (5.9)
Other fermentative Enterobacteriaceae5	12	Cephalosporin	12	7 (58.3)
		Fluoroquinolone	12	5 (42.0)
		Beta-lactamase inhibitor	6	2 (33.3)
		Carbapenemd	11	2 (18.2)
Pseudomonas aeruginosa	19	Ceftazidime	13	7 (53.8)
		Fluoroquinolone	19	11 (37.9)
		Aminoglycoside	19	9 (47.4)
		Piperacillin/ tazobactam	6	3 (50.0)
		Carbapenemd	18	9 (50.0)
Acinetobacter baumannii	60	Ceftazidime	41	40 (97.6)
		Fluoroquinolone	45	41 (91.1)
		Aminoglycoside	59	47 (79.7)
		Ampicillin/ sulbactam	37	29 (78.4)
		Carbapenemd	60	40 (66.7)
		Colistind	8	2 (25.0)

aIndicates methicillin-resistant S. aureus; bindicates vancomycin-resistant Enterococcus; cthird-generation cephalosporins; dagar disc diffusion method; 5other Enterobacteriaceae: Proteus, Enterobacter, Citrobacter, Serratia. ICU = intensive care unit; DAI = device-associated infection.

women; mean LOS was > 1 month; and half of patients eventually died. In the INICC report, mean LOS was ~20 days (CLABSI 19.47 days, VAP 19.66 days and CAUTI 20.99 days) and mortality was ~21% (CLABSI 24.9%, VAP 23.4% and CAUTI 13.3%) (3). These data indicate that LOS and mortality of infected patients are higher in Iranian ICUs. In other reports about LOS or mortality, especially in low- and middle-income countries, the rate was similar to ours or even higher (2,14–19).

The organisms isolated in the present study were commonly Gram-negative Enterobacteriaceae, and similar findings were observed by other investigators (1–4,6,15,16,18). According to the WHO, the most common organisms in ICU-acquired infections are Enterobacteriaceae (20%), *S. aureus* (20%), *Pseudomonas* spp. (17%), *Enterococcus* spp. (10%) and *Acinetobacter* spp. (5%) (2). We found similar types of organisms but with a lower rate of *S. aureus* and higher rate of *Acinetobacter* spp. In a review of microbiological patterns of HAIs in low- and middle-income countries, the most common pathogens for BSI

were *S. aureus*, *Acinetobacter* and Enterobacteriaceae; the most common pathogens for VAP were *Pseudomonas*, *Acinetobacter* and Enterobacteriaceae; the most common pathogens for UTI were Enterobacteriaceae, *Pseudomonas* and *Acinetobacter*; and the rate of MRSA was 54.5% (6). In the present study, the same organisms were detected but there was a higher rate of MRSA (84.6%). In the Islamic Republic of Iran, studies about UTI and VAP pathogens showed the same pattern with a predominance of Gram-negative bacteria (15,20).

In Table 5 the resistance patterns of organisms isolated in the present study is compared with those reported by INICC and NHSN (3,4). The organisms isolated in the present study were more antibiotic resistant than in the INICC study, except for fluoroquinolone resistance of *Pseudomonas* and carbapenem resistance of *Acinetobacter* and *E. coli*. In comparison with NHSN report, in our study the resistance rates of organisms for all main antibiotics were higher.

Table 5 Antibiotic resistance pattern in ICUs of 4 teaching hospitals in Tehran, and comparison with INICC and NHSN ICUs

Organism	Antibiotic	Resistance in present study (%)	Resistance in INICC study (%)	Resistance in NHSN study (%)
Staphylococcus aureus	Oxacillin or cefoxitin	84.6	53.2	54.6
Enterococcus spp.	Vancomycin	83.3	9.4a	9.5a
Pseudomonas aeruginosa	Fluoroquinolones	37.9	42.9	30.5
	Piperacillin/tazobactam	50.0	36.3b	17.4b
	Aminoglycosides	47.4	40.9c	10.0c
	Imipenem or meropenem	50.0	39.6	26.1
Klebsiella pneumoniae	Ceftriaxone or ceftazidime	70.6	67.4	28.8
	Imipenem or meropenem	44.8	16.9	12.8
Acinetobacter baumannii	Imipenem or meropenem	66.7	70.4	62.6
Escherichia coli	Ceftriaxone or ceftazidime	81	63.5	19.0
	Imipenem or meropenem	5.9	7.0	1.9
	Fluoroquinolones	66.7	67.9	41.8

aOnly for Enterococcus faecalis; bresistance to piperacillin ± tazobactam; cresistance to amikacin. ICU = intensive care unit; INICC = International Nosocomial Infection Control Consortium; NHSN = National Healthcare Safety Network.

There were some limitations to this study. First, we collected only data about DAIs in ICUs and no other HCAIs (e.g., surgical site infections) or infections in other wards. Second, the hospitals in the present study were in a tertiary-care teaching setting; therefore, the patients with severe underlying diseases managed in these hospitals required more invasive procedures and more intensive care, so the infection rate in the present study may have been higher than the overall rate in the country.

Conclusion

This study documents a high incidence rate of DAIs and high frequency of resistant organisms in the ICUs. Effective strategies to control antibiotic-resistant bacteria should be implemented and rational use of antibiotics as prophylaxis and adherence to infection control practices are necessary to reduce these infections.

Acknowledgements

Évaluation des taux d'infections associées aux dispositifs médicaux dans les hôpitaux universitaires en République islamique d'Iran

Résumé

Contexte : La surveillance des infections associées aux soins de santé fait partie intégrante du programme de lutte anti-infectieuse, en particulier dans les unités de soins intensifs (USI).

Objectifs : Mesurer le taux d'IADM dans les USI.

Méthodes : La survenue des infections liées aux cathéters veineux centraux, des pneumonies acquises sous ventilation mécanique et des infections des voies urinaires associées aux cathéters a été évaluée dans les USI de quatre hôpitaux universitaires de soins tertiaires de Téhéran (République islamique d'Iran).

Résultats : Le taux d'incidence des infections liées aux cathéters veineux centraux, des pneumonies acquises sous ventilation mécanique et des infections des voies urinaires associées aux cathéters était de 10,20, 21,08, et 7,42 pour 1000 dispositifs/jour, respectivement. Le rapport d'utilisation associé aux cathéters veineux centraux, à la ventilation mécanique et aux cathéters urinaires était de 0,62, 0,47 et 0,84, respectivement. Les organismes les plus fréquemment retrouvés étaient *Acinetobacter* (33,5 %) et *Klebsiella* (19,0 %). Environ 60 à 80 % des *Enterobacteriaceae* appartenaient à des souches produisant des bêtalactamases à large spectre (ESBL⁺). Près de la moitié des isolats de *Pseudomonas aeruginosa* étaient résistants à la pipéracilline/tazobactame et aux carbapénèmes. En outre, le taux de résistance d'*Acinetobacter* à

l'ampicilline/sulbactame et aux carbapénèmes était de 70 à 80 %. Enfin, la prévalence de *Staphylococcus aureus* résistant à la méticilline et d'*Enterococcus* résistant à la vancomycine était de 84,6 % et 83,3 %, respectivement.

Conclusions : La présente étude a montré un fort taux de prévalence des IADM et des organismes résistants dont la réduction nécessite la prise de mesures appropriées.

تقييم معدلات العدوى المرتبطة بالأجهزة في مستشفيات تعليمية، جمهورية إيران الإسلامية

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الخلاصة

الخلفية: يُعَدُّ ترصُّد حالات العدوى المرتبطة بالرعاية الصحية جزءًا لا يتجزأ من برنامج مكافحة العدوى، لا سيّما في وحدات العناية المركزة.

الأهداف: نظرًا لأن حالات العدوى المرتبطة بالأجهزة تُشكِّل تهديدًا كبيرًا لسلامة المرضى، أُجريت هذه الدراسة لقياس معدل حالات العدوى المرتبطة بالأجهزة في وحدات العناية المركزة.

طرق البحث: تم تقييم عدوى مجرى الدم المرتبطة بالقسطرة الوريدية المركزية، والالتهاب الرئوي المرتبط بجهاز التهوية، وعدوى المسالك البولية المرتبطة بالقسطرة في وحدات العناية المركزة في أربعة مستشفيات تعليمية للرعاية الثالثية في مدينة طهران، إيران.

النتائج: بلغ معدل وقوع عدوى مجرى الدم المرتبطة بالقسطرة الوريدية المركزية، والالتهاب الرئوي المرتبط بجهاز التهوية، وعدوى المسالك البولية المرتبطة بالقسطرة ١٠,٢٠، و٢١,٠٨، و٧,٤٢ لكل جهاز/ ١٠٠٠ يوم، على التوالي. وكان معدل استعمال القسطرة الوريدية المركزية، وجهاز التهوية، والقسطرة البولية ٦٢,٠، و٤٧,٠، و٨٤,٠ على التوالي. وكانت الكائنات الحية الأكثر شيوعًا هي الراكدة (٣٣,٥٪) والكلبسيلّة (١٩,٠٪). وحوالي ٦٠-٨٠٪ من الأمعائيّات كانت عبارة عن البكتيريا المنتجة لبيتا لاكتاماز واسعة الطيف. وحوالي نصف معزولات الزَّائفَة الزِّنْجاريَّة كانت مقاومة للمضادات الحيوية بيبيراسيلين/ تازوباكتام وكارابابينيم. وبلغ معدل مقاومة الراكدة للأمبيسيلين/ سولباكتام وكارابابينيم ٧٠-٨٠٪. وكان معدل انتشار العُنْقوديَّة الذَّهَبيَّة المقاومة للميثيسيلين والمكَوَّرَة المِعَويَّة المقاومة للفانكوميسين ٨٤,٦٪ و٨٣,٣٪، على التوالي.

الاستنتاجات: أوضحت الدراسة الوقوع المرتفع لمعدل حالات العدوى المرتبطة بالأجهزة والكائنات الحية المقاومة، ووجوب وضع تدخلات مناسبة لتخفيض هذه المعدلات.

Appendix

A. Definitions of DAIs according to CDC criteria 2014:

A.1. CLABSI definition. Central line was in place for > 2 calendar days (the central line was in place on the date of BSI or the day before); and patient has a recognized pathogen cultured from ≥ 1 blood cultures and organism cultured from blood is not related to an infection at another site; OR patient has ≥ 1 of these signs or symptoms (fever > 38°C, chills, or hypotension) not related to an infection at another site and the same common commensal is cultured from ≥ 2 blood cultures drawn on separate occasions.

A.2. VAP definition. Pneumonia was identified using a combination of radiological, clinical and laboratory criteria: the presence of a new or progressive and persistent infiltrate, consolidation, or cavitation on chest X-ray after mechanical ventilation, and ≥ 2 of the following: temperature > 38°C or < 36°C; leukocytosis: leukocyte count > 11 000/mm3, or leukopenia < 4000/mm3; purulent endotracheal secretions; isolation of pathogenic bacteria from endotracheal aspiration/blood/ pleural fluid; and increasing oxygen requirements.

VAP was defined as a pneumonia in which the patient was on mechanical ventilation for > 2 calendar days on the date of the event, with day of ventilator placement being Day 1, and the ventilator was in place on the date of the event or day before [date of event (infection date): for VAP the date of event was the date when the last element was used to meet the pneumonia criteria occurred].

VAE definition: There are 3 definition tiers within the VAE algorithm: (1) ventilator-associated condition (VAC); (2) infection-related ventilator-associated complication (IVAC); and (3) possible and probable VAP. VAC: Patient who had ≥ 2 days of stability on the ventilator, began worsening oxygenation (increase in FiO2 of ≥ 0.20 (20 points) or positive end-expiratory pressure of ≥ 3 cmH2O) that sustained for 2 days; IVAC: VAC and temperature > 38°C or < 36°C, OR white blood cell count ≥ 12 000 cells/ mm3 or ≤ 4000 cells/mm3; and a new antimicrobial agent is started and continued for ≥ 4 calendar days. Possible/probable-VAP: IVAC and purulent respiratory secretions and/or positive culture (of sputum, endotracheal aspirate, bronchoalveolar lavage, lung tissue, protected specimen brushing, or pleural fluid); OR positive lung histopathology, positive diagnostic test for Legionella spp., or positive diagnostic test on respiratory secretions for specific respiratory viruses.

A.3. CAUTI definition. Patient had an indwelling urinary catheter in place for > 2 days (catheter was in place on the date of urinary infection or the day before); and ≥ 1 of these signs or symptoms (fever > 38°C, urgency, frequency, dysuria, suprapubic tenderness, costovertebral angle pain or tenderness) and a positive urine culture of ≥ 105 colony-forming units (CFU)/ml with no more than 2 species of microorganisms. OR above signs or symptoms and ≥ 1 of these findings (positive dipstick for leukocyte esterase and/or nitrite; pyuria; microorganisms seen on Gram's stain of unspun urine) and a positive urine culture of ≥ 103 and < 105 CFU/ml with no more than 2 species of microorganisms. OR without any urinary signs or symptoms but the urine culture and blood culture both were positive with the same uropathogen.

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Antenatal care among Palestine refugees in Jordan: factors associated with UNRWA attendance

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Abstract

Background: Maternal and neonatal mortality is a global issue acknowledged by the Sustainable Development Goals (SDGs). Adequate ante-natal care (ANC) is pivotal to reducing these mortality rates, while understanding why women don't attend ANC is crucial to addressing the SDGs.

Aims: Using routine primary health care data to determine the factors associated with inadequate attendance by Palestine refugees (PR) to ANC seeking facilities provided by the United Nations Relief and Works agency for Palestine Refugees in the Near East (UNRWA), Jordan.

Methods: A backwards logistic regression model incorporating non-health system factors and health system factors, was performed using UNRWA data.

Results: A younger age of women was associated with inadequate ANC visits ($P = 0.0009$) in the non-health systems model. For health system factors, pregnancy risk status, having a gynaecologist review and the health centre attended were factors found to be significantly associated with ANC attendance ($P < 0.0001$).

Conclusions: Understanding the health system factors associated with ANC attendance can lead to changes and improvements in UNRWA's operational policies.

Keywords: antenatal care, maternal health, Palestine, refugees, Jordan

Introduction

The new Sustainable Development Goals (SDGs) highlight maternal and neonatal health as a global health priority, and aim to reduce the global maternal mortality ratio to less than 70 per 100 000 live births, and neonatal mortality rate to less than 12 in 1000 live births by 2030 (1). Simple interventions can help reach these goals. Antenatal care (ANC) is the single most cost-effective intervention for the prevention of neonatal deaths; if 90% of women receive ANC, 14% of neonatal deaths could be prevented (2-4). To improve the implementation and viability of ANC globally, WHO devised the "Focused ANC" guidelines, advocating a four-visit ANC model to improve care and pregnancy outcomes (5).

The United Nations Relief and Works Agency for Palestine Refugees in the Near East (UNRWA) delivers primary health care, including maternal and child services, to registered Palestine refugees in Five Fields of operation: Gaza, The West Bank, Syrian Arab Republic, Lebanon and Jordan (6). UNRWA's routine data shows 86% of women attended four ANC appointments in 2015, falling short of the 90% target (6). Understanding why women do not attend a minimum of four appointments is a priority for UNRWA. There is little data on the barriers to ANC amongst refugee populations, and no known literature for Palestine refugees. This study aims to address this gap and to investigate the barriers to ANC attendance amongst Palestine refugees in Jordan.

Methods

Data for this study was taken from the electronic information systems (e-health) of UNRWA's primary health care centres in Jordan. Health information was provided for women who registered a delivery between 1 January and 31 December 2015 at one of three operational e-health centres: Amman New Camp, Irbid New Health Centre and Jerash Camp. These health centres were selected because only these had fully operational e-health at the start of the study period. Jordan field was selected because of its relative economic and political stability.

Exclusion criteria

Cases of miscarriage and stillbirths prior to full gestation were excluded. UNRWA guidelines advise an increased frequency of ANC visits for moderate and high-risk pregnancies, and WHO focused, four ANC visits for low-risk births. Due to the impact of pregnancy risk status on number of ANC visits, patients with missing data on risk status were excluded from the dataset.

Variables

The outcome variable is the number of ANC visits made by wome during their pregnancy in the defined study period. ANC visits for subsequent pregnancies during the defined study period were excluded. This variable was binary, with fewer than four ANC visits during pregnancy (< 4ANC) categorized as 1, and attendance of four or more ANC appointments (4+ANC) as 0.

Twenty explanatory variables were extracted from the e-health system. Variables were divided into health system-related factors and non-health system related factors to distinguish between variables that related to UNRWA's health system. Non-health system variables included: age; education level (illiterate, primary, secondary, diploma, higher education); occupation (unemployed, employed, student, housewife); husband's education level (illiterate, primary, secondary, diploma, higher education); husband's occupation (unemployed, employed, student); living male children (yes = 0, no = 1); number of miscarriages (grouped into categorises of 0, 1, 2 or more miscarriages); history of stillbirths and/or child death (no = 0, yes = 1); number of children (grouped into 0–2, 3–4, 5 or more children; only seven women had no previous children).

Health system factors included: risk status of pregnancy at first ANC visit and last recorded risk status during pregnancy in order to account for change in risk status; health centre; outcome of pregnancy; proportion of appointments attended, including visits to other UNRWA services; receipt of referrals for services outside of UNRWA (no = 0, yes = 1); delivery type; place of delivery; receipt of a gynaecologist review (no = 0, yes = 1); and receipt of an ultrasound (no = 0, yes = 1). Risk status of pregnancy was included in this category because it was determined by health centres. Any variable with more than ten percent missing data was excluded from the analysis.

Ethics approval was not required for this study, but the Health Director of UNRWA Headquarters reviewed and approved the proposal.

Statistical analysis

Descriptive analysis by frequency tables can be seen in Table 1. Crude odds ratios were generated by logistic regression. Associations with P-values < 0.1 continued into further analysis. Model 1 included non-health system variables. The second regression model was a combina-

tion of health systems and non-health systems factors (Model 2). Both models were backwards models. Data was analysed using StataCorp. 2013 (7).

Results

A total of 5988 women registered a delivery at Amman New Camp, Irbid New Health Centre and Jerash Camp, in 2015. Four hundred and seventy-five women were excluded because they did not reach full gestation age due to miscarriage or stillbirth, and a further 480 women were excluded because of missing risk status during pregnancy; 5033 women remained in the dataset. One reported case of maternal death remained in the dataset, and five variables were excluded because the level of missing data was high (Table 1).

The median age of women was 26 years old (range 16–47) and the median number of children was 3 (range 0–14). Five ANC visits (range 2–16) was the median number of visits to an UNRWA clinic; 28.67% (n = 1443) of patients attended < 4 ANC.

The univariable analysis yielded nine variables with P-values < 0.1: age, number of children, number of miscarriages, living male child, health centre, proportion of appointments attended, receipt of a gynaecologist review, risk status at first visits, and last recorded risk status. Table 2 shows the variables excluded following univariable analysis. Crude ORs found no male children in the family to be associated with < 4 ANC (OR 1.17, 95% CI: 1.01-1.36 P =0.04), this was unexpected as having no male children was thought to be associated with attendance. Stratum-specific ORs for the proportion of appointments attended suggest this variable demonstrated an association only because of the last stratum of 'no appointments made' (OR 3.41, 95% CI: 2.64–4.42, P = < 0.0001). This relationship was expected, but there was little evidence in the other stratum to suggest an association. To ensure the Model 2 was comprehensive, this variable was included.

Model 1 adjusted for each of the following variables in turn: age, number of children, number of miscarriages and living male child (Table 3). Only age was found to be significantly associated with < 4 ANC (P = 0.0009). In Model 2 (Table 4), which includes health system factors , risk status at first visit, receipt of a gynaecologist review, and health centre had significant associations with < 4 ANC. Moderate and high risk pregnancies at first visit were significantly associated with < 4 ANC (P = < 0.0001)

Table 1 Excluded variables due to missing data

Variables	Number of observations (n)	Percentage of missing data (%)
Occupation	3375	32.94
Education level	2880	42.78
Delivery type	2372	52.87
Delivery complications	504	89.99
Husband's occupation	308	93.88
Husband's education level	304	93.96

Table 2 Variable excluded from logistic regression models

Variables	<4 ANC visits n (%)	4+ ANC visits n (%)	Crude OR	Lower 95% CI	Upper 95% CI	P-value (LRT)
History of a stillbirth or child death						0.84
No	1414 (97.99)	3521 (98.08)	1			
Yes	29 (2.01)	69 (1.92)	1.05	0.68	1.62	
Receipt of an ultrasound scan at UNRWA						0.81
No	1390 (96.33)	3453 (96.18)	1			
Yes	53 (3.67)	137 (3.82)	0.96	0.7	1.33	
Outcome of pregnancy						0.25
Delivered a child	1432 (99.24)	3576 (99.61)	1			
Stillbirth	8 (0.55)	11 (0.31)	1.82	0.73	4.52	
Child death	3 (0.21)	3 (0.08)	2.5	0.5	12.39	
Receipt of referral for other medical services						0.27
No	1438 (99.65)	3569 (99.42)	1			
Yes	5 (0.35)	21 (0.58)	0.59	0.22	1.57	
Place of delivery						0.72
Hospital	1435 (99.45)	3568 (99.39)	1			
Private clinic	8 (0.55)	17 (0.47)	1.17	0.5	2.71	
Home	0	5 (0.14)	—	—	—	

after adjusting for health system and non-health system factors (aOR 2.42, 95% CI: 1.94–3.01 and aOR 7.83, 95% CI: 5.44–11.26 respectively). However, moderate and high risk pregnancies at last visit were found to have aORs

Table 3 Model 1: Non-health system factors compared with crude ORs

Variables	<4 ANC visits n (%)	4+ ANC visits n (%)	Crude OR				Model 1			
			OR	Lower 95% CI	Upper 95% CI	P-value (*mhodds for trend **LRT)	aOR	Lower 95% CI	Upper 95% CI	P-value (LRT)
Age (years old)						<0.0001*				
16–20	205 (14.21)	520 (14.48)	1				1			
21–25	507 (35.14)	1054 (29.36)	1.22	1.01	1.48		1.27	1.04	1.55	
26–30	383 (26.54)	882 (24.57)	1.1	0.09	1.35		1.24	0.99	1.55	
31–35	224 (15.52)	642 (17.88)	0.88	0.71	1.1		1.05	0.81	1.36	
36–40	98 (6.79)	367 (10.22)	0.68	0.51	0.89		0.83	0.61	1.14	
41 +	26 (1.8)	125 (3.48)	0.53	0.34	0.83			0.41	1.06	
Number of children (n)						<0.0001*				0.07
0–2	771 (53.43)	1678 (46.74)	1				1			
3–4	450 (31.19)	1166 (32.48)	0.84	0.73	0.96			0.73	1.01	
5+	222 (15.68)	746 (20.78)	0.65	0.55	0.77		0.78	0.63	0.98	
Number of miscarriages (n)						0.08**				0.74
0	1025 (71.03)	2434 (67.8)	1				1			
1	272 (18.85)	749 (20.86)	0.86	0.74	1.01			0.8	1.1	
2+	146 (10.12)	407 (11.34)	0.85	0.7	1.04			0.8	1.22	
Living male child						0.04**				0.77
Yes	1119 (77.55)	2879 (80.19)	1				1			
No	324 (22.45)	711 (19.81)	1.17	1.01	1.36		1.02	0.87	1.2	

Table 4 Model 2: Health system factors (adjusted) compared to crude ORs

Variables	<4 ANC visits n (%)	4+ ANC visits n (%)	Crude OR				Model 2			
			OR	Lower 95% CI	Upper 95% CI	P-value (*mhodds for trend **LRT)	aOR	Lower 95% CI	Upper 95% CI	P-value (LRT)
Health Centre						<0.0001**				< 0.0001
Amman New Camp	766 (53.08)	2007 (55.91)	1				1			
Irbid New Health Center	561 (38.88)	975 (27.16)	1.51	1.32	1.72		0.43	0.33	0.55	
Jerash Camp	116 (8.04)	608 (16.94)	0.5	0.4	0.62		0.28	0.22	0.35	
Percentage of appointments attended						<0.0001**				< 0.0001
0	278 (19.27)	542 (15.1)	1				1			
1–24.9%	3 (0.21)	17 (0.47)	0.34	0.1	1.18		0.39	0.11	1.41	
25–49.9%	85 (5.89)	128 (3.57)	1.29	0.95	1.77		1.18	0.8	1.74	
50–74.9%	403 (27.93)	937 (26.1)	0.84	0.7	1.1		0.63	0.47	0.84	
75–100%	443 (30.7)	1834 (51.09)	0.47	0.39	0.56		0.33	0.25	0.44	
No appointments made	231 (16.01)	132 (3.68)	3.41	2.64	4.42		3.1	2.37	4.06	
Risk status of pregnancy at first visit						0.003**				< 0.0001
Normal	790 (54.75)	1778 (49.53)	1				1			
Moderate	409 (28.34)	1112 (30.97)	0.83	0.72	0.95		2.42	1.94	3.01	
High risk	244 (16.91)	700 (19.5)	0.78	0.66	0.93		7.83	5.44	11.26	
*Last recorded risk status during pregnancy (*missing 2)*						0.001*				< 0.0001
Normal	735 (50.94)	1265 (35.26)	1				1			
Moderate	458 (31.74)	1239 (34.53)	0.64	0.55	0.73		0.46	0.37	0.56	
High risk	250 (17.33)	1084 (30.21)	0.4	0.34	0.47		0.13	0.09	0.18	
Receipt of a gynaecologist review at UNRWA						0.81**				< 0.0001
No	1390 (96.33)	3453 (96.18)	1				1			
Yes	53 (3.67)	137 (3.82)	0.96	0.7	1.33		0.36	0.29	0.44	

+Adjusted for age, number of children, number of miscarriage, living

of 0.46 (95% CI: 0.37–0.56) and 0.13 (95% CI: 0.09–0.18), respectively. Receipt of a gynaecologist review was found to be protective against inadequate ANC attendance (aOR 0.36, 95% CI: 0.29–0.44, *P* = < 0.0001). Irbid and Jerash health centres in the adjusted model were also found to be protective, compared to Amman New Camp health centre (aOR 0.43, 95% CI: 0.33–0.55 and aOR 0.28, 95% CI: 0.22–0.35, *P* = < 0.0001).

Discussion

Having a moderate and high risk status pregnancy at the first ANC visit is strongly associated with < 4 ANC (aOR 2.42, 95% CI: 1.94–3.01 and aOR 7.83, 95% CI: 5.44–11.26 respectively), but conversely, the aOR for higher risk pregnancies at last ANC visit is 0.46 and 0.13 (95% CI: 0.37–0.56 and 0.09–0.18, respectively, *P* = < 0.0001). This may be due to higher risk women seeking care outside of UNRWA at the start of the pregnancy, while those with a changing risk status, or with higher risk but unable to attend other facilities, continue with UNRWA care. Information on health-seeking behaviours outside of UNRWA facilities is not available. Gynaecologists review specialist cases

at UNRWA's health clinics, including moderate and high-risk pregnancies, and this may be the reason why women who are unable to attend other facilities remain with UNRWA. Specialist services or seeing a gynaecologist is not discussed in the literature, but pregnancy risk status was reviewed by Tran et al. and found to have no association with adequate ANC in urban or rural areas of Vietnam (8). More data on health-seeking practices among women with higher risk pregnancies is needed in this region and context.

The difference between health centres is interesting and explanations may be related to quality of care, availability of other health care providers, access to care and/or socioeconomic differences between communities. A major limitation of this study is not being able to control for socioeconomic factors, due to missing data. Several studies report wealth or education as a significant factor in ANC care (8-14) and more needs to be done to monitor these trends in the region.

Adjusted ORs for age demonstrate wide CIs and should be interpreted with caution. A number of studies show no association between 4ANC and age in adjusted

models (*8,15*). Cultural and social differences may account for the differences between these studies, but more data from this region would be helpful in understanding this relationship.

Ultrasound scans were thought by UNRWA staff to constitute an important determinant of ANC attendance because of strong cultural beliefs in the community that ultrasound scans ensure a safe and normal pregnancy, as well as general cultural preferences for a male child. The data suggests no association between < 4 ANC and having an ultrasound scan (*P* = 0.81) or male children in model 1 and 2 (*P* = 0.77 and *P* = 0.83, respectively). No studies to date have ultrasounds, or seeking out ultrasounds, as a factor for ANC attendance, and qualitative studies on this topic in this Region may guide an understanding of impact of these beliefs. Deo et al. found no significant associations between gender of the last child and adequate ANC, reflecting results found in this study (*10*).

In a study conducted with women in Western Kenya, Van Eijk et al. found that having experienced a stillbirth or child death was not significantly associated with ANC attendance. This supports our finding that a history of stillbirth or child death is not associated with inadequate ANC (*P* = 0.84) [15].

Limitations

Jordan field was selected due to the political and economic stability within the country. Consequently, follow-up with ANC should remain unaffected by these factors. However, Jordan is one of five operational fields and is not representative of all Palestinian refugees in the Region. In Jordan, many Palestinian refugees can access health facilities other than UNRWA facilities at a cost, and the proportion of women who seek ANC outside of UNRWA is currently unknown. Data was only available from a small selection of health centres because of limited availability of ehealth records.

Missing data on education and occupation makes it difficult to compare this population with others around the world. Studies in the field refer to wealth and education status as a factor for ANC attendance. A telephone survey was attempted at the end of study using patient telephone numbers, but was halted when large proportions of mobile numbers were no longer use. There was no proxy data to allow for estimations of missing data and therefore this was excluded. We recognise the major limitation this has on the study, but feel the data is still important for information on this vulnerable population and highlights the need for more research in this region. Data only captures information on Palestinian refugees who attend UNRWA services, and this may not reflect the whole population.

These results add to the current literature, which includes little or no information on Palestinian refugees. Comparing this data to other refugee populations and host country populations may be helpful in obtaining a wider set of data and understanding of the issues in this Region.

Soins prénatals chez les réfugiés palestiniens en Jordanie : facteurs associés à la fréquentation des dispensaires de l'UNRWA

Résumé

Contexte : La mortalité maternelle et néonatale est un problème mondial reconnu dans les Objectifs de développement durable (ODD). Si des soins prénatals adéquats sont essentiels pour faire baisser ces taux de mortalité, il est primordial, pour atteindre les ODD, de comprendre pour quelles raisons les femmes ne se tournent pas vers les dispensaires de soins prénatals.

Objectifs : Utiliser les données courantes relatives aux soins de santé primaires afin d'identifier les facteurs associés à une fréquentation insuffisant par les réfugiés palestiniens des dispensaires de soins prénatals que l'Office de secours et de travaux des Nations Unies pour les réfugiés de Palestine dans le Proche-Orient (UNRWA) met à disposition en Jordanie.

Méthodes : Un modèle de régression logistique descendante intégrant des facteurs associés aux systèmes de santé et à d'autres systèmes a été réalisé à l'aide de données de l'UNRWA.

Résultats : Dans le modèle reposant sur les autres systèmes que celui de la santé, une association a été établie entre le jeune âge des femmes et une fréquentation insuffisante des dispensaires de soins prénatals (*p* = 0,0009). Pour ce qui est des facteurs associés aux systèmes de santé, le niveau de risque de la grossesse, des examens pratiqués par un gynécologue ainsi que la fréquentation d'un centre de santé se sont révélés des facteurs liés de façon significative à la consultation de dispensaires de soins prénatals (*p* < 0,0001).

Conclusions : Comprendre les facteurs concernant les systèmes de santé associés à la consultation de dispensaires de soins prénatals peut permettre de modifier et d'améliorer les politiques opérationnelles de l'UNRWA.

الرعاية السابقة للولادة بين اللاجئات الفلسطينيات في الأردن: العوامل المرتبطة بالحضور إلى وكالة الأمم المتحدة لإغاثة وتشغيل اللاجئين الفلسطينيين في الشرق الأدنى (الأونروا)

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الخلاصة

الخلفية: تُعَدُّ وفيات الأمهات والأطفال حديثي الولادة مشكلة عالمية تقرها أهداف التنمية المستدامة. وتُعَدُّ الرعاية السابقة للولادة الكافية ضرورية لتقليل معدلات الوفيات هذه، كما أن فهم عدم حضور النساء للرعاية السابقة للولادة يعد أمرًا بالغ الأهمية لتحقيق أهداف التنمية المستدامة.

الأهداف: استخدمت بيانات الرعاية الصحية الأولية الروتينية لتحديد العوامل المرتبطة بالحضور غير الكافي للاجئات الفلسطينيات إلى المرافق التي تقدِّم الرعاية السابقة للولادة والتي توفرها وكالة الأمم المتحدة لإغاثة وتشغيل اللاجئين الفلسطينيين في الشرق الأدنى (الأونروا)، الأردن.

طرق البحث: طُبِّق نموذج الارتباط المنطقي الراجع الذي يشمل عوامل النُظُم الصحية ونُظُم أخرى بخلافها باستخدام بيانات الأونروا الثانوية.

النتائج: ارتبط عمر النساء الأصغر سنًا بعدد الزيارات غير الكافية للحصول على الرعاية السابقة للولادة ($P=0.0009$) في نموذج النُظُم الأخرى بخلاف النُظُم الصحية. وبالنسبة لعوامل النُظُم الصحية، كانت حالة الحمل المعرض للخطر ومراجعة طبيب النساء والمركز الطبي الذي تم الذهاب إليه من العوامل التي وُجِد أنها ترتبط بشكل كبير بحضور الرعاية السابقة للولادة ($P=0.0001$).

الاستنتاجات: يؤدي فهم عوامل النظام الصحي المرتبطة بحضور الرعاية السابقة للولادة إلى إدخال تغييرات وتحسينات في السياسات التشغيلية للأونروا.

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A country-wide comparison of cost recovery and financing systems of blood and blood products

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Abstract

Background: As blood is a scarce and expensive resource, irrational blood usage places huge burden on health expenditures. In response to this challenge, governments and health care providers are developing different strategies to optimize blood utilization. Among these strategies is trying to raise the public awareness on the actual costs of the blood production and changing the cost recovery systems of blood and blood components.

Aims: This study aims to compare cost recovery and financing systems of blood and blood products in different countries.

Methods: This research was an email-based survey of 30 countries from four HDI categories. All related literature was reviewed.

Results: Out of 28 countries, 19 have blood and blood products that are provided totally free of charge to the patients. In nine countries blood and blood products are totally or partially chargeable to the patients.

Conclusions: In countries with low and lower-middle income economies, total or partial costs of blood and blood products are recovered directly from the patients. While countries in which blood and blood products are 'free of charge' for patients are mostly categorized in upper-middle- or high-income economies with well-developed healthcare and insurance systems. There is no clear relation between blood usage and the type of cost recovery system. However, having an efficient cost recovery system will help blood establishments to sustain their service delivery.

Keywords: blood, blood transfusion, rational blood use, cost recovery system, blood cost

Introduction

Blood transfusion as a life-saving treatment is an irrepressible part of modern healthcare. The World Health Organization (WHO) estimates that 112.5 million blood donations are collected across the world annually (1). However, data on the use of blood products is generally lacking, but studies suggest that blood components are often overprescribed in both high-income and low- and middle-income countries (2). It is estimated that worldwide over 50% of all medicinal interventions are prescribed, dispensed, or sold inappropriately (3).

Since blood is a scarce and expensive resource, irrational blood usage places huge burden on health expenditures (4). In a study conducted in the United States of America, the authors concluded that almost half of the transfusions were inadequately indicated causing an almost US$ 860 000 financial loss for a total of 10 902 units (5).

However, the annual cost of providing blood and blood components is increasing (6). While blood donation is voluntary, the collection, processing, testing and distribution of blood and blood components incur significant costs. An American study published in April 2010 shows that the actual cost of blood is substantially higher than previously estimated. The study calculates that the true cost of blood for clinical use is 3.2 to 4.8-fold higher than reported blood component procurement costs. According to the study, when all the activities involved in blood transfusion are considered, the estimated price of transfusion of one unit of red cells is between US$ 700–$1200 (7). It is estimated that red blood cell transfusion costs at least US$ 100 000 000 yearly in Turkey (8). Comparing the cost related to the preparation of blood components, a much larger cost is incurred to run a blood establishment (9).

In addition, inappropriate use of blood and blood components may result in significant patient harm. An increasing number of studies show that there is a relationship between transfusion of blood components and the risk of morbidity and mortality (10–12). These adverse effects include allergic reactions, increased length of hospital stay, febrile nonhemolytic transfusion reaction, transfusion-related acute lung injury and circulatory overload in patients with heart disease. Although the existence of some confounding effects and lack of case-control studies make the causation difficult, the evidence alleging allogenic blood transfusion as the

culprit for worsening patient outcomes continues to accumulate (*13*).

In response to this challenge and increasing demand for blood transfusion due to an escalating number of elective surgeries, advanced medical interventions and aging population specially in high-income countries (*14*), governments and healthcare providers are developing different strategies to rationalize blood utilization. These strategies range from patient blood management and using blood transfusion alternatives such as autologous blood procurement, erythropoiesis-stimulating agents, and haemostatic agents to improving blood inventory management system and enhancing awareness of unit prices (*15*). The idea of supporting a relation between underestimating the actual costs of blood and blood products and irrational blood usage has led some countries such as the Ilsamic Republic of Iran (*16*) and Australia (*17*) to review their current fully government-funded 'free of charge' policies and sending price signals to the prescribing clinicians as an incentive to take appropriate decision and bear the financial consequences.

A cost-recovery system named 'free of charge' means that the consumer and/or end-consumer are not charged for preparation and processing of blood and blood products. In this situation the government (tax money) finances 100% of blood transfusion service or the costs are recovered by the insurer fund or both (government and insurers). The system is named 'totally or partially chargeable to patients' when either the blood establishment or the hospital directly charge the end-consumer for the total or partial costs of blood or blood products. This study aimed to 1) compare cost recovery and financing systems in different countries for blood and blood products; and 2) find out whether the type of reimbursement system has any effect on rational use of blood. The emphasis is on the system in use and not on the calculation of the costs involved, and whether the system in use relates to the validity of clinical use of blood and blood products.

Methods

An email-based survey was sent to blood transfusion experts and executive authorities within different countries. Respondents were asked to answer questions regarding the cost recovery or reimbursement system of blood and blood products in their countries; the effects of the current system on the efficiency of blood usage; and the explanation of any other policies for reduction of blood wastage in their respective countries. A 5-question survey (Table 1) was sent by the Iranian Blood Transfu-

sion Organization (IBTO) directorate. After one month, a reminder was sent out. Due to a lack of responses from certain countries, the data were derived from related literature, documents and websites. In addition, all other related literature and documents were reviewed. Statistical analysis was not needed for this descriptive comparative study.

Results

A total of 56 experts from 30 countries were contacted, and the experts of 17 countries (56%) from Canada, Denmark, Finland, France, Germany, Hungary, India, Islamic Republic of Iran, Italy, Nepal, Netherlands, New Zealand, Nigeria, Pakistan, Slovakia, Turkey and United Kingdom completed the survey. The information of other countries (Australia, Bangladesh, Côte d'Ivoire, Mozambique, Namibia, Singapore, South Africa, Sri Lanka, Uganda, United States of America and Zimbabwe) surveyed in this study has been derived from available resources that were mentioned in the methodology.

In 19 out of 28 countries (67%), blood and blood products are provided totally free of charge to the patients. In nine countries blood and blood components are chargeable to the patients but with some considerations; In India, it has been mandatory for all blood banks since 2012 to provide blood and blood products free of charge for the patients who require repeated blood transfusion as a life-saving intervention (*18*). In Pakistan and Sri Lanka there is no charge for blood and its products in governmental blood banks, if used inside governmental hospitals; however, patients are charged in private hospitals. In Nigeria, patients pay the equivalent of approximately US$ 12 per unit of whole blood. In Mozambique, the expenses are recovered by direct charges to the patients and funding of foreign donors (*19*).

In other countries, the charges for whole blood range between US$ 5 (Bangladesh) up to US$ 43 (India when the blood is screened by Nucleic Acid Test (NAT) (*20*). In Singapore patients need to pay the blood processing fee, which is subsidized by the government (*21*). In the United States of America, the average charge to the hospitalized patient per red blood cell unit transfused was estimated US$ 343.63 ± 135 (*22*). There are two main sources of finance for the countries that provide blood and blood products free of charge to patients, namely government and insurers. In six out of 19 countries where blood and blood components are provided free to patients, the expenses are reimbursed to blood services directly by the government. In nine countries insurers pay the related costs and in four countries both government and insurers

Table 1 Questionnaire
Are blood and blood products provided free of charge to the patients?
How are the expenses reimbursed in your country; by government or insurers?
How much is the cost of whole blood, packed cells, platelets, fresh frozen plasma?
Have the current charging policies/reimbursment system been effective to rationalize blood usage?
What are other policies of your country to prevent wastage of blood?

reimburse the expenses (Table 2).

Effective strategies to rationalize blood usage mentioned by the respondents are patient blood management; employing of transfusion medicine specialists; training programmes for physicians and nurses; integrated blood inventory management systems; developing guidelines for the appropriate clinical use of blood products and plasma-derived medicinal products; haemovigilance; and use of blood transfusion alternatives.

Out of six countries where the government reimburses the expenses, Australia and the Islamic Republic of Iran are not satisfied with this policy due to continued inappropriate blood usage by hospitals and are considering some revisions (23,24). However, the experts of two other countries (Denmark and Italy) believe

that applying a charging or cost-recovery policy is not effective on the awareness of rational blood usage. This information was not available for Canada and Uganda.

Of the two countries (France and UK) where both insurers and government reimburse the expenses, the respondents believe that there is not any relation between this policy and rational blood usage. In these countries, blood and its products are reimbursed by governments if they are distributed in governmental hospitals. There are also private hospitals treating patients covered by insurance policies and these hospitals will pass costs on to the insurers. Out of seven countries where insurers pay the related costs, the respondents from three countries (Germany, Finland and Hungary) believe that this policy has helped to rationalize blood usage and according to the replies received from another four countries

Table 2 Charging policies of different countries

Country (blood supply system)2	Type of charging system for patients	Type of cost recovery or financing system
Very High HDI3		
USA (H, RC, ABC)	Totally or partially chargeable	Insurers/patients
UK (N)	Free of charge	Government and insurers
Netherlands (N)	Free of charge	Insurers
France (N)	Free of charge	Government /insurers
Slovakia (N)	Free of charge	Insurers
Denmark (H)	Free of charge	Government
Hungary (N)	Free of charge	Insurers
New Zealand (N)	Free of charge	Insurers
Australia (RC)	Free of charge	Government
Germany (RC, H)	Free of charge	Insurers
Italy (H)	Free of charge	Government
Canada (RC, ABC)	Free of charge	Government
Finland (RC)	Free of charge	Insurers
Singapore (N)	Totally or partially chargeable	Government/patients/ insurers
High HDI		
Turkey (RC, H)	Free of charge	Insurers
Iran (N)	Free of charge	Government
Sri Lanka (N)	Totally or partially chargeable	Government/patients
Medium HDI		
South Africa (N)	Free of charge	Insurers
Bangladesh (H)	Totally or partially chargeable	Government/patients
India (H)	Totally or partially chargeable	Government/insurers/patients
Namibia (N)	Free of Charge	Government /insurers
Low HDI		
Nepal (RC)	Totally or partially chargeable	Government/patients
Pakistan (M)	Totally or partially chargeable	Government/patients
Nigeria (H)	Totally or partially chargeable	Government/patient
Mozambique (M)	Totally or partially chargeable	Patients
Côte d'Ivoire (N)	Free of charge	Government/ insures
Zimbabwe (N)	Free of charge	Government /insurers
Uganda (N)	Free of charge	Government

(Netherlands, New Zealand, Slovakia, Turkey,) this policy has a positive effect on awareness of rational blood usage.

Discussion

To cover the cost made by a blood establishment for the supply of blood and blood products to hospitals and the transfusion of blood at the bedside, there are several systems in operation in different parts of the world. Where a comprehensive healthcare system has been established, costs and cost recovery usually have been considered. In principle, the consumer pays for what has been consumed, whether materials or services or both (25). The end-consumer is the patient, although hospitals also may be considered as consumers. Costs made to provide agreed standards of care may be covered by tax revenue, by insurance funds or a combination (26).

In the absence of an accessible and affordable health insurance system, the end-consumer may be charged by the health provider for the cost of care including the service. Central to the system of provision of blood and blood products is the blood establishment or blood bank, which needs to recover the costs made to provide blood and blood products as well as the continuous supportive services (27). These costs may be recovered through the government, hospitals and or the insurance funds, but also directly by the end-consumer. Hospitals may recover the costs made for individual haemotherapy directly from the patient or indirectly from the insurance fund through which the patient is insured, or by the government (28). For example, in Côte d'Ivoire the government covers 73% of expenses while 15% of costs are reimbursed by public hospitals, 5% from private hospitals and the remainder by miscellaneous sources such as charitable foundations (19).

According to WHO reports published in 2016, 32% of countries had a specific item in their governmental budget for blood transfusion services; 16% had a cost recovery system; and 33% reported having both a specific budget for blood services and a cost recovery system. The remaining 11% reported neither a specific budget nor a cost recovery system for blood transfusion services (29). According to the outcome of this survey, all countries where total or partial costs of blood and blood products are recovered directly from the patients are categorized as low and lower–middle income economies, which suffer from fragmented and non-centralized blood transfusion systems and an underdeveloped healthcare system. WHO's findings show that 24 countries continued to be dependent on paid donations in 2013, amounting to 1 650 000 donations in total (29). Since there is no united cost recovery system due to the absence of a structured healthcare system in these countries, the evaluation of the current policy on blood usage is not easy and in most cases there is neither a policy nor the necessary infrastructure in place to optimize blood usage. However, significant progress has been made in countries such as Côte d'Ivoire, India, Tanzania and Zimbabwe through centralization of blood establishments and development of national guidelines on clinical use of blood where blood and blood products are provided free of charge to the patients (except India) (19).

Generally, countries in which blood and blood products are 'free of charge' for patients are mostly categorized in upper-middle- or high-income economies with well-developed healthcare and insurance systems. Almost all of them benefit from a centralized, integrated and organized blood transfusion system where the government, insurers or both finance the related costs. Among WHO regions, European countries have the highest rate of reporting financing the blood services through a cost recovery (67%), either partially or entirely (29).

As mentioned, irrational usage of blood and blood products in some countries where the government is the sole source of finance has led to a revision of current policy. These revisions are mainly focused on extending price signals in the system, particularly to hospitals (30). Since 2013, the Australian Red Cross Blood Service included a manufacturing cost indicator on all fresh blood products such as red blood cells, platelets and fresh (frozen) plasma. The aim of this national initiative is to increase the awareness and appreciation of the costs associated with the provision of blood and blood products within Australia (31). Suffering from the same challenge, since 2015 the Iranian Blood Transfusion Organization (IBTO) has adopted a new policy which was a shift from government as the sole funder of IBTO to the insurers as the partial funder of blood services. As a result, some of the blood products were incorporated into the pricing framework. It is planned to obtain 30% of the costs of IBTO's operations from this new cost recovery system. Given the fact that all Iranians are under the national insurance scheme, this new rule does not pose any significant financial burden on patients.

However, the existence of a possible relation between the type of reimbursement system and the amount of blood usage is disputed between the experts of the countries approached. Although experts of some countries with an advanced blood transfusion system such as France, Italy, Netherlands and the United Kingdom believe that rationalizing blood usage is usually more based on guidelines, training and education rather than implementing charging policies, the respondents from some countries where the insurers pay the related costs believe that this type of cost recovery system has a positive effect on rational use of blood.

Although the data from Red Blood Cells (RBC) consumption per 1000 population in different European Union (EU) countries and Australia, New Zealand and the United States of America in 2013 (32,33) appear to support a relation between cost recovery system and blood usage, this relation is not conclusive. The data show that in countries with the lowest rate of RBC consumption per 1000 population (Netherlands – 27, New Zealand – 26.6, and United States of America – 19.3), the costs are recovered by insurers and not government; the RBC usage is relatively high in countries which the government funds all blood transfusion activities

(47 and 41.7 per 1000 population in Denmark and Italy respectively). Similarly this rate in France and the United Kingdom, with mix cost recovery systems (government and insurers), was reported to be 38.1 and 31.5 respectively (the median range). However, several exceptions apply to this observation; Australia (fully government-funded blood service) has low RBC consumption (29 per 1000 population). On the other hand, Germany, with insurer-recovered cost system, has one of the highest RBC usage rates among EU countries (54 per 1000 population). This indicates the importance of other factors intervening in the rational use of blood such as education, standards setting and guidelines, having an updated needs assessment system, and active collaboration between hospitals and blood services (clinical interface).

Conclusion

Apart from the effects on blood usage and cutting unnecessary costs, having an efficient cost recovery system will help blood establishments to sustain their service delivery and to ensure reliable revenue. This gains importance especially in countries with scarce resources where the existing funding (government or external donors) are generally insufficient to meet the demands for safe blood. For example, the Netherlands (population of approximately 17 million) has a successful cost recovery system where the Sanquin Blood Bank invoices the hospitals. The hospitals then invoice the insurance companies and the latter collect the annual insurance fee from either the individual or the employer, which compensates the health insurer through their monthly salary structure. Applying this policy not only has led to the recovery of related costs but also operate with a blood supply turnover of approximately €144 million in 2013 (34).

Limitations

Although this study is unique, the authors are aware of certain limitations. The study is based on a simple questionnaire and does not provide the detailed analysis of cost calculation. The approach has been descriptive rather than analytic when comparing the cost recovery/reimbursement systems currently in practice and their assumed effect on clinical use of blood and blood components. However, due to the lack of information, some parts of the study are based on the views expressed by the blood transfusion authorities and experts from different countries. There is a need to conduct a more evidence-based and extensive research to verify and generalize the results.

Acknowledgments

Comparaison des systèmes de financement et de recouvrement des coûts pour le sang et les produits sanguins dans différents pays

Résumé

Contexte : Le sang étant une ressource rare et coûteuse, son utilisation irrationnelle pèse très lourd sur les dépenses de santé. En réponse à ce problème, les gouvernements et les prestataires de soins de santé développent différentes stratégies visant à optimiser l'utilisation du sang. L'une d'elle consiste à essayer de sensibiliser le public aux coûts réels de la production de sang et de modifier les systèmes de recouvrement des coûts associés au sang et à ses composants.

Objectifs : La présente étude a pour but de comparer les systèmes de financement et de recouvrement des coûts pour le sang et les produits sanguins dans différents pays.

Méthodes : Ces travaux de recherche consistaient en une enquête réalisée par courriel et menée dans 30 pays répondant à quatre catégories d'indice de développement humain. Toute la littérature connexe a été passée en revue.

Résultats : Sur 28 pays, 19 fournissent gratuitement aux patients le sang et les produits sanguins. Ils sont en revanche totalement ou partiellement à la charge des patients dans neuf pays.

Conclusions : Dans les pays à revenu faible ou intermédiaire de la tranche inférieure, les coûts associés au sang et aux produits sanguins sont recouvrés, pour tout ou partie, directement auprès des patients. En revanche, la plupart des pays où le sang et les produits sanguins sont « gratuits» pour les patients figurent parmi ceux dont le revenu est élevé ou intermédiaire supérieur et qui sont dotés de systèmes de santé et d'assurance bien développés. Aucune relation claire entre l'utilisation du sang et le type de système de recouvrement des coûts n'a été identifiée. Toutefois, l'existence d'un système de recouvrement des coûts efficace aidera les établissements du sang à maintenir leurs prestations de services.

مقارنة قُطْرية لنُظُم استرداد التكاليف والتمويل للدم ومنتجاته

نسيم ديوكلاهى، فريا سيغلي، علي أكبر بور فتح الله، سميث سيبنجا

الخلاصة

الخلفية: يُعَدُّ الدم موردًا نادرًا وغالي الثمن، والاستخدام المخالف للصواب للدم يُشكِّل عبئًا ضخمًا على النفقات الصحية. واستجابة لهذا التحدي، وضعت الحكومات ومقدِّمو الرعاية الصحية استراتيجيات مختلفة لاستخدام الدم على المستوى الأمثل. ومن ضمن هذه الاستراتيجيات، محاولة رفع وعي العامة بشأن التكاليف الفعلية لمنتجات الدم وتغيير نُظُم استرداد التكاليف للدم ومكوناته.

الأهداف: هدفت هذه الدراسة إلى مقارنة نُظُم استرداد التكاليف والتمويل للدم ومنتجاته في البلدان المختلفة.

طرق البحث: يُعَدُّ هذا البحث مسحاً قائمًا على البريد الإلكتروني أُجري على مستوى ٣٠ بلدًا تنتمي لأربع فئات من مؤشر التنمية البشرية. وتم استعراض جميع المواد المنشورة ذات الصلة بالموضوع.

النتائج: من بين ٢٨ بلدًا، يتوافر الدم ومنتجاته في ١٩ بلدًا، والتي يتم توفيرها للمرضى بشكل مجاني تمامًا. وفي تسعة بلدان، يدفع المرضى مقابل الدم ومنتجاته بشكل كلي أو جزئي.

الاستنتاجات: في البلدان ذات اقتصاديات الدخل المنخفض والمتوسط الأدنى، يتم استرداد تكاليف الدم ومنتجاته كليًا أو جزئيًا من المرضى مباشرةً. بينما البلدان التي يكُون فيها الدم ومنتجاته "مجانية" للمرضى، تُصنَّف غالبًا على أنها بلدان ذات اقتصاديات الدخل المتوسط الأعلى أو الدخل المرتفع والتي توجد فيها نُظُم متطورة للرعاية الصحية والتأمين الصحي. ولا توجد علاقة واضحة بين استخدام الدم ونوع نظام استرداد التكاليف. ومع ذلك، وجود نظام فعّال لاسترداد التكاليف يساعد مؤسسات الدم في مواصلة تقديم خدماتها.

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Tobacco and waterpipe use among university students in Saudi Arabia: impact of tobacco sales ban

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Abstract

Background: Waterpipe smoking is a method of tobacco consumption that continues to spread globally. In 2002, a ban of tobacco sales was adopted in the Saudi Arabian cites of Mecca and Medina.

Aims: This study aimed to examine prevalence of waterpipe and cigarette smoking among students of Taibah University, the biggest in Medina, where the tobacco sales ban has been implemented.

Methods: A structured questionnaire was distributed between February and April 2015 to examined tobacco use among Taibah University students.

Results: The prevalence of current and ever waterpipe use was 24.2% and 36.04%, respectively, compared with 31.9% and 42.7% for current and ever cigarette smoking. This prevalence is similar to that reported in other Saudi cities where tobacco sales are allowed. Multivariate analysis showed that waterpipe use was higher among senior students; those with pocket money spending of > 500 Saudi Arabia riyal (SAR)/month; and if > 5 individuals were living in the household. In addition, waterpipe use was lower among students with monthly household income of 5000–9000 SAR. In contrast, current cigarette smoking was more frequent in those aged > 22 years; among male students; in those with pocket money spending of > 500 SAR/month; and those who lived away from their parents.

Conclusions: Waterpipe and cigarette smoking, despite the ban on tobacco sales, is still common among Taibah University students in Medina, Saudi Arabia.

Keywords: shisha, tobacco, smoking, hookah, Taibah

Introduction

Globally, ~6 million deaths each year are attributed to tobacco smoking (1). In addition to cigarette smoking, waterpipe tobacco smoking has become more popular (2), particularly among high school and university students (3). This growth in popularity is due, in part, to the misperception that the waterpipe filters the smoke, rendering it less harmful than other types of tobacco smoking (4). In fact, waterpipe tobacco smoke contains carcinogens such as polycyclic aromatic hydrocarbons that cause lung tumours, toxic aldehyde compounds that cause lung inflammation, high levels of carbon monoxide that contribute to cardiovascular disease, and nicotine that causes addiction (5). Animal studies have shown that waterpipe smoke exposure leads to lung inflammation, oxidative stress, and impaired pregnancy outcomes, renal function, chromosomal structure, and cognitive and mental ability (6–11). Thus, this type of smoking has the potential to cause cancer, lung disease, cardiopulmonary disease, dependence, and other disorders (6,12). For these reasons, waterpipe tobacco smoking is now seen as a public health threat requiring effective policy intervention (13).

One potential intervention is to ban tobacco sales, and this approach was adopted in the Saudi Arabian cites of Mecca and Medina in 2002 (14). This is a total ban throughout the whole city including Taibah University (where the current study was conducted), and all forms of tobacco including cigarettes, cigars, Jurak, and waterpipe tobacco (waterpipe cafés are also banned, as is the sale of paraphernalia used in waterpipe tobacco smoking). Traders who violate the ban are compelled to pay a fine between 5000 and 10 000 Saudi Arabian riyal (SAR) (1 SAR = US$ 0.37), and their stores could be closed if they are cited for a third violation (15). Tobacco consumption is common in Saudi Arabia, where studies indicate that, among high-school children, the prevalence of all types of tobacco smoking was 30.3% in boys and 8.5% in girls, and waterpipe smoking represented 53.9% (both genders) of current tobacco users (16). Similar prevalence was reported among college (17) and medical and dental (18–20) students.

The purpose of this study was to examine the prevalence and demographic and environmental factors associated with cigarette and waterpipe tobacco smoking among students of Taibah University, the biggest

university in Medina. Taibah University is a government university in Saudi Arabia that has > 69 000 students and offers both undergraduate and graduate programmes in most fields including basic sciences, medical sciences, engineering and humanities. As of 2014, the city of Medina had a population of ~1.5 million (*21*). The size of the city is ~589 km2 and it is located in Western Saudi Arabia.

Methods

Participants

Students from Taibah University, Medina, Saudi Arabia were recruited to participate in the study. To be eligible to participate, subjects had to be at least 18 years old and enrolled as students at Taibah University. The study was conducted between February and April 2015. The study procedures were approved by the Research and Ethical Committees of Taibah University.

Recruitment

Participation was voluntary and participants were selected randomly using a two-stage cluster sampling strategy as previously described (*22*). The main campus regions of Taibah University were identified in both the male and female branches. The regions were allocated numbers and 3 regions from each branch were randomly selected using a fish bowl drawing method. Recruitment was facilitated by gender-specific staff from each region during the working days of a given week from 10:00 to 15:00 hours. During sampling time, every fourth student to enter the selected region was invited to be part of the study. Approximately 1700 students (1200 male and 500 female) were invited to participate in the study, and 793 male (66%) and 274 female (35%) students completed the anonymous survey.

Instrument and measures

The survey instrument (in Arabic) was constructed based on that used previously in Jordan (*23*). The instrument was modified to accommodate differences in spoken Arabic between Jordan and Saudi Arabia. To make sure that the instrument was suitable for the population, it was pilot tested in the university with 50 students and was modified according to their comments.

Among the measures was cigarette and/or waterpipe smoking, for which students were asked to report if they had smoked tobacco using a waterpipe and/or cigarettes, even a puff, in the past 30 days (current users), or ever. Demographic measures such as student specialty, age, university level, sex, paternal education, monthly household income, and pocket money spent were also obtained. For student specialty, participants were asked to select from: basic sciences, medical sciences, engineering and humanities. For paternal education, we asked participants to select from: did not complete high school, completed high school, and completed college or higher degrees. For monthly household income, we asked the student to select from the followings: SAR 0–5000, 5001–9000 and ≥ 9001. The survey also contained items

asking whether participants lived in a city or village and whether or not they lived with their parents.

Data analysis

SPSS version 21 was used for statistical analysis. The χ2 test was used to determine significant differences in prevalence of cigarette and waterpipe tobacco use across sociodemographic variables. The multivariate logistic regression method was used to determine the independent association between different variables. $P < 0.05$ was considered significant.

Results

Of the 1700 invited participants, 1067 returned the questionnaire (62.8%). Of the final sample, 793 (74.3%) were male (Table 1). The age range was 18–29 years with the majority between 21 and 25 years (662, 62.8%). Most of the participants were studying basic sciences (451, 46.4%) followed by humanities (186, 19.2%). The majority of participants lived in the city (982, 92.4%) and with their parents (951, 89.6%), and 424 (40.7%) reported monthly household income of < 5000 SAR. Approximately half of participants (524, 49.7%) spent > 1000 SAR per month from pocket money.

The prevalence of current and ever waterpipe use was 24.2% and 36.04%, respectively, compared with 31.9% and 42.7% for current and ever cigarette smoking. In bivariate analyses (Table 1), waterpipe tobacco use was significantly associated with university level ($P < 0.001$), age ($P < 0.01$), monthly household income ($P < 0.001$), number of others living in the home ($P < 0.001$) and living away from parents ($P < 0.01$). Current cigarette smoking was significantly associated with university level and specialty ($P < 0.01$), age ($P < 0.001$), gender ($P < 0.005$), monthly household income ($P < 0.001$), pocket money spent monthly ($P < 0.001$) and living away from parents ($P < 0.01$).

In multivariate analysis (Table 2), odds of waterpipe use were significantly lower among engineering students (current and ever use) and those with monthly household income of SAR 5000–9000 (current use only). Odds of current and ever waterpipe use were significantly higher among 6th year students, those with pocket money spending of SAR > 500 per month, those with ≥ 5 individuals living at home, and those not living with their parents. However, odds of current cigarette smoking were reported to be higher in students ≥ 22 years of age, and among male students, in those with pocket money spending > SAR 500 per month and those who lived away from parents. Ever cigarette smoking was significantly higher among students aged ≥ 23 years, and those with income of > 500 SAR (P < 0.05). In addition, ever cigarette smoking was significantly lower in 2nd, 4th and 6th university year students ($P < 0.05$).

Discussion

The results of this study showed that tobacco use is common among university students in Medina, Saudi Arabia, where sale of tobacco products is banned. The number of

Table 1 Demographic and environmental associations with waterpipe tobacco and cigarette smoking among Taibah University students

Participant characteristic		Waterpipe tobacco				Cigarettes			
		Current use		Ever use		Current use		Ever use	
	N (%[a])	%	P*	%	P*	%	P*	%	P*
College									
Basic sciences	451 (46.4)	25.6	0.252	33.1	0.167	29.3	0.062	37.0	0.011
Medical sciences	164 (16.9)	33.1		43.1		40.5		47.0	
Engineering	170 (17.5)	22.0		40.0		33.1		47.6	
Humanities	186 (19.2)	25.0		33.3		29.9		34.9	
Year									
1	114 (12.0)	17.4	< 0.001	24.1	< 0.001	31.0	0.012	39.5	< 0.001
2	138 (14.5)	29.5		36.8		34.1		41.3	
3	223 (23.5)	32.0		45.4		37.2		45.7	
4	193 (20.3)	28.5		34.9		30.5		36.8	
5	223 (24.6)	18.1		22.4		25.0		28.8	
6	48 (5.1)	57.9		87.2		48.9		72.9	
Age, years									
> 21	185 (17.5)	23.6	0.005	33.9	0.173	23.0	0.002	33.5	0.002
22	163 (15.5)	28.7		35.5		31.9		39.3	
23	196 (18.6)	38.4		46.8		41.3		48.0	
24	175 (16.6)	25.7		32.6		37.0		39.4	
25	128 (12.1)	29.6		38.9		29.9		38.3	
≥ 26	208 (19.7)	18.4		34.4		38.5		52.4	
Sex									
Male	793 (74.3)	25.5	0.100	34.8	0.010	36.8	0.005	44.0	0.153
Female	274 (25.7)	31.5		44.7		27.3		39.1	
Paternal education									
Did not complete high school	238 (23.2)	25.7	0.208	32.4	< 0.001	36.4	0.197	45.4	0.001
Completed high school	346 (33.7)	24.5		30.1		29.6		33.5	
Completed college or higher	442 (43.1)	30.7		47.1		33.9		45.7	
Monthly household income, SAR[b]									
0–5000	424 (40.7)	22.3	< 0.001	26.6	< 0.001	31.5	< 0.001	36.6	< 0.001
5001–9000	374 (35.9)	20.0		36.9		28.2		39.8	
≥ 9001	245 (23.5)	43.5		53.0		46.5		56.3	
No. of others living at home									
0–4	420 (39.3)	18.0	< 0.001	26.7	< 0.001	34.1	0.806	40.7	0.548
5–6	315 (29.5)	32.2		42.4		33.2		43.2	
≥ 7	334 (31.2)	33.5		45.6		35.6		44.6	
Pocket money spent monthly, SAR[b]									
0–500	274 (26.0)	11.8	< 0.001	15.7	< 0.001	17.5	< 0.001	21.9	< 0.001
501–1000	256 (24.3)	26.4		42.5		31.5		46.9	
1001–2000	277 (26.3)	37.2		46.3		51.8		57.0	
≥ 2001	247 (23.4)	32.3		43.8		36.9		44.1	
Urban dwelling									
City	982 (92.4)	26.2	0.185	35.8	0.027	33.5	0.175	41.6	0.116
Village	81 (7.6)	34.6		50.9		41.0		50.6	
Living arrangement									
With parents	951 (89.6)	24.2	< 0.001	33.3	< 0.001	32.1	< 0.001	40.1	< 0.001
Other	110 (10.4)	50.7		71.4		50.9		62.7	

Calculated using χ2 analyses comparing proportion of users in each sociodemographic category.
[a]Values may not add up to 100 due to rounding.
[b]SAR 1 = US$ 0.37

Table 2 Multivariable analyses comparing associations among current waterpipe and cigarette smokers[a]

Participant characteristic	AOR (95% CI) for waterpipe tobacco smoking b		AOR (95% CI) for cigarette smoking b	
	Current use	Ever use	Current use	Ever use
College				
Basic sciences	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)
Medical sciences	0.57 (0.28–1.14)	0.61 (0.31–1.19)	1.16 (0.70–1.94)	0.89 (0.54–1.45)
Engineering	0.39 (0.19–0.81)	0.40 (0.20–0.80)	0.63 (0.37–1.09)	0.66 (0.40–1.09)
Humanities	0.67 (0.29–1.11)	0.57 (0.30–1.07)	0.76 (0.46–1.27)	0.67 (0.41–1.08)
Year				
1	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)
2	1.23 (0.44–3.42)	0.97 (0.38–2.48)	0.40 (0.19–0.84)	0.45 (0.23–0.89)
3	1.32 (0.46–3.75)	1.08 (0.43–2.70)	0.43 (0.20–0.91)	0.52 (0.26–1.03)
4	1.55 (0.50–4.79)	0.62 (0.23–1.71)	0.24 (0.11–0.54)	0.25 (0.12–0.54)
5	0.71 (0.23–2.25)	0.44 (0.16–1.21)	0.25 (0.11–0.58)	0.24 (0.11–0.54)
6	8.88 (1.78–44.26)	29.98 (5.47–64.23)	0.64 (0.17–2.33)	4.05 (1.11–14.76)
Age, years				
18–21	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)
22	1.39 (0.55–3.48)	1.27 (0.54–3.01)	2.19 (1.08–4.45)	1.80 (0.95–3.41)
23	1.66 (0.62–4.48)	2.31 (0.92–5.79)	3.67 (1.73–7.78)	3.34 (1.68–6.61)
24	1.61 (0.57–4.56)	2.45 (0.92–6.53)	4.46 (2.01–9.87)	4.06 (1.96–8.43)
25	1.56 (0.53–4.61)	2.73 (1.00–7.50)	2.93 (1.26–6.82)	3.09 (1.42–6.72)
≥ 26	0.84 (0.27–2.62)	1.83 (0.65–5.15)	1.89 (0.78–4.57)	3.13 (1.42–6.93)
Sex				
Male	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)
Female	1.09 (0.54–2.19)	0.88 (0.45–1.70)	0.38 (0.22–0.67)	0.75 (0.50–1.13)
Paternal education				
Did not complete high school	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)
Completed high school	0.95 (0.48–1.86)	0.75 (0.40–1.44)	0.98 (0.60–1.61)	0.66 (0.41–1.05)
Completed college or higher	0.51 (0.25–1.06)	0.75 (0.38–1.50)	0.61 (0.36–1.03)	0.56 (0.34–0.91)
Monthly household income, SAR [c]				
0–5000	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)
5001–9000	0.40 (0.20–0.81)	0.73 (0.38–1.39)	0.77 (0.46–1.29)	0.82 (0.51–1.33)
≥ 9001	1.83 (0.87–3.84)	1.95 (0.96–3.98)	2.12 (1.20–3.75)	2.30 (1.34–3.96)
No. of others living in the home				
0–4	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)
5–6	2.53 (1.44–4.44)	2.84 (1.67–4.81)	1.02 (0.68–1.55)	1.14 (0.77–1.69)
7 or more	3.49 (1.98–6.14)	4.46 (2.62–7.59)	1.27 (0.84–1.92)	1.38 (0.94–2.04)
Pocket money spent monthly, SAR [c]				
0–500	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)
501–1000	2.44 (1.10–5.40)	4.76 (2.27–10.02)	2.08 (1.17–3.70)	3.29 (1.93–5.61)
1001–2000	10.40 (4.87–22.18)	9.23 (4.44–19.16)	5.01 (2.82–8.90)	4.73 (2.74–8.17)
≥ 2001	4.69 (1.99–11.05)	3.73 (1.64–8.47)	2.41 (1.25–4.65)	2.12 (1.14–3.94)
Urban living				
City	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)
Village	1.42 (0.48–4.23)	1.15 (0.39–3.37)	1.11 (0.51–2.44)	1.27 (0.59–2.72)
Living arrangement				
With parents	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)	1.0 (Ref)
Other	2.85 (1.17–6.93)	3.40 (1.38–8.36)	2.11 (1.08–4.11)	1.82 (1.05–3.48)

Bold values are significant.

[a]Values may not add up to 100 due to rounding.

[b]Multivariable analyses controlled for all variables in the table and were adjusted for clustering of individuals within institutions.

[c]SAR 1 = US$ 0.37.

current waterpipe smokers did not differ significantly relative to that of cigarette smokers. As described below, the prevalence of tobacco use among students of Taibah University is similar to that reported in other universities in the country, indicating the ineffectiveness of banning tobacco products in the city for reducing tobacco use among students.

Several reports have examined the prevalence of tobacco use in Saudi Arabia. A 2013 survey of 10 735 individuals aged ≥ 15 years (5482 women and 5253 men) showed that current cigarette smoking was 12.2%, while daily waterpipe smoking was reported by 4.3% of the population (7.3% of men and 1.3% of women) (24). A study of dental students at King Saud University in Riyadh showed that the current prevalence of all forms of tobacco smoking was 27.6% in male students and 2.4% in female students (19). The study also showed that most smokers used waterpipe only (51.5%), followed by both waterpipe and cigarettes (25%), or cigarettes only (23.5%). A study of female college students in the Dammam area showed that current smoking rate was 8.6%, and 43.2% of smokers were waterpipe users (25). In addition, waterpipe smoking was reported to reach 37% among healthcare university students in Saudi Arabia (26) and 36% among dental practitioners in the Medina area (27).

Among secondary school children in Riyadh, current smoking was reported by 28.6% of the students (17). Similar numbers were reported among schoolchildren at Riyadh and Al-Hassa regions of Saudi Arabia (16). A previous study in another Saudi city before the Medina city ban reported a prevalence for current tobacco smoking of 25.3% (28). In the current study, waterpipe use was 24.2% and cigarette smoking 31.9%. Thus, prohibiting selling tobacco products in Medina did not lower prevalence of cigarette and waterpipe tobacco smoking compared with that in other Saudi regions, and in some cases it was even higher. Importantly, according to the law, the ban is restricted to selling tobacco products; however, no fines are imposed on individuals who smoke inside the city. An assessment done in Mecca in 2008 showed that only 75% of stores complied with the no sale ban (29), while no such evaluation was carried out in Medina. In addition waterpipe and cigarette smokers may bring their products with them and may also smuggle them in for others.

A similar ban on tobacco sales was imposed in Bhutan in 2004. Sixty-three percent of those surveyed as part of an International Tobacco Control study reported purchasing their cigarettes from Bhutan, with sales taking place in a concealed manner, a lack of proper enforcement and availability of smuggled products (30). However, in Bhutan other stringent tobacco control measures such as bans on smoking in all indoor areas as well as outdoor public places, bans on advertising and promotions, and increased taxation on cigarettes imported for personal use were in place. In fact, the rate of current tobacco use in Bhutan in 2014 according to a STEPwise survey was 25% (31). To date, in line with the implementation of the World Health Organization (WHO) Framework Convention of Tobacco Control (FCTC), which is an international binding public health treaty on tobacco control, more comprehensive tobacco control policies have been evaluated globally and have repeatedly shown to be successful in decreasing smoking rates. These policies include bans on smoking indoors with penalties for violation, bans on promotion and advertising, as well as larger pictorial warnings on all tobacco products. More in-depth evaluations of tobacco sales bans, such as those in Mecca, Medina and Bhutan, are needed to build evidence and further shed light on the effectiveness of this policy in decreasing tobacco consumption as a stand-alone policy, independent of other tobacco control policies.

The current findings showed that waterpipe and cigarette tobacco use was associated with university level, age, monthly household income, number of others living in the home and living away from parents. However, gender was associated only with cigarette smoking but not waterpipe use, indicating social acceptance of waterpipe use among women in the region (32). Gender and age were found to be associated with smoking among Saudi smokers (24). Having smoker friends and being male were the highest risk factors for tobacco use among dental students at King Saud University in Riyadh (33). A family member smoker was the main factor associated with smoking among female students in Dammam city (25). Amin et al. (16) showed in 2010 that gender, age and having relatives and friends as smokers were among the major factors associated with waterpipe smoking. In other countries in the region, gender, income, living away from parents and having relatives/friends as smokers were among the risk factors for waterpipe/cigarette smoking (3,22,23,34,35). Thus, risk factors for tobacco use are shared among university students in Taibah University and other local and regional universities.

Among the limitations of the current study was that we did not examine prevalence of tobacco use among Taibaih University students in branches other than Medina main campus where tobacco sales are allowed. In addition, the study was cross-sectional; therefore, change in tobacco use over several years was not examined.

Conclusion

The current study indicates that waterpipe and cigarette smoking are common among students at Taibah University in Medina, irrespective of the ban on tobacco product sales in that area. However, the results advocate implementation of more comprehensive tobacco control measures such as smoke-free environments, increased taxation of tobacco products, bans on advertising, promotion and sponsorship, and larger pictorial health warnings in line with FCTC and WHO MPOWER measures. Future studies that compare prevalence of tobacco use in Medina and Mecca to that in other Saudi cities (where tobacco sales are not banned) are recommended to shed light on the effectiveness of such bans.

Consommation de tabac et utilisation de la pipe à eau chez les étudiants à l'université en Arabie saoudite : incidence de l'interdiction des ventes de tabac

RÉSUMÉ

Contexte : La consommation de tabac par pipe à eau est une forme de tabagisme qui ne cesse de s'étendre à travers le monde. En 2002, une interdiction sur les ventes de tabac a été adoptée dans les villes saoudiennes de la Mecque et Médine.

Objectifs : La présente étude avait pour but d'analyser la prévalence du tabagisme par cigarette et pipe à eau chez les étudiants de l'université Taibah, plus grand établissement universitaire de Médine dans lequel l'interdiction sur les ventes de tabac est appliquée.

Méthodes : Un questionnaire structuré a été distribué entre février et avril 2015 pour analyser la consommation de tabac chez les étudiants de l'université Taibah.

Résultats : La prévalence de l'utilisation de la pipe à eau à tout moment dans le passé était de 36,04 % contre 24,2 % au moment de l'étude, alors que les chiffres associés à la consommation de cigarettes sont de 42,7 % et 31,9 % respectivement. Cette prévalence est semblable à celle observée lors d'études menées dans d'autres villes saoudiennes où les ventes de tabac sont autorisées. L'analyse multivariée a montré que l'utilisation de la pipe à eau était plus importante chez les étudiants de cycle supérieur, ceux dont les dépenses d'argent de poche excèdent 500 riyals saoudiens (SAR) par mois, ceux dont le foyer dispose d'un revenu mensuel compris entre SAR 5000 et 9000 et dans les foyers comptant au moins cinq personnes. En comparaison, la consommation actuelle de cigarettes était supérieure chez les plus de 22 ans, les étudiants de sexe masculin, ceux dont les dépenses d'argent de poche dépassent SAR 500/mois et ceux vivant loin de chez leurs parents.

Conclusions : Dans l'ensemble, malgré l'interdiction sur les ventes de tabac, la consommation de tabac par pipe à eau et cigarette est toujours courante parmi les étudiants de l'université Taibah à Médine (Arabie saoudite).

تعاطي التبغ والشيشة بين طلاب الجامعة، المملكة العربية السعودية: تأثير حظر مبيعات التبغ

هيثم درادكه، عمر خابور، كارم الزعبي، ريها نقاش، توماس آيسنبيرج

الخلاصة

الخلفية: يُعَدُّ تدخين الشيشة إحدى وسائل استهلاك التبغ التي لا تزال منتشرة حول العالم. وفي عام ٢٠٠٢، تم إقرار حظر مبيعات التبغ في مكة المكرمة والمدينة المنورة بالمملكة العربية السعودية.

الأهداف: هدفت هذه الدراسة إلى فحص معدل انتشار تدخين الشيشة والسجائر بين طلاب جامعة طيبة، التي تُعَد أكبر جامعة في المدينة المنورة حيث طُبِّق حظر مبيعات التبغ.

طرق البحث: استُخدم استبيان هيكلي لتحقيق أهداف الدراسة.

النتائج: أظهرت الدراسة أن معدل انتشار تدخين الشيشة الحالي والدائم ٢٤,٢٪ و٣٦,٠٤٪ على التوالي، بينما تدخين السجائر الحالي والدائم ٣١,٩٪ و٤٢,٧٪ على التوالي. ويُعَد معدل الانتشار هذا مشابه لمعدل الانتشار المُبَلّغ عنه بواسطة الدراسات التي أجريت في المدن السعودية الأخرى المسموح فيها ببيع التبغ. وأوضح التحليل متعدد المتغيرات أن تدخين الشيشة كان أعلى بين طلاب الصفوف العليا، والذين ينتمون لعائلات دخلها الشهري يتراوح بين ٥٠٠٠ و٩٠٠٠ ريال سعودي، والذين يزيد مصروفهم عن ٥٠٠ ريال سعودي/ شهريًا، وعندما يكون عدد الأفراد الذين يعيشون في نفس المنزل ٥ أشخاص أو أكثر. ومن ناحية أخرى، كان معدل التدخين الحالي للسجائر أعلى بين الذين تزيد أعمارهم عن ٢٢ عامًا، وبين الطلاب الذكور، وبين الذين يزيد مصروفهم عن ٥٠٠ ريال سعودي/ شهريًا، والذين يعيشون بعيدًا عن آبائهم.

الاستنتاجات: إجمالاً، لا يزال تدخين الشيشة والسجائر، رغم حظر مبيعات التبغ، شائعًا بين طلاب جامعة طيبة في المدينة بالمملكة العربية السعودية.

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Inequalities in access to hospitals: a case study in the Islamic Republic of Iran 1997–2012

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Abstract

Background: Nowadays, the significance of applying Geographic information system (GIS) to survey accessibility to hospitals and understanding disparities in this regard has increased.

Aims: The main aim of this descriptive–analytical research was to study the spatial accessibility of the population of Kermanshah for 3 years 1997 (n=693157), 2007 (n=794863), and 2012 (n=851 405) to hospitals based on age and gender groups through GIS.

Methods: The study was conducted based on network analysis models, mean centre, and standard distance in the environment of Arc/GIS. A standard radius of 1500 metres was set for the medical centres, and a 25-minute walking span was set for the distance of each person from home to the nearest hospital.

Results: The results of the network analysis demonstrated that the hospitals were inaccessible to the populations according to our criteria, and their geographical access to hospitals measured 68.80%, 64.23% and 66.20% in 1997, 2007, and 2012, respectively. Women aged 65 years and above were more at risk in this regard.

Conclusions: Over the total period under study, the results revealed that hospitals were concentrated in the central and southern areas of Kermanshah.

Keywords: Society, geographical access, health management, GIS, hospitals.

Introduction

Equitable access to health services results supports social welfare as well as economic growth and social development (1). Equitable access is a major concern for healthcare managers who argue that mismanagement of the issue has repercussions for mortality and morbidity globally (2–5). Access is defined as the relative ease to reach a given location (6) based on two criteria: availability of services and access to services (7). In this regard, studies have indicated that distance and time are both seen as two crucial factors in access to healthcare services (8,9). To understand access to healthcare services and their appropriate spatial distribution are important for policy-makers and stakeholders from two perspectives: changes in demand and supply, and cost minimization (10).

Today, geographic information systems (GIS) are much in demand and are employed as a tool to facilitate vulnerable and deprived communities' access to hospitals (11), palliative care (12), and primary healthcare needs (13). Hence, given the growing urban population, the demand for healthcare services is increasing and GIS can be employed for better management and thus better access to healthcare services (14). Although urbanization in the Islamic Republic of Iran has witnessed enormous growth over the past four decades, many areas are still medically underserved (15) and Kermanshah is no exception to the rule (15–17).

The Islamic Republic of Iran contains 31 provinces; Kermanshah Province, with an area of approximately 10 000 hectares, is located in the west of the country (18). The population in 2012 was 851 405 and served by 13 hospitals. A city is a densely populated area with political, administrative and historical centralization whose residents are primarily involved in non-agricultural occupations. However, a conurbation enjoys a special economic-political centralization that has a central position at regional or national levels and is simultaneously in the first place in terms of controlling its surrounding region economically (19). In this regard, Kermanshah was a city according to Iranian national classifications in 2011 and was then described as a conurbation as the city developed. Given the prominence of geographical access to hospitals, lack of geographical access to such services and the background of this issue in Kermanshah, the present study aimed to investigate the spatial access to hospitals through GIS from 1997 to 2012 in the conurbation of Kermanshah, Islamic Republic of Iran.

Methods

Study setting and data sources

Data were extracted from the statistical database on

population clusters in Kermanshah for three years (1997, 2007 and 2012), which were based on the population and household census in Kermanshah and compiled by the Statistical Center, Tehran. Hospital information was sourced from the Health Promotion Research Center, Kermanshah University of Medical Sciences. The urban road networks and hospitals based in the region were statistically studied and the topology and spatial relations between the road networks were re-created as map documents using ArcCatalog (Esri, New York, NY, USA), and environmental restrictions applied through Network Analysis. The population of Kermanshah was calculated to be 693 157, 794 863 and 851 405 in 1997, 2007, and 2012, respectively, and was served by 10, 14 and 13 hospitals, respectively.

Study models

This descriptive and analytical research was based on network analysis, mean centre and standard distance models using Arc/GIS 9.3. The models in our research are as follows:

A) Mean centre: Calculated as the mean of geographical latitude and longitude coordinates of all features within the scope of the study using the following equation (20):

$$\text{Equation (1): } = \overline{X} = \sum_{i=1}^{n} \frac{X_i}{n} \quad \overline{Y} = \sum_{i=1}^{n} \frac{Y_i}{n}$$

Where Xi and Yi represent the coordinates of the areas of i and n is equal to the total number of features and areas.

B) Standard distance (SD): A method for examining the level of concentration or dispersion of geographic features around the mean centre and is calculated as following equation (20):

$$\text{Equation (2): } SD = \sqrt{\sum Di^2 / n}$$

Where Di is the distance between two points, the mean centre, and n points.

Data collection

In the current study, the appropriate and actual geographical access to hospitals was assessed. Appropriate access denotes access to hospital services based on the standard used in the study, while actual access denotes the residents' current access ability. Geographical access has been traditionally measured by the distance or (travel time) to the nearest facility. However, geographical access as a measure does not take into account all access variables faced by communities. The GIS platform helps to address most of these problems within the standard radius, and GIS network analysis serves as an advanced method in this regard.

Networks used by Arc/GIS Network Analyst are stored as network datasets. A network dataset is created from the feature source or sources that participate in the network. It incorporates an advanced connectivity model that can represent complex scenarios, such as multimodal transportation networks. It also possesses a rich network attribute model that helps model impedances, restrictions,

and hierarchy for the network. The network dataset is built from simple features (lines and points) and turns. This network has a streets feature class that can act as an edge source, a street intersections feature class acting as a junction source, additional line feature classes that act as edges (streets), and point feature classes that act as junctions (hospitals).

The urban movement practices include walking and using vehicles (21). The movement practices and geographic access to healthcare services and hospitals are often calculated using the estimation of travel time through GIS (22). In the present study, the walking span was considered according to the standard accessibility radius of 1500 m for hospitals (15,19) and taking the velocity of a person's movement while walking to be between 0.75 and 1.25 m/s (average 1 m/s) (23); a walking duration of 25 minutes for each individual from home to the nearest hospital was set in this research. Using the scores of the extension in Network Analysis, some borders were created in the regions where hospitals were supplied. The layers of the statistical blocks containing the demographic data (sex and age) were separated from the original map of the city using intersect and symmetrical difference, thereby the populations in geographical access were assessed based on sex (male and female) and three age groups (0–14, 15–64 and > 65 years) (24).

To identify the areas with and without geographical access, the following instruments were exploited:

A) Intersect: The geometric intersection of the input features is computed. The features or portions of features that overlap in all layers and/or feature classes are exported to the output feature class (25).

B) Symmetrical difference: The geometric intersection of the input and updated features is computed. The features or portions of features in the input and updated features that do not overlap are exported to the output feature class (25).

Results

Figure 1 shows the accessibility status of the target community to the hospitals settled in Kermanshah in 1997, 2007 and 2012. The results demonstrated that despite the increasing number of hospitals from 10 to 13 from 1997 to 2012, the percentage of the population with geographical access to hospitals decreased (Figure 1), and therefore was considered a demonstration of inequity in access to hospitals. The results also revealed that the hospitals were inaccessible to populations according to our criteria, and the percentage of the population without geographical access rose (68.80%, 64.23% and 66.20% in 1997, 2007 and 2012, respectively) (Table 1).

For the 0–14 age group, 39.11% did not have any geographical access to hospitals in 1997 according to our criteria, which dropped to 23.54% in 2007 and 20.56% in 2012. For the 15–64 age group, the percentage without geographical access to hospitals according to our criteria was 56.19% in 1997, rising to 71.08% in 2007 and 74.60% in 2012. For the age group 65 years and above, 4.70% did
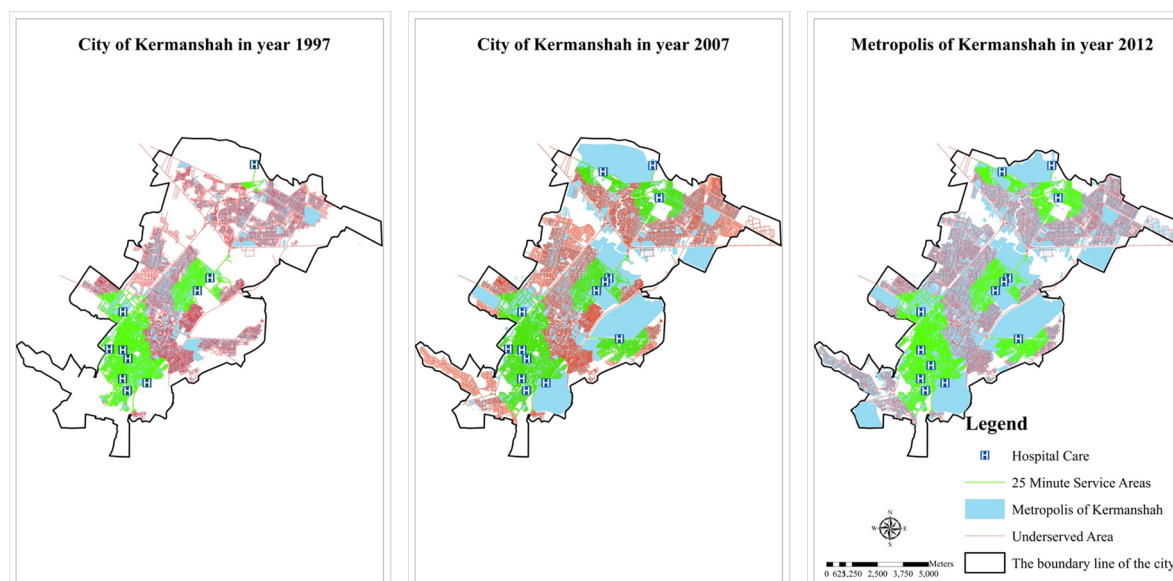
Figure 1 The spatial distribution of Hospitals and areas within or outside their coverage in the Kermanshah in 1997, 2007–2012

not have any geographical access to hospitals in 1997 according to our criteria, rising to 5.38% in 2007, but falling to 4.84% in 2012 (Table 1 and Figure 2).

The results revealed that the mean centre of all hospitals overlapped with the geographical centre of the city during the mentioned periods of study, indicating inequity in access to hospitals according to our second criteria in this regard. However, the mean centre was affected by two hospitals established in the northern area of the city in 2007. Additionally, the mean centre was affected by the establishment of hospitals in the southern area of the city in 2012. Furthermore, based

Table 1 Population with or without access to medical centres in terms of gender and age groups in Kermanshah in 1997, 2007–2012

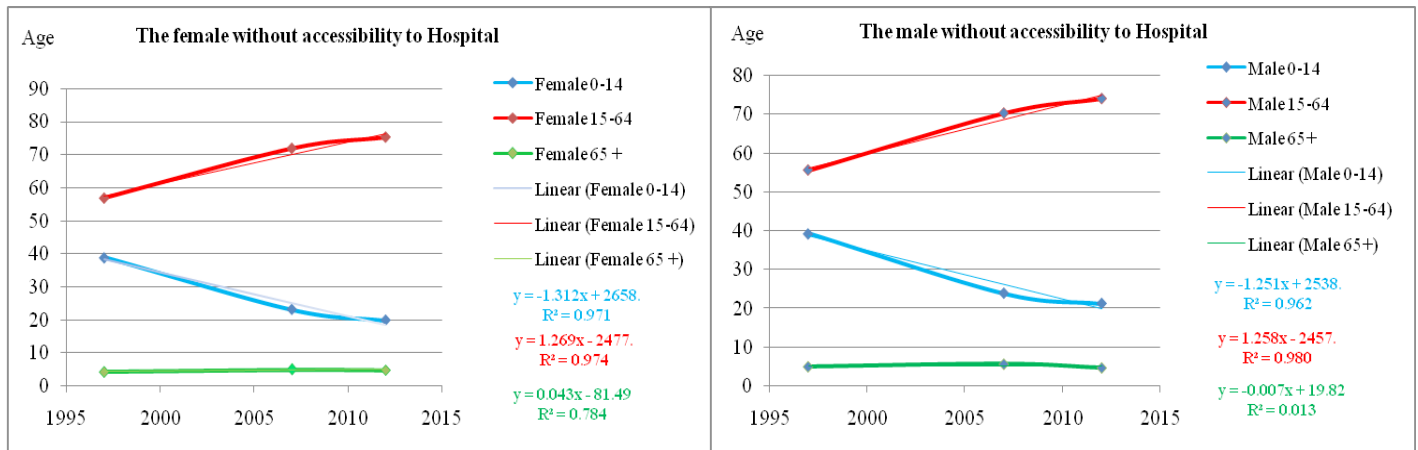| Year		1997			2007			2012		
Access	Age Group	Female No. (%)	Male No. (%)	Both Sexes No. (%)	Female No. (%)	Male No. (%)	Both Sexes No. (%)	Female No. (%)	Male No. (%)	Both Sexes No. (%)
Without Access	0-14	85666 (38.88)	89997 (39.32)	175663 (39.11)	57528 (23.14)	62692 (23.93)	120220 (23.54)	55861 (19.85)	60034 (21.26)	115895 (20.56)
	15-64	125153 (56.81)	127238 (55.59)	252391 (56.19)	178647 (71.86)	184230 (70.33)	362877 (71.07)	211828 (75.26)	208690 (73.94)	420518 (74.60)
	>65	9497 (4.31)	11645 (5.09)	21142 (4.70)	12416 (5)	15053 (5.74)	27469 (5.38)	13771 (4.89)	13529 (4.80)	27300 (4.84)
	total	220316 (100)	228880 (100)	449196 (100)	248591 (100)	261975 (100)	510566 (100)	281460 (100)	282253 (100)	563713 (100)
Total population	0-14	129812 (38.14)	136221 (38.61)	266033 (38.38)	87483 (22.48)	94537 (23.31)	182020 (22.90)	82930 (19.43)	88355 (20.81)	171285 (20.11)
	15-64	192633 (56.61)	195413 (55.39)	388046 (55.99)	280484 (72.04)	285804 (70.47)	566288 (71.24)	318632 (74.66)	311910 (73.46)	630542 (74.06)
	>65	17879 (5.25)	21199 (6)	39078 (5.63)	21336 (5.48)	25219 (6.22)	46554 (5.86)	25211 (5.91)	24367 (5.73)	49578 (5.83)
	total	340324 (100)	352833 (100)	693157 (100)	389303 (100)	405560 (100)	794862 (100)	426773 (100)	424632 (100)	851405 (100)
Proportion of age groups to the whole population	0-14	18.73	19.65	38.38	11.01	11.89	22.90	9.74	10.38	20.11
	15-64	27.79	28.19	55.99	35.29	35.96	71.24	37.42	36.63	74.06
	>65	2.58	3.06	5.64	2.68	3.17	5.86	2.96	2.86	5.83
	total	49.10	50.90	100	48.98	51.02	100	50.13	49.87	100
Proportion of population without access to the whole population	0-14	12.36	12.98	25.34	7.23	7.89	15.12	6.56	7.05	13.61
	15-64	18.05	18.36	36.41	22.48	23.18	45.65	24.88	24.51	49.39
	>65	1.37	1.68	3.05	1.56	1.89	3.45	1.62	1.59	3.21
	total	31.78	33.02	64.80	31.27	32.96	64.23	33.06	33.15	66.21

Figure 2 **Population deprived of access to hospitals in terms of gender and age groups in Kermanshah in 1997, 2007–2012**

on the standard distance, the results revealed that most of the hospitals were concentrated in the central and southern parts of Kermanshah conurbation, and there was a cumulative distribution of hospitals in these areas (Figure 3). Our data in this regard revealed inequity in access to hospitals according to our third criteria in this regard.

Discussion

The present study indicated that geographical access of the target population to hospitals held a downward trend during the total study period. In this regard, several factors might have contributed to this trend, including: 1) the growing rate of population (Table 1), 2) the inappropriate
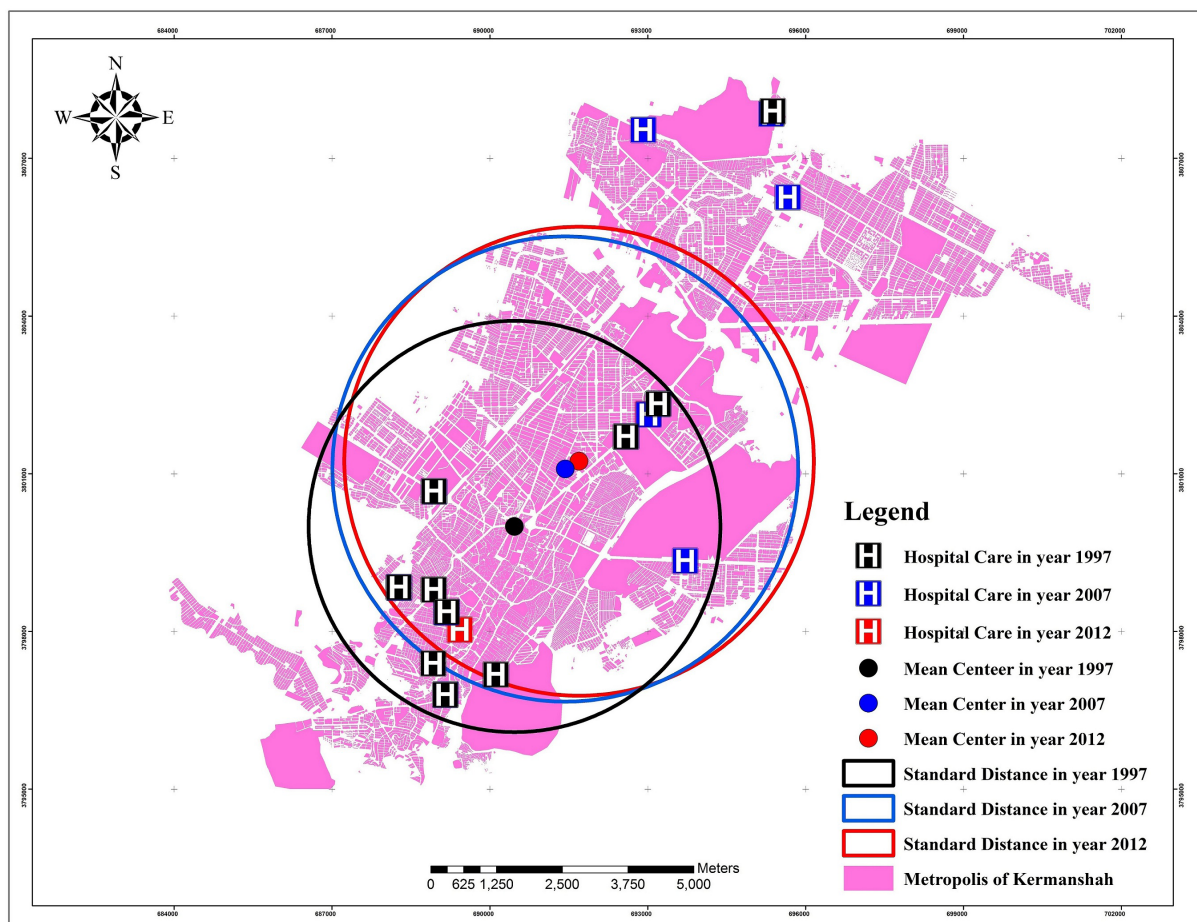
Figure 3 **Mean centre and standard distance of hospitals in Kermanshah in 1997, 2007–2012**

spatial distribution of hospitals across the city, as shown in the present research and other Iranian studies (*15,16*); and 3) migration of people from central city areas to outlying zones due to various reasons including poor quality housing, inefficient transport networks, lack of proper urban facilities, and re-designation of settlements as commercial and/or administrative, but still fall under the coverage of hospitals in Kermanshah (*26*). Moreover, the newly established hospitals did improve the inhabitants' geographical access over the period of study.

Lack of geographical access to such services has been observed in similar studies such as the one conducted in Alabama and Kentucky, United States of America (*27*), which revealed that a 22.9% drop in mortality rates was a direct result of improved availability and accessibility to healthcare services. In addition, the study pointed out that mortality rates were not only a result of demographic characteristics (*28*), but inequity might have also affected the epidemic patterns of disorders and might have resulted in unexpected events (*29*). The issue of appropriate geographical access to hospitals and healthcare centers is not surprising, and it is regarded as a national goal in some countries (*28,30*). Therefore, it is suggested that the healthcare managers of Kermanshah apply such policies towards creating appropriate geographical access to hospitals.

The geographical access of the 0–14 age group to hospitals during the period under study showed that hospitals were inaccessible according to our criteria and held a downward trend (Table 1 and Figure 2). A possible reason for this might be changes in the fertility rates in Kermanshah, thereby influencing the downward trend. Likewise, studies conducted in Kermanshah suggested that the total fertility rate declined from 2.50 in 1997 to 1.72 in 2012 (*31*), thereby reducing this age group and affecting the results of the present study.

Inequalities in geographical access to healthcare services, i.e. hospitals, especially with regard to children, could have adverse repercussions, including growing mortality rates and outpatient referrals. In a study performed by Wang (2012), he concluded that the number of visits to clinics reduced by 34% per kilometre of rise in the distance of inhabitants from the medical centres through applying the variable of the nearest clinic to each child (*6*).

The age group of > 65 years experienced an upward trend of non-accessibility from 4.70% in 1997 to 5.38% in 2007, yet witnessed a downward trend from 5.38% in 2007 to 4.84% in 2012 (Table 1 and Figure 2). Possible explanations for this include: 1) reducing age group population; 2) migration of young and middle-age groups city centre areas where most hospitals are located, to areas without access according to our criteria (*32*); and 3) geographical access to healthcare services is a high priority for the elderly population of the target community; the results of studies performed in the United States and Spain demonstrated that the elderly population had a tendency to live in the immediate vicinity of medical facilities (*27,33*). Furthermore, in another study it was shown that

long travel intervals between the place of residence for the elderly and medical centres created substantial physical obstacles for them (*34*).

Our results revealed that the elderly population without geographical access to hospitals held an upward trend, possibly ensuing from a rise in this demographic (Table 1 and Figure 2) since, according to statistical data, Kermanshah has recently attracted rural migrants from other western provinces of the country, such as Ilam and Kurdistan (*26,35*).

According to our data, women had greater inaccessibility to hospitals according to our criteria (Table 1 and Figure 2). The results of studies performed in the United States also demonstrated that women had the least access to medical centres (*36*), which was concurrent with the results of a study conducted by Buor (2003) (*8*). The appropriate standard of health management is of particular importance for this group, especially those at a reproductive stage in life, which has generational repercussions.

Limitations

One of the limitations of the present study was the utilization of health services, i.e. hospitals, being affected by personal characteristics, such as age, social class, economic status, transportation opportunities, etc., which were all excluded from the present study. Moreover, geographical access is also affected by other determinants such as traffic density, weather conditions and time constraints. Accordingly, it is recommended that these factors be considered in future studies.

Conclusion

According to the results of the present study, there were inequities in geographical access to hospitals in Kermanshah. The results also demonstrated that a large number of people were medically underserved, thereby holding an upward trend in this regard. Female and elderly groups were more at risk, especially females in the 15–64 age group that witnessed an upward trend, and was not resolved by newly established hospitals, as well as the fact that the majority of hospitals were concentrated in the central and southern parts of Kermanshah conurbation. GIS is a useful tool for evaluating inequality in geographical access to hospitals and can be utilized to address problems in planning and policy-making regarding the proper distribution of medical facilities. Our data showed that hospitals were not distributed in proportion to the population distribution. Consequently, it is recommended that more attention be paid to this issue by healthcare managers and GIS be employed towards establishing new hospitals appropriately in the future.

Inégalités en matière d'accès aux hôpitaux : étude de cas en République islamique d'Iran 1997-2012

Résumé

Contexte : De nos jours, il devient de plus en plus important d'appliquer le système d'information géographique (GIS) aux études d'accessibilité aux hôpitaux et de comprendre les disparités associées.

Objectifs : La présente étude analytique et descriptive avait pour objectif principal d'examiner, au cours de trois années différentes (1997 [n = 693157] ; 2007 [n = 794863] et 2012 [n = 851405]), l'accessibilité spatiale de la population de Kermanshah aux hôpitaux, sur la base de groupes d'âge et de sexe et au moyen du système (GIS).

Méthodes : L'étude a été menée en utilisant des modèles d'analyse du réseau et des méthodes de mesure des distances moyenne et standard jusqu'aux centres, à l'aide du logiciel d'information géographique ArcGIS. Un rayon standard de 1500 mètres a été déterminé autour des centres médicaux, de même qu'une distance de 25 minutes entre le domicile de chaque individu et l'hôpital le plus proche.

Résultats : Les résultats de l'analyse du réseau ont montré que les hôpitaux étaient inaccessibles pour la population, selon les critères que nous avions définis, et que l'accès géographique des personnes aux hôpitaux était de 68,80 %, 64,23 % et 66,20 % en 1997, 2007 et 2012 respectivement. Les femmes âgées de 65 ans et plus étaient sujettes à un risque plus important à cet égard.

Conclusions : Sur la période couverte par l'étude, les résultats ont révélé que les hôpitaux étaient concentrés dans les zones situées dans le centre et le sud de la ville de Kermanshah.

أوجه عدم المساواة في الوصول إلى المستشفيات: دراسة حالة في جمهورية إيران الإسلامية للفترة ما بين ١٩٩٧ – ٢٠١٢

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الخلاصة

الخلفية: تتزايد حاليًا أهمية تطبيق نظام المعلومات الجغرافية لاستطلاع إمكانية الوصول إلى المستشفيات وفهم التفاوت بهذا الصدد.

الأهداف: لقد كان الهدف الرئيسي من هذا البحث الوصفي–التحليلي هو دراسة إمكانية الوصول المكاني لسكان مدينة كرمانشاه إلى المستشفيات، على مدار ٣ سنوات: عام ١٩٩٧ (١٥٧ ٦٩٣ =n)، وعام ٢٠٠٧ (n=٧٩٤٨٦٣)، وعام ٢٠١٢ (٨٥١ ٤٠٥n=)، وذلك بناءً على الفئات العمرية والنوع، وباستخدام نظام المعلومات الجغرافية.

طرق البحث: أُجريت الدراسة بناءً على نماذج التحليل الشبكي، ومركز المتوسط، والمسافة القياسية في بيئة نظام Arc/GIS. وتم تحديد نصف القُطْر المعياري ١٥٠٠ متر للمراكز الطبية، ونطاق ٢٥ دقيقة للمسافة التي يمشيها كل شخص من منزله إلى أقرب مستشفى.

النتائج: أوضحت نتائج التحليل الشبكي صعوبة وصول السكان إلى المستشفيات وفقًا للمعايير الخاصة بنا، وأن قدرتهم على الوصول جغرافيًا للمستشفيات بلغت ٦٨,٨٠٪ و٦٤,٢٣٪ و٦٦,٢٠٪ في الأعوام ١٩٩٧ و٢٠٠٧ و٢٠١٢ على التوالي. وأن النساء اللاتي كانت أعمارهن ٦٥ عامًا فأكثر أكثر تعرضاً للخطر بسبب ذلك.

الاستنتاجات: على مدار المدة قيد الدراسة، أوضحت النتائج أن المستشفيات متركزة في المناطق المركزية والجنوبية في مدينة كرمانشاه.

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A review of family planning policies and services in WHO Eastern Mediterranean Region Member States

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Abstract

Background: Family planning (FP) is a cost-effective public health and development intervention. Eastern Mediterranean Region (EMR), has one of the lowest contraceptive prevalence rate (CPR) and high unmet need for family planning.

Aims: The aim of this review is to assist Member States in highlighting those areas that need strengthening to improve quality of FP services in information and commodity supplies.

Methods: A structured questionnaire focusing on FP services was sent to 22 Member States of the WHO Eastern Mediterranean Region between August and December, 2015. Sixteen (73%) countries responded.

Results: Family planning services are part of the basic health benefits package and are delivered at hospitals, primary healthcare centres and outreach clinics to all women regardless of their ability to pay in the majority of Member States. In 16 Member States the family planning/birth spacing (FP/BS) counselling and FP methods are provided by general practitioner/family doctor, nurses and midwives. In many Member States the services are integrated with child health, STI and HIV services. In 16 Member States FP/BS is part of the pre- and in-service training programmes for all cadres of healthcare providers. FP/BS is actively promoted through effective social marketing of FP/BS methods in two thirds of Member States.

Conclusions: The findings of the survey indicate that national policies and programmes endorse FP to achieve national targets. Despite progress in many areas in FP services, many countries still struggle with weak implementation of FP programmes. There are also policy gaps for key vulnerable groups including the poor, the disabled and adolescents. This review highlighted policy and programmatic gaps required to strengthen those FP services that can help improve maternal and infant health outcomes. Special programmes for adolescents, refugees and persons with disabilities need to be streamlined and strengthened.

Keywords: family planning, contraceptive, services, Eastern Mediterranean Region

Introduction

Currently there are an estimated 214 million women (1) in low- and middle-income countries who want to delay or prevent pregnancy but are not using a modern method of contraception.[1] Family planning – especially modern methods of family planning or contraception (1) – are considered to be one of the most health-promoting and cost-effective activities in public health, with the potential to avert approximately 30% of maternal deaths and 10% of child death (2). One key pathway to better health outcomes is to reduce the high number of unintended pregnancies and unwanted births, since each pregnancy and birth carries a health risk for the mother. Particularly in areas where obstetric services are poor, maternal mortality is still high (2).

Recent global surveys estimate that 55·7 million abortions occurred worldwide each year from 2010 to 2014. Out of these, 25·1 million (45·1%) abortions each year were unsafe, with 24·3 million (97%) of these in low- and middle-income countries (3). The annual number of maternal deaths is estimated to be 303 000 in 2015, of which 28 000 are in Eastern Mediterranean region, with a life time risk maternal death of 1 in 170, compared to 1 in 3400 in Europe (3).

Family planning has clear health benefits, principally the prevention of unintended pregnancies and reductions in maternal and infant mortality and morbidity (4). It is estimated that if all women who want to avoid a pregnancy used modern contraceptives and all pregnant women and newborns received care at the standards recommended by WHO, the benefits would be dramatic. Providing access would prevent 67 million unintended pregnancies and reduce induced abortions by 13 million. It would reduce maternal deaths by 76 000 per year, newborn deaths from 2.9 million to 660 000 per year, and HIV infections in newborns from 130 000 to 9 000 (4).

The prevalence of contraceptive use among women aged 15–49 years who were married or in a consensual union increased globally from 55% in 1990 to 64% in 2012. Unmet need – defined as the proportion of women who are married or in a union who want to stop or postpone childbearing but are not using contraception, also declined (Figure 1) (5).

It is a challenge to meet this SDG 3, target 3.7, i.e., by 2030 ensure universal access to sexual and reproductive health care services, including for family planning, information and education, and the integration of reproductive health into national strategies and programs (*6*) in the EMR as it has the second lowest contraceptive prevalence rate CPR (48%) and second highest unmet needs of FP globally, after the Africa (Figure 1). However, regardless of the well-established FP benefits, many governments in low- and middle-income countries have made only limited investments in these programmes since priority was given to donors' interests and other areas (7) (Table 1).

An earlier survey was conducted in 2009 (*8*); however, due to recent changes and upheavals in several countries of the Region it was considered important to take review the existing policies and programmes in order to improve evidence-based policies for the future. Thus, the main objective of this survey was to review the FP policies, identify and map evidence-based programme practices in EMR Member States in order for their governments to design better FP strategic planning and policy.

Methods

The survey was conducted by the WHO Regional Office for the Eastern Mediterranean (WHO/EMRO) in collaboration with WHO headquarters, country offices and national ministries of health. A descriptive study design was used to landscape the policies and implementation status of evidence-based practices in FP in EMR Member States. The tool used for the survey was a modified version of the questionnaire used in the 2009 survey in EMR for the FP status assessment (*8*). A total of 77 questions in the survey focused on: FP policies and guidelines present in the available health systems, integration of services, commodity security, staff competencies in FP, access to vulnerable groups, policies and strategies on family planning promotion, and programme monitoring and evaluation.

The survey was conducted between August and December 2015. The questionnaire was sent to 22 EMR Member States of which 16 responded; these were:

Afghanistan, Egypt, Iraq, Jordan, Lebanon, Morocco, Oman, Qatar, Pakistan, Palestine, Saudi Arabia, Somalia, Sudan, Syrian Arab Republic, Tunisia and Yemen. Six countries did not respond; these were: Bahrain, Djibouti, Islamic Republic of Iran, Kuwait, Libya and the United Arab Emirates. The survey was completed by WHO country offices in consultation with Ministries of Health. No response to three reminders was considered as unwillingness to participate in the survey. The survey data from 16 Member States was checked for any errors before analysis. The data was entered in Microsoft excel sheet and analysed using calculated frequencies and percentages. Three researchers analyzed the questionnaires. The answers of the questionnaires were entered in the excel sheet. The numbers of "yes" and "no" answers of each topic and their proportions were calculated.

Results

The questionnaire responses were checked by WHO/EMRO. Based on the questionnaire, we were able to analyse these responses, as presented below. Compared to previous surveys, a greater number of countries responded as shown in Table 2.

The result section is divided into seven thematic areas, as follows:

1. Polices, regulations and guidelines ensuring the quality of FP/BS services

All 16 Member States involved in the survey have created up-to-date minimum standards for the national regulation of health facilities to insure the safety of FP/BS services. Fifteen Member States regularly update national guidelines and protocols for FP/BS counseling and service provision that are evidence-based; only Lebanon had no guidelines for counseling although minimal counseling is included in the reproductive health service delivery guidelines. A competency-based national qualification system that certifies health workers to provide quality FP/BS counseling and services is in place in nine Member States; an effective and functional quality assurance system is in place to ensure the quality of provided
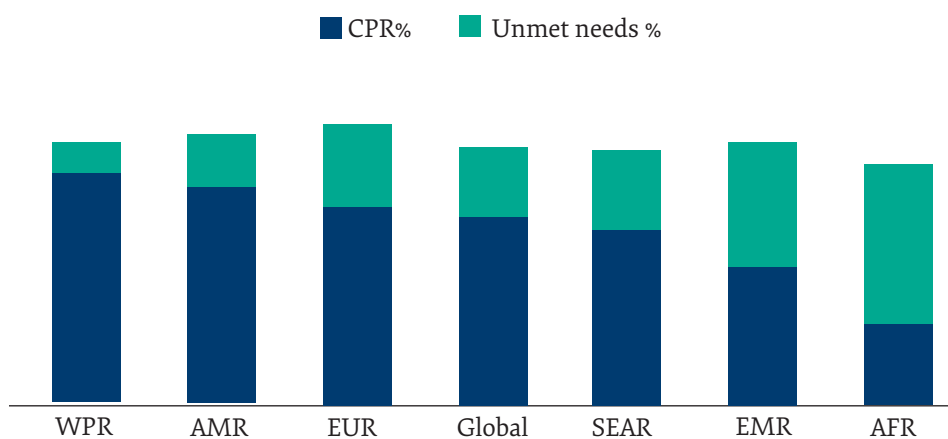

CPR%   **Unmet needs %**

Figure 1 **Contraceptive prevalence, unmet need and total demand for family planning: globally and by WHO region, 2012.**

Table 1 Eastern Mediterranean Region Member States: an overview of family planning

Eastern Mediterranean Region Member States	Contraceptive prevalence rates (%)	Unmet need for family planning (%)
Afghanistan	21	–
Bahrain	–	–
Djibouti	19	–
Egypt	60	12
Iran (Islamic Republic of)	77	06
Iraq	53	08
Jordan	61	12
Kuwait	–	–
Lebanon	–	–
Libya	42	27
Morocco	67	11
Oman	24	56
Pakistan	35	20
Qatar	38	06
Saudi Arabia	24	–
Somalia	–	–
Sudan	09	29
Syrian Arab Republic	54	16
Tunisia	63	07
United Arab Emirates	–	–
Yemen	–	–

World health statistics 2015. http://apps.who.int/iris/bitstream/10665/170250/1/9789240694439_eng.pdf?ua=1&

FP/BS services in 11 Member States; and a supportive supervision system is in place to support service providers and improve their performance in 14 Member States at primary health care level, and 12 Member States at secondary health care level.

2. Integrated FP/BS services and mix of service delivery points

All 16 Member States involved in the survey have stated that FP/BS services are part of their basic health benefit package and are delivered at the primary healthcare level. All involved in the survey have stated that a mix of contraceptives is part of the country's essential drug list. Most of the Member States responded that oral pills, intra-uterine devices, male condoms, injectables and implants are the most common contraceptives. Only six Member States (Lebanon, Morocco, Oman, Qatar, Saudi Arabia and Tunisia) have responded that family planning counseling and methods are provided in preconception care. Ten Member States (Afghanistan, Egypt, Iraq, Jordan, Pakistan, Palestine, Somalia, Sudan, Syrian Arab Republic and Yemen) have responded no such services are provided in preconception care. Fourteen Member States stated that FP/BS counselling is provided by nurses. Only two Member States, Pakistan and Saudi Arabia, responded that nurses does not provide such services.

All countries provided services for surgical methods such as tubal Ligation and vasectomy. Although the question was asked and emergency contraception (EC)

is present in most countries, no-one explicitly provided information on it.

3. Commodity security

FP/BS commodity security is ensured through effective supply chain management all over the country by 13 Member States. Only three countries (Somalia, Syrian Arab Republic and Yemen) responded ineffective FP supply chain management all over the country due to humanitarian crisis. FP/BS commodity security is ensured through data-based planning by all Member States except Somalia, and is also supported by well-functioning contraceptive logistics management information system by all Member States except Iraq, Lebanon and Somalia. The supply chain management is generally carried out by the facility staff, but not all staff is formally trained.

4. Well-trained staff

Pre-service and in-service training programmes exist in technical schools for midwives, nurses and female health visitors in all Member States, except in Saudi Arabia. It was also noted that 14 Member States (excluding Jordan and Somalia [only in Puntland]) responded that FP/BS is part of pre-service as well as in-service training programmes for healthcare providers (doctors, nurses, female health visitors and community health workers) in medical universities. Also 15 Member States (excluding Palestine and Somalia) responded that FP training guidelines and materials are evidence-based and are updated

Table 2 Comparison of responses on selected variables between 2009 and 2015 by EMR Member Dates

Selected variables	Result in 2015	Result in 2009*
FP safety regulation at Health facility α	16/16 (100%)	16/18 (89%)
FP guidelines and protocols updated β	15/16 (94%)	13/18 (72%)
FP as basic package and delivered at Primary Health Care level	16/16 (100%)	17/18 (94%)
Mix contraceptives in essential drug list	16/16 (100%)	16/18 (89%)
FP counselling and methods in preconception care	6/16 (38%)	NA
FP counselling by nurse	14/16 (88%)	14/18 (78%)
FP effective supply chain management all over the country	13/16 (81%)	12/18 (67%)
FP pre- and in-service training programme in universities	14/15 (93%)	14/18 (78%)
Training guidelines and materials: evidence-based	14/15 (93%)	15/18 (83%)
FP special program for adolescents	8/16 (50%)	6/18 (33%)
FP special program for displaced or refugees	12/13 (92%)	9/18 (50%)
FP special program for poor/disadvantaged	10/15 (67%)	9/18 (50%)
FP promoted through Effective social marketing	10/15 (67%)	12/18 (67%)
FP promoted through community mobilization efforts	12/15 (80%)	11/18 (61%)
HMIS system collects and analyses FP data	15/16 (94%)	13/18 (72%)

Please note the 2009 data are taken from a previous regional survey on FP (8).

α*: This refers to utilization of WHO MEC standards in prescription of contraceptives to clients.*

regularly. Fifteen Member states excluding Syrian Arab Republic) stated that training guidelines on quality of contraceptive care standards are evidence based and updated regularly.

5. Special programmes for vulnerable groups

This programme primarily includes in-service training and orientation courses on the needs of adolescents and those with disabilities. Only half of Members States responded that they have FP special programme for adolescents and for those with disabilities. All Member States except Egypt (Morocco, Oman and Saudi Arabia did not reply) stated having special FP programmes for displaced populations or refugees. Ten Member States (Egypt, Lebanon, Morocco, Oman, Qatar, Pakistan, Palestine, Somalia, Syrian Arab Republic and Tunisia) stated having a FP special programme for the poor and disadvantaged. It was also interesting to note that only nine Member States had special programmes to meet the needs of rural and peri-urban and slum populations. In only 10 Member States is there a special component to meet the needs of males, which was absent in Afghanistan, Egypt, Iraq, Jordan, Oman, Sudan and Yemen.

6. FP/BS promotion

Ten Member States (Afghanistan, Egypt, Morocco, Oman, Qatar, Pakistan, Sudan, Syrian Arab Republic, Tunisia and Yemen) have stated that FP is promoted through effective social marketing. Community mobilization efforts was used in 12 Member States (Afghanistan, Jordan, Morocco, Oman, Qatar, Pakistan, Palestine, Somalia, Sudan, Syrian Arab Republic, Tunisia and Yemen), while community education (including a wide distribution of quality education and information materials) was the norm in Afghanistan, Egypt, Iraq, Morocco, Oman, Qatar, Palestine, Somalia, Sudan, Syrian Arab Republic, Tunisia and Yemen.

7. Programme planning, monitoring and evaluation

Regarding health management information system (HMIS) collection and analysis of FP data, 15 Member States (except Lebanon) responded that evidence-based indicators are selected to monitor and evaluate FP/BS programmes. Jordan remarked that the selection of evidence-based indicators to monitor and evaluate FP/BS programme were well formulated in its FP strategy 2013–2017.

Discussion

Globally, the Eastern Mediterranean Region has the second lowest contraceptive prevalence rate (48%) and second highest unmet needs of family planning (18%) after the African Region. The EMR Member States include a broad range of countries with varying income levels, including high-income states (Bahrain, Kuwait, Oman, Saudi Arabia, Qatar, United Arab Emirates) to upper middle-income states (Islamic Republic of Iran, Iraq, Lebanon, Libya), lower middle-income states (Djibouti, Egypt, Jordon, Pakistan, Morocco, Sudan, Syrian Arab Republic, Tunisia, Yemen) to low-income economies (gross national income per capita of US$ 1005 or less in 2016) such as Afghanistan and Somalia (8). Based on the contextual background, it is difficult to identify common factors across all countries; however, there are certain factors among lower middle and low-income countries including lack of infrastructure, stock shortages, lack of trained staff, and cost of contraceptive methods that lead to limited access among vulnerable groups. Religious belief is another common denominator for EMR countries and cultural views on family size may also vary that sometimes plays a role for the acceptance and use of contraception.

Our results noted that nine Member States (Afghanistan, Djibouti, Oman, Pakistan, Qatar, Saudi Arabia, Somalia, Sudan and Yemen) have lower CPR

than the regional average, which needs to have priority on national agendas in order to improve the quality and access of services of FP programmes. It is also worth mentioning that unmet needs exceed 20% in 10 Member States, leading to a tremendous burden on reproductive health to achieve the SDG target of ensuring universal access to sexual and reproductive healthcare services, including FP, information and education, and the integration of reproductive health into national strategies and programmes by 2030.

Against this background, this survey will help national schemes identify strengths and weaknesses in FP programmes, while allowing comparison with regional countries regarding best practices in FP and application to improve their own programmes in the coming years. In addition, this survey identified the weaknesses in national programmes and where improvements can be made to increase quality of care and increase access for the vulnerable. It clearly shows that although national guidelines are in place, there are clear policy and programme weaknesses; for example, absence of policies for adolescents, vulnerable populations, and most importantly for men. Member States can make strides to fill these gaps and improve within the existing systems.

In Addition, competency-based national qualification systems certifying health workers to provide quality FP/BS counseling and services was also highlighted as one key issue to ensure better quality of services. National health authorities should advocate and lead the process of appraisal and prioritization for scaling up best practices in FP/BS. Based on available evidence and additional targeted research findings, a country specific action plan should be developed, and an interdisciplinary body is suggested to be established, if not already available.

Despite progress in many areas in FP services, many countries still struggle with weak or nonexistent health information systems, which is crucial for determining and documenting progress. It was also interesting to note that despite the existence of policies, infrastructure and resources, the vital FP indicators do not provide a positive picture of EMR countries. The problem may lie in implementation of national strategies. In this regard, a well-functioning monitoring and evaluation framework will be essential to assess programme effectiveness and make recommendations for further improvements. The findings of this survey were shared with all EMR Members States in a regional meeting.

Conclusions

The findings of the survey indicate that national policies and programmes endorse FP to achieve national targets. Despite progress in many areas in FP services, many countries still struggle with weak implementation of FP programmes. There are also policy gaps for key vulnerable groups including the poor, the disabled and adolescents. This review highlighted policy and programmatic gaps required to strengthen those FP services that can help improve maternal and infant health outcomes. Special programmes for adolescents, refugees and persons with disabilities need to be streamlined and strengthened.

Analyse des politiques et des services de planification familiale dans les États Membres de la Région OMS de la Méditerranée orientale

Résumé

Contexte : La planification familiale est une intervention de santé publique et de développement qui a un bon rapport coût-efficacité. La Région de la Méditerranée orientale affiche l'un des taux les plus faibles de prévalence de la contraception, ainsi que d'importants besoins non satisfaits en matière de planification familiale.

Objectifs : La présente étude avait pour objectif d'accompagner les États Membres dans l'identification des domaines qui doivent être renforcés afin d'améliorer la qualité des services de planification familiale, notamment pour ce qui a trait à l'information et à l'approvisionnement en produits.

Méthodes : Un questionnaire structuré se concentrant sur les services de planification familiale a été envoyé aux 22 États Membres de la Région entre août et décembre 2015. Seize pays (73 %) ont répondu.

Résultats : Les services de planification familiale font partie des paniers de services de santé essentiels et sont proposés dans les hôpitaux, les centres de soins de santé primaires et les cliniques de proximité à toutes les femmes, indépendamment de leur capacité de payer, dans la majorité des États Membres. Dans 16 États Membres, le conseil en planification familiale/espacement des naissances et les méthodes associées est assuré par un médecin de famille/un généraliste, des personnels infirmiers et des sages-femmes. Dans de nombreux États Membres, il est intégré aux services de santé de l'enfant, de prise en charge des infections sexuellement transmissibles et de prévention du VIH. Dans 16 États Membres, la planification familiale/l'espacement des naissances fait partie des programmes de formation initiale et

continue pour toutes les catégories des prestataires de soins. Les méthodes associées font l'objet d'une promotion active grâce à un marketing social efficace dans deux tiers des États Membres.

Conclusions : Les résultats de cette étude indiquent que les politiques et les programmes nationaux approuvent la planification familiale en vue d'atteindre les cibles nationales. Malgré des progrès réalisés dans différents aspects des services de planification familiale, de nombreux pays sont toujours confrontés à une faible mise en œuvre des programmes associés. Des lacunes existent également en matière de politiques pour les groupes vulnérables clés tels que les personnes démunies, les personnes handicapées et les adolescents. la présente analyse a mis en lumière des lacunes politiques et programmatiques qu'il est nécessaire de combler en vue de renforcer les services de planification familiale qui permettent d'améliorer l'état de santé des mères et des enfants. Les programmes spécifiquement destinés aux adolescents, aux réfugiés et aux personnes souffrant de handicap doivent être rationalisés et renforcés.

استعراض سياسات وخدمات تنظيم الأسرة في الدول الأعضاء بإقليم شرق المتوسط لمنظمة الصحة العالمية

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الخلاصة

الخلفية: يُعَدُّ تنظيم الأسرة تدخلاً فعّالاً من حيث التكاليف في مجال الصحة العامة والتنمية. ويوجد في إقليم شرق المتوسط أدنى معدل انتشار لوسائل منع الحمل وأعلى احتياج لم يُلبَّى بعد لتنظيم الأسرة.

الأهداف: هدف هذا الاستعراض هو مساعدة الدول الأعضاء على إلقاء الضوء على المجالات التي تحتاج إلى تعزيز بهدف تحسين جودة خدمات تنظيم الأسرة من حيث المعلومات وإمدادات السلع.

طرق البحث: أُرسل استبيان منظم يركز على خدمات تنظيم الأسرة إلى الدول الأعضاء الاثنين والعشرين بإقليم شرق المتوسط لمنظمة الصحة العالمية في الفترة بين شهري أغسطس/ آب وديسمبر/ كانون الأول ٢٠١٥. وأجاب ستة عشر بلدًا (٧٣٪) على الاستبيان.

النتائج: تُعَدُّ خدمات تنظيم الأسرة جزءًا من مجموعة المزايا الصحية الأساسية، وتُقدم في المستشفيات ومراكز الرعاية الصحية الأولية وعيادات التوعية لجميع النساء بغض النظر عن قدرتهن على دفع رسوم مقابل هذه الخدمات في أغلب الدول الأعضاء. وفي ١٦ دولة عضو، تُقدم استشارات تنظيم الأسرة/ المباعدة بين الولادات ووسائله بواسطة ممارس عام/ طبيب الأسرة والممرضات والقابلات. وفي العديد من الدول الأعضاء، تُدمج هذه الخدمات في خدمات صحة الأطفال وعلاج الأمراض المنقولة جنسيًا وفيروس نقص المناعة البشري. وفي ١٦ دولة عضو، يُعَدُّ تنظيم الأسرة/ المباعدة بين الولادات جزءًا من برامج التدريب قبل الخدمة وأثنائها لجميع الكوادر التابعين لمقدّمي الرعاية الصحية. ويجري تعزيز تنظيم الأسرة/ المباعدة بين الولادات بنشاط من خلال التسويق الاجتماعي الفعّال لوسائله في ثلثي الدول الأعضاء.

الاستنتاجات: تشير نتائج الاستطلاع إلى أن البرامج والسياسات الوطنية تعتمد تنظيم الأسرة بهدف تحقيق الغايات الوطنية. ورغم التقدم المُحرز في العديد من المجالات في خدمات تنظيم الأسرة، لا تزال بعض البلدان تحاول التغلب على ضعف تنفيذ برامج تنظيم الأسرة. وتوجد أيضًا ثغرات في السياسات فيما يتعلق بالفئات الرئيسية المعرضة للخطر، بما يشمل الفقراء وذوي الإعاقة والمراهقين. ويكشف هذا الاستعراض الثغرات في السياسات والبرامج المطلوب معالجتها بهدف تعزيز خدمات تنظيم الأسرة والتي تساعد بدورها في تحسين المخرجات الصحية للأمهات والرضع. كما يجب تنظيم برامج مخصصة للبالغين واللاجئين وذوي الإعاقة وتعزيزها.

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Ultrapure water in haemodialysis: a step towards better quality in Lebanon

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Abstract

Globally the nephrology community is witnessing an increased use of high-flux membranes and ultrapure water in hae-modialysis (HD) units, and in low-and middle-income countries, data are lacking regarding HD water quality. In Lebanon the Ministry of Public Health released a decree calling for a progressive change in the HD water treatment system in order to implement ultrapure water in all dialysis facilities. This article reports on the problems previously encountered regarding water quality in Lebanon. It exposes the recent changes in standards as recommended by the government, especially the mandatory three sessions per week and ultrapure water. In addition, it analyses the cost-effectiveness of ultrapure water implementation in a low/middle-income country and demonstrates that the cost is lower than in high-income countries. Finally, this article summarizes the obstacles met and suggests a practical approach to maintain this high level of water treatment quality.

Keywords: haemodialysis, ultrapure water, public health reform, developing countries

Introduction

Patients undergoing chronic haemodialysis (HD) three times per week, four hours each, are exposed to a high volume of water between 360 and 576 litres weekly depending on their dialysate blood flow (500 to 800 mL/min). Therefore contamination of this water by microorganisms or toxic chemicals could be very harmful to the patient's health, and it becomes mandatory to achieve the highest level of purity of water coming into close contact with a patient's blood. Worldwide, the nephrology community is witnessing an increased use of high-flux membranes with or without haemodialfiltration (HDF) and consequently ultrapure water becomes a must with those treatment modalities (1). Many nephrologists, especially in Europe and Japan, believe that the ultimate goal to improve patient outcomes is the eventual global transition to the use of ultrapure fluids (2,3). In low- and middle-income countries, there are several published papers comparing the cost of different dialysis modalities, but data are lacking regarding their respective water quality (4,5).

Lebanon is an upper middle-income country with a total population estimated at 4.5 million in 2014 (6). The regulations concerning the HD water treatment system in Lebanon and agreement between each dialysis centre and the Lebanese Ministry of Public Health (MoPH), have not been amended for more than 20 years. On the contrary, worldwide guidelines concerning water purification for dialysis have evolved and have been continuously updated by the International Standards Organization (ISO) (7–10). Moreover, two problems emerged lately. First, the persistent inquiry by the Lebanese hospitals' union to increase dialysis reimbursement fees by the

MoPH; and second, the use of high-flux membranes in some Lebanese centres despite the absence of ultrapure water and endotoxins measurement. Knowing that endotoxins, when entering the patient's blood, can lead to pyrogenic reactions, septicemia and even death (8,11), improving water purity is a requisite.

Consequently, under those circumstances and in collaboration with the Lebanese Society of Nephrology and Hypertension, the Lebanese MoPH released in September 2014 a new decree (number 1/1690) calling for a progressive change in the HD water treatment system over a one-year period in order to implement ultrapure water in all dialysis facilities. Simultaneously, the MoPH raised the reimbursement of HD. This decree provided time for hospitals, institutions and dialysis providers to understand and assimilate the new standards in order to start adopting the new water treatment system and develop strategies to ensure long-term compliance. This report aims to expose the problems previously encountered regarding the water quality lately. It will also review the recent changes and rationale of the standards as recommended by the MoPH. It will evaluate as well the cost-effectiveness of ultrapure water implementation in a low/middle-income country, the obstacles met and the lessons learned to maintain this new water treatment system.

Dialysis in Lebanon

At the beginning of 2015, 70 dialysis facilities were well established in Lebanon, providing HD to 3350 Lebanese patients approximately. Among the 70 HD centres, 59 were located in private hospitals and 11 in public hospi-

tals. Around 150 patients were undergoing peritoneal dialysis (PD). Table 1 summarizes the distribution of the prevalent and incident rates of HD and PD patients as well of nephrologists. The incident and prevalent rates of ESRD in Lebanon are similar to many countries worldwide (12). However, there is a relatively low proportion of ESRD patients per nephrologist (27 patients).

The opening of a new dialysis centre requires prior approval of the MoPH. The latter imposes quality measures and does not allow or covers HD outside hospitals, making home HD very difficult. Each HD session cost is reimbursed totally by the MoPH, the National Social Security Fund (NSSF), the Army, the Internal Security Forces (ISF) or the Civil Servants Cooperative (CSC). Private insurances do not cover dialysis therapy in Lebanon and insured patients will be automatically covered by MoPH when they need dialysis.

The MoPH was covering in 2015 the dialysis of approximately 1600 patients per month, half of the Lebanese HD population. The average number of sessions of hemodialysis per patient per month was 11.5, since many centres in the south of Lebanon had a small proportion of patients undergoing dialysis only twice per week. Therefore, the total number of HD sessions reimbursed by the MoPH was around 221 000 annually.

Problems previously encountered regarding water quality in Lebanon: data collection 2012–2014.

As previously mentioned, the MoPH imposes quality measures that dialysis centres should follow and report monthly. Each centre sends to the MoPH on a monthly basis the type of filters used, the results of the dialysis fluid analysis for chemical contaminants, and the water culture. Endotoxin level was not mentioned in the previous agreement.

To examine this, data were retrospectively collected from each dialysis centre's report at the MoPH between June 2012 and June 2014. The results of 67 centres were as follows: concerning the culture results, one centre had 20 000 CFUs for two consecutive months, two centres had repetitive pseudomonas, 26 centres reported culture negative, and 26 centres reported 0 CFUs. Twelve 12 centres never sent any culture result.

Concerning the chemical analysis: only two centres sent a complete chemical analysis. Forty-four centres sent calcium and/or sodium and/or chloride tested in the local laboratory, and the majority of them were above the maximum level allowed. Forty-two centres sent the calcium level. Calcium was > 2 mg/l (>0.2 mg/dL) in 15 reports (5-58 mg/dL).

Only eight centres provided the MoPH with the Total Dissolved Solids (TDS) measurement result: five of the eight had a TDS ≥ 10 ppm (TDS reflects the performance of the reverse osmosis unit and should be < 10 ppm). Not a single report was signed by the nephrologist.

Four centres were using high-flux membranes. One centre was equipped with the ultrapure water, but none of these centres performed the endotoxin level monitoring. No reports were available about the symptomatology of patients in those centres that had bacterial and chemical contamination of the dialysis fluid.

The only plausible explanation of those results is the lack of involvement of the nephrologists in the monitoring of the water quality. Therefore, it is imperative that nephrologists realize they must have a good knowledge of their facility's water treatment system to ensure that purified water used in dialysis meets the standards for quality as recommended by ISO standards (13).

New recommendations by MoPH: ultrapure water

As a response to the inadequate water quality in several HD facilities, the MoPH decided to update the recommendations regarding water treatment system for HD, and follow very closely the execution of this policy and the regular monitoring of the water analysis. The decree released emphasized the use of ultrapure water in all Lebanese dialysis facilities. Ultrapure water is characterized by a bacteria level below 0.1 CFU/mL and endotoxin level below 0.03 EU/mL as recommended by the ISO (10).

The water treatment system

In order to secure ultrapure water, the MoPH made a proposal for the water treatment system based on ISO 26722:2014 (8) and made up of the following: pretreatment, reverse osmosis (RO), endotoxin-retentive filter and distribution to the machines.

Pretreatment cascade is similar to the older one and consists of preliminary filtration of the municipal drinking water with microfilters and sediment filters, softening, and filtration through activated carbon. The water softener exchanges Na+ ions for Ca++ and Mg++

Table 1 Incident and prevalent estimated rates of ESRD patients and nephrologists in Lebanon in 2015 per million population (pmp)

	Estimated absolute number in 2015	Average incidence between 2014 and 2015 (pmp)	Prevalence (pmp)
Nephrologists	132	1.5	29
HD patients	3350	187	744
PD patients	150	4	33
ESRD patients on dialysis	3500	191	777

as well as for other cations. Activated carbon removes chlorine and chloramine that are not removed by RO; one or two carbon beds are installed depending on the level of chloramine previously used to disinfect the municipal drinking water.

A double Reverse Osmosis (RO) unit (two ROs in series) is recommended, and endotoxin-retentive filter at locations downstream of RO is also recommended. The water distribution system is the piping system and configured in a loop with direct feed of the purified water from the RO pump to the dialysis unit and back to the RO. Chemical or heat disinfection of the water distribution system is recommended. Heat-resistant materials should be used in piping systems to be disinfected by hot water. Storage tanks should be avoided. One pyrogen filter on each dialysis machine is mandatory (two are necessary for online HDF).

Bacterial and chemical contaminants monitoring

Endotoxin, water culture, TDS and total chlorine should be sent monthly to the MoPH and a total chemical analysis once a year. It is recommended also to follow daily the TDS and total chlorine. The maximum levels allowed for toxic chemicals, fluid electrolytes and microbiological contaminants in dialysis water as recommended by the ISO (10) are summarized in Tables 2 and 3.

Nephrologists should not confuse chlorine with chloramine. Total chlorine is the sum of free and combined chlorine. Chlorine can exist in water as dissolved molecular chlorine, hypochlorous acid, and/or hypochlorite ion (free chlorine) or in chemically combined forms (combined chlorine). Where chloramine is used to disinfect water supplies it is usually the principal component of combined chlorine. There is no direct test for measuring combined chlorine, but it can be measured indirectly by measuring both total and free chlorine and calculating the difference.

Suggested sites of sampling for toxic chemicals, post-RO and for endotoxin test are the first and end point of the distribution loop. The presence of endotoxin is determined using the limulus amoebocyte lysate (LAL) method and is based on using a gel-clot or turbidimetric, colorimetric or fluorescent methods. The most sensitive is the kinetic chromogenic assay detecting very low concentrations of endotoxins. However, it is noteworthy to remember that extremely small fragments of lipopolysaccharides below 8000 Da are not detected by the LAL test and can still induce secretion of inflammatory cytokines (11). The only laboratory in Lebanon equipped to perform this test uses the chromogenic LAL endotoxin assay kit and can detect down to 0.01 EU/mL.

In accordance with the decree, new regulations concerning hemodialysis practice were released in order to improve the whole management of dialysis patients. Thus, all patients should undergo dialysis three times per week and each session should last four hours at least. Nephrologists are not allowed to work in more than one

Table 2 Maximum levels allowed for chemical contaminants, to be tested once per year

Chemical contaminant	Maximum recommended concentration (mg/l=ppm)
Lead	0.005
Aluminum	0.01
Nitrate (as N)	2
Total chlorine	0.1
Copper	0.1
Fluoride	0.2
Magnesium	4 (0.15 mmol/L)
Calcium	2 (0.05 mmol/L)
Potassium	8 (0.2 mmol/L)
Sodium	70 (3 mmol/L)

Table 3 Maximum allowable levels for TDS, Chlorine, Total viable microbial count (TVC) and Endotoxins, to be tested once per month

Parameter tested	Maximum allowable level in ultrapure water
TDS	10 ppm
Total Chlorine	0.1 mg/l
TVC	0.1 CFU/mL
Endotoxins	0.03 EU/mL

dialysis facility (each nephrologist is responsible for a maximum of 40 patients). For every four dialysis patients, there needs to be one registered nurse in each shift.

Dialyzer membranes, bloodlines and fistula needles should be FDA (Food and Drug Administration) approved or CE (European Conformity) certified and surfaces should be appropriately chosen accordingly to every patient's body surface. Bicarbonate concentrate should be supplied in a powder form. High-flux synthetic membranes should be used after the implementation of ultrapure water. A separate machine should be used for HBs Ag positive patients. The MoPH will reimburse the blood tests as indicated in Table 4.

Rationale for the new recommendations
Rationale for the water treatment system

Water treatment systems are designed to produce dialysis-quality water, but the types of components used can vary significantly according to the local water quality and the contaminants that must be removed (8). RO will remove more than 95% of chemicals and endotoxins and it should be equipped with online monitors that display TDS to measure its performance. We recommended double reverse osmosis to be placed in series to ensure a better quality of the water especially since, in some regions of Lebanon, the TDS of the municipal drinking water is very high. The other reason for a double RO system is to

Table 4 Minimum laboratory investigations required

Test	Frequency
CBC	Once per month
Urea (pre and post-dialysis)	
Creatinine	
Electrolytes	
Calcium	
Phosphate	
ASAT	
PTH	Every 4 months
Ferritin, TSAT	
HCV serology	
Ag Hbs, Anti-Hbs Ab	
Albumin	
Magnesium	
Alkaline phosphatase	
HIV serology	Once a year
Lipid panel	
PPD	
Chest XRay	
EKG	

encounter any possible pump failure due to a cut out by the functional pump and prevent inappropriate water quality delivery to the patients.

Endotoxin-retentive filters remove endotoxins and may be configured in a cross-flow mode or dead-end mode. Endotoxin retentive filters should be placed in dialysis water systems at locations downstream of RO and also in the dialysis fluid line as a final barrier (7). Bacteria attach to surfaces and aggregate in a biopolymer matrix to form biofilm. Due to inadequate disinfection protocols, membranes are exposed to persistent bacterial contamination and biofilm is allowed to form and grow (14). Biofilms should be avoided in HD water treatment systems by allowing a continuous flow of water in a loop without multiple branches or dead-end pipes with direct feed system. Storage tanks are not recommended but if used they must have a conical or bowl-shaped base and should drain from the lowest point of the base. An endotoxin-retentive filter should be installed distal to the storage tank (8). All those requirements are essential to reduce to a minimum the endotoxin level and ensure ultrapure water.

Rationale for the need of ultrapure water

Higher endotoxin levels in dialysis fluid may be related to increased morbidity and increased risk for all-cause mortality among HD patients. Correcting this parameter might improve the response to erythropoietin, the inflammatory markers and the outcome of hemodialysis patients (3,15,16). Ultrapure water use is mandatory when using high-flux membranes. In fact, high-flux membranes, with larger pores than low-flux membranes, allow convection and are prone to the passage of endotoxins from the dialysate to the patient's blood. Endotoxins are lipopolysaccharides with a molecular mass that ranges between 2000 to 20000 Da and thus cross the large pores

easily (1,11). In 2002, the European Best Practice Guidelines (named the European Renal Best Practice [ERBP] since 2008) for HD published new recommendations encouraging the use of synthetic high-flux membranes and ultrapure dialysis fluid as a goal for all patients and all modalities to delay long-term complications of HD therapy (17). A large randomized controlled study, the HEMO study, showed a benefit of high-flux membranes on survival when dialysis duration exceeded 3.7 years (18). In the membrane permeability outcome (MPO) study, a significantly higher survival rate for patient subgroups with a serum albumin below 4g/dL and for diabetic patients was observed when they were treated with high- compared with low-flux membranes (19).

Moreover, Kim et al. (20) have shown that patients without residual renal function dialyzed with high-flux membranes had a 60% less risk of death than those treated with the low-flux In Japan. A large cohort study showed that patients exposed to ≥ 0.1 EU/mL of endotoxin in dialysis fluid had a 28% higher risk of all-cause mortality than those exposed to <0.001 EU/mL (ultrapure endotoxin target level set by the JSDT for dialysis fluid) (3).

Finally, the reliability of any endotoxin level depends on a right sampling. Prior to sampling, the outlet system (sample port or connector) should be disinfected using 70% ethanol, with an exposure time of ≥ 30 s. Sample recipients should be sterile and endotoxin-free. The first sample of ≥ 20 mL should be discarded and a fresh sample should be taken using a new syringe. For ET quantification and bioassay, a sample volume of 5 mL each will suffice. Samples should be stored at 4°C for a maximum of 24 h (11).

Rationale for the laboratory investigations and haemodialysis schedule

Regarding the routine blood tests and the three sessions per week, the MoPH followed the latest KDIGO Clinical Practice guidelines for the treatment of anemia and CKD-MBD (21,22) and the European Best Practice Guideline (currently ERBP) (23), respectively.

New policy implementation

Ultrapure water implementation strategy and barriers

After the decree's release, MoPH organized a meeting to ask for feedback of all concerned parties, nephrologists, hospitals' administration and water systems' providers. Three main concerns were identified: the cost and feasibility of the new water system, the time needed for implementation in the whole country, and the acceptance of the nephrologists of this new responsibility.

Since all the dialysis centres in Lebanon are based in hospitals, the first barrier was the acceptance of the additional cost by the hospitals' union. They found the new system's cost high and the modification of the infrastructure difficult. But after long discussions

with the engineers it became clear that the new piping can be installed without modifying the building. After calculation of the number of sessions reimbursed for an average centre of 40 patients (Table 5) multiplied by the US$ 29 increase for each session, the payback period of the US$ 100 000 cost of the new water treatment system was estimated to be 6–7 months.

The other issue was that installation of a new water treatment system in all 70 facilities in Lebanon would take time. One year is not enough to establish ultrapure water in all centres knowing that there are only four dialysis providers with good experience in water treatment systems and that piping will be done at the end of the day after patients leave the dialysis facility. Therefore, the first step would be to ensure that all centres have signed the agreements concerning this project and would proceed with its execution in the near future. Second, the deadline of one year previously agreed by the MoPH would need to be extended for an additional year.

Finally, nephrologists' concerns have been addressed; a meeting between nephrologists, biomedical engineers and dialysis providers was held in June 2015 to spread awareness about the importance of the quality of water used in haemodialysis. This kind of meeting should take place on a more regular basis (probably annually till the whole country is provided with ultrapure water). Nephrologists need to know that the supplier of the water treatment system is responsible for assuring that the water produced meets the maximum allowable chemical contaminant levels required by ISO standards at installation. Beyond this qualification, it becomes the responsibility of the physician in charge of dialysis to monitor the system to ensure that the treatment devices maintain an acceptable level of purity of the water (8,13).

During and after the adoption of the ultrapure water in all Lebanese dialysis facilities, nephrologists must send the results of the endotoxin level and TDS to the MoPH on a monthly basis, and if they are not in the acceptable range, corrective measures should be applied.

Economic evaluation

The total cost of the new water treatment system

The goal of any healthcare delivery system is to improve the value of a treatment while keeping it cost effective. The cost of a total new water treatment system varies between US$ 60 000 and US$ 100 000 whether the disinfection is chemical or thermal respectively. Assuming that some centres would keep their old pre-treatment system that cost on average US$ 15 000, the additional installation of a double RO and a distribution loop with chemical or heat disinfection will cost only from US$ 45 000 to US$ 85 000.

The project of aiming to improve the water quality includes an increase in the reimbursement of each dialysis session by US$ 29, leading to a total of US$ 102 per session instead of US$ 73 as witnesses in the past (Table 5). The other paying parties (NSSF, Army) joined the MoPH in this new regulation. This raised the cost of HD treatment on the national level by ~US$ 15 000 000 for the year 2015. The annually cost of HD per patient was US$ 15 340 before the decree release. After its release, the annually cost per patient for HD reimbursed as a bundled fee by the MoPH, NSSF or Army rose to US$19 916. This bundled fee takes into account mainly the direct medical and non-medical costs. Direct medical costs include staffing costs, physician fees, costs of dialyzers and tubing, costs associated with radiology, laboratory and medications and capital costs of HD machines.

The direct non-medical costs include the building, the electricity and the water costs. It would be important to add that the annual reimbursed cost for PD per patient varies between US$ 14 240 and US$ 24 000 depending on the company providing the bags and the technique (CAPD or APD). Erythropoietin for PD patients is covered also by the MoPH and has been included in the above total amount. Laboratory (≥ US$ 1100 annually) and physician (US$ 200 to $600) fees for PD are not covered by the MoPH.

Table 5 Old and new reimbursed bundled fees to hospitals excluding physicians' fees (US$)

	Old* reimbursed fee per session	New** reimbursed fee per session	Old total amount reimbursed for 40 patients per facility per year (6240 sessions)	New total amount reimbursed for 40 patients per facility per year (6240 sessions)	Old total amount reimbursed for the 3500 patients in the country per year (546 000 sessions)	New total amount reimbursed for the 3500 patients in the country per year (546 000 sessions)
Bundled fee including medical and non-medical costs	$73	$73	$455 520	$455 520	$39 858 000	$39 858 000
Added amount to cover the new water system	N/A	$29	N/A	$180 960	N/A	$15 834 000
Total	$73	$102	$455 520	$636 480	$39 858 000	$55 692 000

*Old means before the decree release and the implementation of ultrapure water.
**New means after ultrapure water implementation.

Dialysis is known to be cost-effective worldwide. A study done in Japan on the cost-effectiveness of HD according to primary disease found that HD is a cost-effective intervention in elderly patients especially in diabetic patients (24). However, the cost varies significantly between high-income and low- and middle-income countries. According to the USRDS 2013 Annual Report, the annual per patient cost of HD in the United States of America is ~US$ 89 000 per year (12). This cost becomes highly variable when considering low to middle-income countries. It is also variable within one country category (HD cost per patient per year ranged from US$ 3424 to US$ 42 785, and PD from US$ 7974 to US$ 47 971) (4,5,25). In all cases the cost of dialysis per year is higher than the gross national product in those low to middle-income countries (25). Lebanon is an upper middle-income country, with a GNI per capita of US$ 10 030 according to the World Bank 2014 (6). However, the estimated dialysis costs in Lebanon (US$ 19 916 per patient per year), even with the higher quality of water, remain lower compared to other upper middle-income countries (e.g., Brazil, Chile, China, Malaysia, South Africa and Turkey) (25).

It is not enough to show that high-quality hemodialysis is less expensive in Lebanon; we need also to assess the cost-effectiveness of taking into account the per capita GNI. In public health, when comparing interventions, the incremental cost–effectiveness ratio (ICER) – i.e. the difference in costs divided by the difference in health effects – is often used (26). Dialysis is a life-sustaining therapy and patients who need it but do not get it will die. With this in mind, ICER of a dialysis treatment is calculated as its cost per quality-adjusted life-year (QALY) gained. Thus, the ICER of haemodialysis in Lebanon would be the ratio of the yearly cost (US$ 19 916) divided by one year of life gained. In an attempt to compare ICERs between two healthcare systems, the WHO's Choosing Interventions that are Cost-Effective (WHO-CHOICE) project suggested using the ratio between cost and per capita GNI, knowing that a ratio < 1 is highly cost-effective and a ratio < 3 is cost-effective (26). The ratio of cost-effectiveness of haemodialysis with the new water system would be US$ 19 916 divided by the Lebanese per capita GNI US$ 10 030, and calculated as 1.98 or ~2. According to this cost-effectiveness threshold, dialysis upgraded with ultrapure water in Lebanon remains cost-effective.

Future needs

One laboratory for endotoxin measurement is not enough for a whole country. More laboratories able to perform the test with a reduced cost need to be involved. Installation of heat disinfection in all facilities must be encouraged since it is the most practical and safest way for disinfection of the loop system with a high performance in preventing biofilms. We need observational studies comparing the era before and after ultrapure water implementation. Variables that should be assessed are mortality, quality of life and haemoglobin levels along with erythropoiesis-stimulating agents (ESAs) and iron doses used. Finally, we need, as a next step, to promote and put regulations for PD utilization in ESRD patients, since it appears to be more cost-effective than HD (assuming that HD and PD provide the same survival).

Conclusion

Providing ultrapure water for haemodialysis is a long process that involves many concerned parties and needs thorough economic assessment. From our experience, implementing ultrapure water for HD in upper middle-income countries, and recommending three sessions per week, is feasible and cost effective. It needs an initial evaluation of the community's needs and acceptance, strict regulations enforced by the country's government, and should be maintained by sustained efforts from nephrologists to keep dialysis water purity at its best level.

Utilisation de l'eau ultrapure en hémodialyse : vers une qualité supérieure au Liban

Résumé

La communauté de la néphrologie assiste, partout dans le monde, à l'essor de l'utilisation des membranes à haut débit et de l'eau ultrapure dans les unités d'hémodialyse. Dans les pays à revenu faible ou intermédiaire, les données concernant la qualité de l'eau employée dans les unités d'hémodialyse sont insuffisantes. Au Liban, le ministère de la Santé publique a publié un décret préconisant le changement progressif du système de traitement de l'eau utilisée dans les unités d'hémodialyse afin de généraliser l'emploi de l'eau ultrapure dans tous les établissements de dialyse. Le présent article fait état des problèmes de qualité de l'eau auparavant rencontrés au Liban. Il expose aussi les changements de normes récemment mis en œuvre conformément aux recommandations du gouvernement, et en particulier l'adoption des trois séances hebdomadaires obligatoires et de l'eau ultrapure. En outre, il analyse le rapport coût-efficacité de la mise en œuvre de l'eau ultrapure dans un pays à revenu faible/intermédiaire et démontre que son coût est inférieur à celui constaté dans les pays dont le revenu est élevé. Enfin, cet article résume les obstacles rencontrés et suggère une approche pratique visant à maintenir un niveau de qualité de traitement de l'eau aussi haut.

المياه فائقة النقاوة في غسيل الكلى: خطوة نحو جودة أفضل في لبنان

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الخلاصة

يشهد مجتمع طب الكلى على مستوى العالم زيادة في استخدام الأغشية عالية التدفق والمياه فائقة النقاوة في وحدات غسيل الكلى، ولا تتوافر بيانات كافية بشأن جودة المياه المستخدمة في غسيل الكلى في البلدان منخفضة ومتوسطة الدخل. وأصدرت وزارة الصحة العامة في لبنان مرسومًا يدعو إلى إحداث تغيير تدريجي في نظام معالجة المياه المستخدمة في غسيل الكلى بهدف تنفيذ استخدام المياه فائقة النقاوة في جميع مرافق غسيل الكلى. ويوضح هذا المقال المشكلات التي تمت مواجهتها سابقًا فيما يتعلق بجودة المياه في لبنان، حيث يعرض أحدث التغييرات التي أُدخلت على المعايير وفقًا لما أوصت به الحكومة، لا سيّما الثلاث جلسات الإجبارية الأسبوعية والمياه فائقة النقاوة. بالإضافة إلى ذلك، يحلل المقال المردودية العالية لاستخدام المياه فائقة النقاوة في البلدان منخفضة/ متوسطة الدخل، ويوضح أن تكلفتها أقل منها في البلدان المرتفعة الدخل. وأخيرًا، يُلخص المقال العوائق التي تمت مواجهتها، ويقترح نهجًا عمليًا للمحافظة على هذا المستوى العالي لجودة معالجة المياه.

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Tackling obesity in the Eastern Mediterranean Region

Introduction

The World Health Organization (WHO) Eastern Mediterranean Region has experienced epidemiological and nutritional transitions that have contributed to high rates of overweight and obesity within the Region. Half the Region's adult women (50.1%) and more than two in five men (43.8%) were overweight or obese in 2014 (*1*). The rates of overweight or obesity among the Region's children are higher than the global average of 7%, and in some countries more than 15% of children are affected (*1*). In many countries in the Region, more than half of adolescents were reported to be overweight or obese (*1*). The consequences for the health and well-being of the population are serious, and the social and economic case for investing in prevention of overweight and obesity is clear.

The WHO Regional Office for the Eastern Mediterranean supports the implementation of national strategies and action plans to address overweight and obesity. Countries have struggled, however, to implement multi-sectoral policies or interventions to tackle this major challenge. In 2016, therefore, a process was initiated to assess the situation, identify key challenges and gaps, and come up with a series of proposals on priority areas for action to prevent obesity.

A new regional framework for action on obesity prevention (2019–2023) (*2*) was endorsed by the 65th session of the Regional Committee for the Eastern Mediterranean in October 2018 (*3*). A regional meeting to present the regional framework and discuss the promotion of its implementation was held at the University of Sharjah, United Arab Emirates on 26 November 2018 (*4*). The meeting was held alongside the Seventh Regional Sehati Conference and was co-hosted by the Federal Ministry of Health of the United Arab Emirates, the University of Sharjah and the City of Sharjah, under the patronage or Her Highness Sheikha Jawaher Bint Mohammed Al Qasimi, wife of His Highness the Ruler of Sharjah and Chairperson of the Supreme Council for Family Affairs. The regional meeting was attended by 45 participants, including nutrition focal points of 12 countries, external experts and members of the WHO Secretariat.

The objectives of the meeting were to:

- encourage Member States to engage in active coordination for the implementation of the UN Decade on Nutrition (*5*), aiming to identify solutions and good practices to tackle obesity;

- share policies, programmes and plans to address overweight and obesity; and

- launch the regional framework for action on obesity prevention and a new regional report on implementation of policies on restricting marketing of unhealthy foods to children.

Summary of discussions

The 10 recommended areas for action in four domains (regulatory action, prevention, obesity management and treatment, and surveillance) of the new regional framework were presented to participants. There is substantial and growing evidence to support these recommendations and lessons to be drawn from the experience of implementing countries, both within the Region and elsewhere. Presentations were made describing experiences in implementing national obesity strategies, taxing soft drinks, restricting marketing of unhealthy food to children, front-of-pack nutrition labelling, and food product reformulation in European countries.

Countries were made clear on what needs to be done to tackle obesity, but they would like more guidance and support on how to implement and scale-up these actions. There was a call to draw on the lessons from experience with tobacco control and the approaches applied through the WHO Framework Convention on Tobacco Control (FCTC) (*6*).

The Organization has a number of initiatives underway, to support countries in these efforts. For example: new global guiding principles and a regional technical roadmap for implementation of front-of-pack nutrition labelling; step-by-step guidance on implementation of the WHO set of recommendations on marketing of foods and non-alcoholic beverages to children in the Region; establishment of a regional nutrition network to facilitate exchange and sharing of technical support and best practice; and development of a new 10-year regional nutrition strategy to guide efforts to tackle all forms of malnutrition, including overweight and obesity, within the framework of the UN Decade of Action on Nutrition.

The meeting concluded with signing the Sharjah Declaration on Obesity Prevention, in which signatories renewed their commitment to tackling obesity, through

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the new regional framework on obesity prevention, and accelerating progress towards achieving the targets of the Sustainable Development Goals to reduce premature mortality from non-communicable diseases by one third by 2030 and end all forms of malnutrition by 2030.

Recommendations

1. Facilitating sharing of knowledge, experience and good practice. This could include establishing platforms/websites/social media groups and e-learning tools for dissemination and exchange, organization of country field visits, and other actions to foster intercountry collaboration.

2. Providing technical guidance on a range of issues, including: how to tackle cross-border marketing; standardizing portion sizes; designing taxes for high fat or sugar foods and meals; training materials for

health professionals; infant and young child feeding resources; and prioritizing nutrition-related research needs.

3. Supporting advocacy and building political will by, for example, generating economic data to make the investment case for action, producing "score cards" to assess and compare country progress, organizing high-level meetings and producing advocacy materials to help decision-makers respond to opposition from vested interests.

4. Supporting data collection for surveillance and monitoring progress, including for national nutrition surveys, and providing an implementation framework for monitoring and evaluating interventions and guidance on data collection at the subnational level.

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